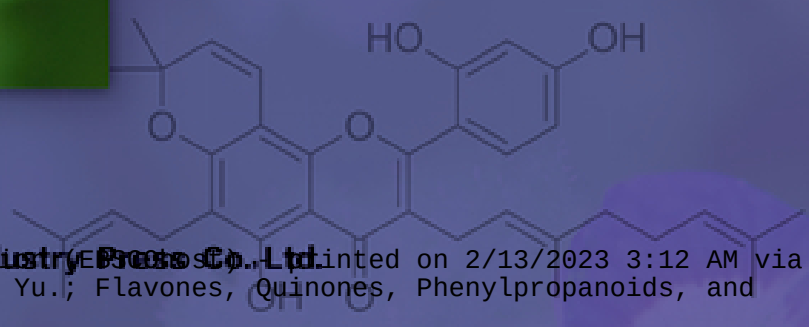
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HANDBOOK OF NATURAL PRODUCTS

VOLUME 3: FLAVONES, QUINONES, PHENYLPROPANOIDS, AND STILBENES

Edited by Hailin Qin, Dequan Yu





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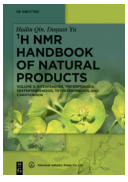
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Hailin Qin, Dequan Yu

^{1}H NMR Handbook of Natural Products

Volume 3: Flavones, Quinones, Phenylpropanoids, and Stilbenes

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4 Flavonoids

4.1 Flavones

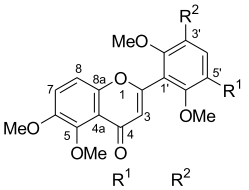
4.1.1 Flavone-type flavones

Table 4-1-1: Cos, MFs, and TSs of flavone-type flavones **4-1-1**~**4-1-33**.

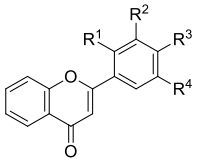
No.	Compounds	MFs	Test solvents	References
4-1-1	5,6,2′,3′,5′,6′-hexamethoxyflavone	$C_{21}H_{22}O_8$	$CDCl_3$	[1]
4-1-2	5,6,2′,3′,6′-pentamethoxyflavone	$C_{20}H_{20}O_7$	$CDCl_3$	[1]
4-1-3	5,6,2′,6′-tetramethoxyflavone	$C_{19}H_{18}O_6$	$CDCl_3$	[2]
4-1-4	3′-hydroxy-4′,5′-dimethoxyflavone	$C_{17}H_{14}O_5$	$CDCl_3$	[2]
4-1-5	2′-hydroxyflavone	$C_{15}H_{10}O_3$	$CDCl_3$	[2]
4-1-6	3′,4′-dimethoxyflavone	$C_{17}H_{14}O_4$	$CDCl_3$	[2]
4-1-7	3′,4′,5′-trimethoxyflavone	$C_{18}H_{16}O_5$	$CDCl_3$	[2]
4-1-8	3′-methoxy-4′,5′-methylenedioxyflavone	$C_{17}H_{12}O_5$	$CDCl_3$	[2]
4-1-9	2′,5′-dimethoxyflavone	$C_{17}H_{14}O_4$	$CDCl_3$	[2]
4-1-10	2′-methoxyflavone	$C_{16}H_{12}O_3$	$CDCl_3$	[2]
4-1-11	3′-methoxyflavone	$C_{16}H_{12}O_3$	$CDCl_3$	[2]
4-1-12	7,8-dimethoxy-5-hydroxyflavone	$C_{17}H_{14}O_5$	$CDCl_3$	[3]
4-1-13	5-hydroxy-7,8,2′,3′-tetramethoxyflavone	$C_{19}H_{18}O_7$	$CDCl_3$	[3]
4-1-14	5-hydroxy-7,8,2′,5′-tetramethoxyflavone	$C_{19}H_{18}O_7$	$CDCl_3$	[4]
4-1-15	5-hydroxy-7,2′,3′-trimethoxyflavone	$C_{18}H_{16}O_6$	$CDCl_3$	[5]
4-1-16	7,2′,3′,4′-tetramethoxyflavone	$C_{19}H_{18}O_6$	$CDCl_3$	[6]
4-1-17	7,4′-dimethoxy-3′-hydroxyflavone	$C_{17}H_{14}O_5$	DMSO-d_6	[6]
4-1-18	5,3′,5′-trihydroxy-7,4′-dimethoxyflavone	$C_{17}H_{14}O_7$	DMSO-d_6	[7]
4-1-19	7-*O*-methyldihydrowogonin	$C_{17}H_{14}O_5$	DMSO-d_6	[8]
4-1-20	5,2′-dihydroxy-7,8-dimethoxyflavone	$C_{17}H_{14}O_6$	DMSO-d_6	[8]
4-1-21	anadanthoflavone	$C_{19}H_{14}O_7$	C_5D_5N	[9]
4-1-22	5,8-dihydroxy-6,7-dimethoxyflavone	$C_{17}H_{14}O_6$	$CDCl_3$	[10]
			DMSO-d_6	[10]
4-1-23	5,8-dihydroxy-6,7,4′-trimethoxyflavone	$C_{18}H_{16}O_7$	$CDCl_3$	[10]
			DMSO-d_6	[10]
4-1-24	5,8-dihydroxy-6,7,3′,4′,5′-pentamethoxyflavone	$C_{20}H_{20}O_9$	$CDCl_3$	[10]
			DMSO-d_6	[10]
4-1-25	8-hydroxy-5,6,7-trimethoxyflavone	$C_{18}H_{16}O_6$	$CDCl_3$	[10]
4-1-26	8-hydroxy-5,6,7,4′-tetramethoxyflavone	$C_{19}H_{18}O_7$	$CDCl_3$	[10]
4-1-27	8-hydroxy-5,6,7,3′,4′,5′-hexamethoxyflavone	$C_{21}H_{22}O_9$	$CDCl_3$	[10]
4-1-28	5,6-dihydroxy-7,8-dimethoxyflavone	$C_{17}H_{14}O_6$	$CDCl_3$	[10]
			DMSO-d_6	[10]
4-1-29	5,6-dihydroxy-7,8,4′-trimethoxyflavone	$C_{18}H_{16}O_7$	$CDCl_3$	[10]
			DMSO-d_6	[10]
4-1-30	5,6-dihydroxy-7,8,3′,4′,5′-pentamethoxyflavone	$C_{20}H_{20}O_9$	$CDCl_3$	[10]
			DMSO-d_6	[10]
4-1-31	6-hydroxy-5,7,8-trimethoxyflavone	$C_{18}H_{16}O_6$	$CDCl_3$	[10]
4-1-32	6-hydroxy-5,7,8,4′-tetramethoxyflavone	$C_{19}H_{18}O_7$	$CDCl_3$	[10]
4-1-33	6-hydroxy-5,7,8,3′,4′,5′-hexamethoxyflavone	$C_{21}H_{22}O_9$	$CDCl_3$	[10]

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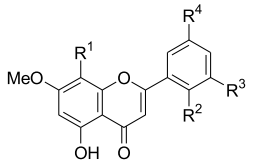
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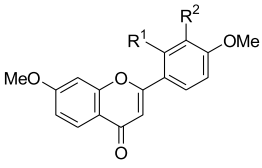
	R^1	R^2
4-1-1	OMe	OMe
4-1-2	H	OMe
4-1-3	H	H



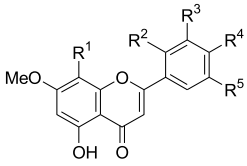
	R^1	R^2	R^3	R^4
4-1-4	H	OH	OMe	OMe
4-1-5	OH	H	H	H
4-1-6	H	OMe	OMe	H
4-1-7	H	OMe	OMe	OMe
4-1-8	H	OMe	OCH_2O	
4-1-9	OMe	H	H	OMe
4-1-10	OMe	H	H	H
4-1-11	H	OMe	H	H



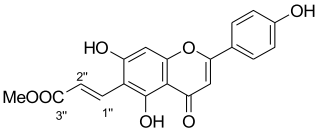
	R^1	R^2	R^3	R^4
4-1-12	OMe	H	H	H
4-1-13	OMe	OMe	OMe	H
4-1-14	OMe	OMe	H	OMe
4-1-15	H	OMe	OMe	H



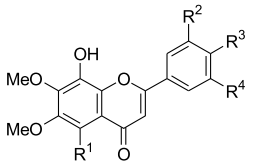
	R^1	R^2
4-1-16	OMe	OMe
4-1-17	H	OH



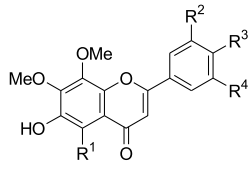
	R^1	R^2	R^3	R^4	R^5
4-1-18	H	H	OH	OMe	OH
4-1-19	OMe	H	H	H	H
4-1-20	OMe	OH	H	H	H



4-1-21



	R^1	R^2	R^3	R^4
4-1-22	OH	H	H	H
4-1-23	OH	H	OMe	H
4-1-24	OH	OMe	OMe	OMe
4-1-25	OMe	H	H	H
4-1-26	OMe	H	OMe	H
4-1-27	OMe	OMe	OMe	OMe



	R^1	R^2	R^3	R^4
4-1-28	OH	H	H	H
4-1-29	OH	H	OMe	H
4-1-30	OH	OMe	OMe	OMe
4-1-31	OMe	H	H	H
4-1-32	OMe	H	OMe	H
4-1-33	OMe	OMe	OMe	OMe

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Table 4-1-2: ^{1}H NMR spectroscopic data of flavone-type flavones **4-1-1**~**4-1-5**.

H	4-1-1	4-1-2	4-1-3	4-1-4	4-1-5
3	6.29 s	6.27 s	6.26 s	6.76 s	7.26 s
5	3.98 s(OMe)	3.97 s(OMe)	3.98 s(OMe)	8.23 dd(8.1, 1.5)	8.51 dd(8.1, 1.6)
6	3.91 s(OMe)	3.91 s(OMe)	3.92 s(OMe)	7.43 ddd(8.1, 7.1, 1.1)	7.48 ddd(8.1, 7.1, 1.0)
7	7.26 or 7.17 d(9.0)	7.26 or 7.18 d(9.0)	7.28 d(9.2)	7.71 ddd(8.2, 7.1, 1.5)	7.76 ddd(8.5, 7.1, 1.6)
8	7.26 or 7.17 d(9.0)	7.26 or 7.18 d(9.0)	7.20 d(9.2)	7.57 dd(8.2, 1.1)	7.62 ddd(8.5, 1.0, 0.3)
2′	3.75 s(OMe)	3.83(OMe)	3.79 s(OMe)	7.24 d(2.4)	10.79 s(OH)
3′	3.88 s(OMe)	3.85(OMe)	6.63 d(8.4)	5.99 br s(OH)	7.28 dd(8.5, 1.1)
4′	6.67 s	6.98 d(9.0)	7.39 t(8.4)	4.00 s(OMe)	7.44 ddd(8.5, 7.2, 1.7)
5′	3.88 s(OMe)	6.65 d(9.0)	6.63 d(8.4)	3.96 s(OMe)	7.04 ddd(8.0, 7.2, 1.1)
6′	3.75 s(OMe)	3.73(OMe)	3.79 s(OMe)	7.01 d(2.4)	8.00 dd(8.0, 1.7)

Table 4-1-3: ^{1}H NMR spectroscopic data of flavone-type flavones **4-1-6**~**4-1-10**.

H	4-1-6	4-1-7	4-1-8	4-1-9	4-1-10
3	6.87 s	6.79 s	6.71 s	7.17 s	7.14 s
5	8.24 ddd(8.1, 1.6, 0.4)	8.24 ddd(8.1, 1.8, 0.3)	8.22 ddd(7.9 1.7, 0.3)	8.23 dd(8.0,1.7)	8.22 ddd(7.9, 1.7, 0.4)
6	7.43 ddd(8.1, 7.1, 1.1)	7.44 ddd(8.1, 7.2, 1.2)	7.42 ddd(7.9, 7.1, 1.1)	7.41 ddd(8.0, 7.1, 1.1)	7.39 ddd(7.9, 7.1, 1.1)
7	7.70 ddd(8.4, 7.1, 1.6)	7.72 ddd(8.4, 7.2, 1.8)	7.69 ddd(8.5, 7.1, 1.7)	7.68 ddd(8.6, 7.1, 1.7)	7.66 ddd(8.5, 7.0, 1.7)
8	7.58 ddd(8.4, 1.1, 0.4)	7.65 ddd(8.4, 1.2, 0.3)	7.55 ddd(8.5, 1.1, 0.3)	7.53 dd(8.6, 1.7)	7.51 ddd(8.5, 1.1, 0.4)
2′	7.40 d(2.4)	7.14 s	7.11 d(1.6)	3.90 s(OMe)	3.92 s(OMe)
3′	3.97 s(OMe)	3.97 s(OMe)	4.00 s(OMe)	6.98 d(9.1)	7.03 dd(8.5, 1.1)
4′	3.99 s(OMe)	3.94 s(OMe)		7.04 dd(9.1, 2.9)	7.46 ddd(8.4, 7.4, 1.7)
5′	7.00 d(8.4)	3.97 s(OMe)		3.86 s(OMe)	7.09 ddd(7.8, 7.4, 1.1)
6′	7.58 dd(8.4, 2.4)	7.14 s	7.14 d(1.6)	7.46 d(2.9)	7.89 d(7.8, 1.7)
OCH_2O			6.09 s		

Table 4-1-4: ^{1}H NMR spectroscopic data of flavone-type flavones **4-1-11**~**4-1-15**.

H	4-1-11	4-1-12	4-1-13	4-1-14	4-1-15
3	6.83 s	6.66 s	6.89 s	7.06 s	6.98 s
5	8.24 dd(7.9, 1.4)	12.55 s(OH)		12.62 s(OH)	12.82 s(OH)
6	7.43 dd(7.9, 7.0)	6.43 s	6.42 s	6.40 s	6.36 d(2.2)

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Table 4-1-4 (continued)

H	4-1-11	4-1-12	4-1-13	4-1-14	4-1-15
7	7.71 ddd(8.4, 7.0, 1.4)			3.92 s(OMe)	3.89 s(OMe)
8	7.58 d(8.4)			3.90 s(OMe)	6.44 d(2.2)
2′	7.45 d(2.2)	7.93 dd(2.2, 7.4)		3.88 s(OMe)	3.92 s(OMe)
3′	3.90 s(OMe)	7.7~7.4 m		6.96 d(9.0)	3.86 s(OMe)
4′	7.08 dd(8.2, 2.2)	7.7~7.4 m	7.06 dd(2.4, 8.1)	7.01 dd(9.0, 3.0)	7.07 dd(8.1, 1.5)
5′	7.44 dd(8.2, 7.8)	7.7~7.4 m	7.19 t(8.1)	3.83 s(OMe)	7.21 dd(8.1, 7.9)
6′	7.52 br d(7.8)	7.93 dd(2.2, 7.4)	7.42 dd(2.4, 8.1)	7.51 d(3.1)	7.33 dd(7.9, 1.5)
OMe		3.95 s	3.90 s, 3.92 s		
		3.95 s	3.94 s①		

① Typographic error exists in the literature, giving one less data of methoxyl.

Table 4-1-5: ^{1}H NMR spectroscopic data of flavone-type flavones **4-1-16**~**4-1-20**.

H	4-1-16	4-1-17	4-1-18	4-1-19	4-1-20
3	6.92 s	6.70 s	6.66 s	6.68 s	7.11 s
5	8.11 d(8.8)	7.89 d(8.9)	12.83 s(OH)	12.60 s(OH)	12.71 s(OH)
6	6.94 dd(8.8, 2.3)	7.03 m	6.67 d(2.1)	6.44 s	6.60 s
7	3.95 s(OMe)	3.88 s(OMe)	3.83 s(OMe)	3.96 s(OMe)	3.92 s(OMe)
8	6.88 d(2.3)	7.21 d(1.5)	6.33 d(2.1)	3.95 s(OMe)	3.82 s(OMe)
2′	3.93 s(OMe)	7.43 d(1.5)	6.97 s	7.95 dd(2.2, 7.4)	10.92 s(OH)
3′	3.92 s(OMe)	9.44 s(OH)	9.59 s(OH)	7.7~7.4 m	7.06 m
4′	3.89 s(OMe)	3.84 s(OMe)	3.75 s(OMe)	7.7~7.4 m	7.42 ddd(1.5, 7.3, 8.1)
5′	6.77 d(8.8)	7.03 m	9.59 s(OH)	7.7~7.4 m	7.06 m
6′	7.50 d(8.8)	7.51 dd(8.9, 1.5)	6.97 s	7.95 dd(2.2, 7.4)	7.88 dd(1.5, 8.1)

Table 4-1-6: ^{1}H NMR spectroscopic data of flavone-type flavones **4-1-21**~**4-1-23**.

H	4-1-21	4-1-22($CDCl_3$)	4-1-22(DMSO-d_6)	4-1-23($CDCl_3$)	4-1-23(DMSO-d_6)
3	6.92 s	6.68 s	7.04 s	6.58 s	6.93 s
5		12.24 br s(OH)	12.30 s(OH)	12.34 s(OH)	12.41 s(OH)
6		3.98 s(OMe)	3.84 s(OMe)	3.98 s(OMe)	3.87 s(OMe)
7		4.15 s(OMe)	3.95 s(OMe)	4.14 s(OMe)	3.95 s(OMe)
8	6.77 s				
2′, 6′	7.86 d(8.6)	7.92~7.97 m	8.17~8.19 m	7.91 d(8.8)	8.14 d(8.8)
3′, 5′	7.16 d(8.6)	7.51~7.58 m	7.56~7.64 m	7.02 d(8.8)	7.14 d(8.8)
4′		7.51~7.58 m	7.56~7.64 m	3.89 s(OMe)	3.83 s(OMe)
1″	8.86 d(16.1)				
2″	7.66 d(16.1)				
OMe	3.76 s				

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Table 4-1-7: ^{1}H NMR spectroscopic data of flavone-type flavones **4-1-24**~**4-1-27**.

H	4-1-24($CDCl_3$)	4-1-24(DMSO-d_6)	4-1-25	4-1-26	4-1-27
3	6.61 s	7.14 s	6.82 s	6.65 s	6.62 s
5		12.33 s(OH)	3.93 s(OMe)	3.92 s(OMe)	3.99 s(OMe)
6	3.98 s(OMe)	3.83 s(OMe)	3.99 s(OMe)	3.98 s(OMe)	3.93 s(OMe)
7	4.14 s(OMe)	3.95 s(OMe)	4.13 s(OMe)	4.12 s(OMe)	4.12 s(OMe)
2′, 6′	7.17 s	7.45 s	7.94~7.96 m	7.89 d(8.8)	7.15 s
3′, 5′	3.96 s(OMe)	3.91 s(OMe)	7.50~7.54 m	7.02 d(8.8)	3.95 s(OMe)
4′	3.93 s(OMe)	3.76 s(OMe)	7.50~7.54 m	3.89 s(OMe)	3.92 s(OMe)

Table 4-1-8: ^{1}H NMR spectroscopic data of flavone-type flavones **4-1-28** and **4-1-29**.

H	4-1-28($CDCl_3$)	4-1-28(DMSO-d_6)	4-1-29($CDCl_3$)	4-1-29(DMSO-d_6)
3	6.70 s	7.04 s	6.61 s	6.93 s
5		12.37 s(OH)		12.48 s(OH)
7	4.15 s(OMe)	3.97 s(OMe)	4.14 s(OMe)	3.96 s(OMe)
8	4.00 s(OMe)	3.93 s(OMe)	4.00 s(OMe)	3.92 s(OMe)
2′, 6′	7.93~7.96 m	8.08~8.10 m	7.90 d(8.8)	8.05 d(8.8)
3′, 5′	7.52~7.59 m	7.60~7.65 m	7.04 d(8.8)	7.16 d(8.8)
4′	7.52~7.59 m	7.60~7.65 m	3.90 s(OMe)	3.87 s(OMe)

Table 4-1-9: ^{1}H NMR spectroscopic data of flavone-type flavones **4-1-30**~**4-1-33**.

H	4-1-30($CDCl_3$)	4-1-30(DMSO-d_6)	4-1-31	4-1-32	4-1-33
3	6.64 s	7.15 s	6.86 s	6.62 s	6.80 s
5		12.37 s(OH)	4.00 s(OMe)	4.00 s(OMe)	4.00 s(OMe)
7	4.15 s(OMe)	3.97 s(OMe)	4.16 s(OMe)	4.14 s(OMe)	4.16 s(OMe)
8	4.00 s(OMe)	3.95 s(OMe)	4.05 s(OMe)	4.04 s(OMe)	4.05 s(OMe)
2′, 6′	7.17 s	7.37 s	7.94~7.96 m	7.88 d(8.8)	7.18 s
3′, 5′	3.96 s(OMe)	3.91 s(OMe)	7.52~7.55 m	7.03 d(8.8)	3.96 s(OMe)
4′	3.94 s(OMe)	3.77 s(OMe)	7.52~7.55 m	3.89 s(OMe)	3.94 s(OMe)

Table 4-1-10: Cos, MFs, and TSs of flavone-type flavones **4-1-34**~**4-1-47**.

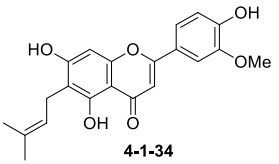
No.	Compounds	MFs	Test solvents	References
4-1-34	cannflavin B	$C_{21}H_{20}O_6$	CD_3COCD_3	[11]
4-1-35	dinklagin C	$C_{20}H_{18}O_6$	CD_3OD	[12]
4-1-36	artoindonesianin Q	$C_{22}H_{22}O_7$	CD_3COCD_3	[13]
4-1-37	artoindonesianin R	$C_{22}H_{22}O_7$	CD_3COCD_3	[13]
4-1-38	8-geranyl-3′,4′,7-trihydroxyflavone	$C_{25}H_{26}O_5$	$CDCl_3$-CD_3OD (10:1)	[14]

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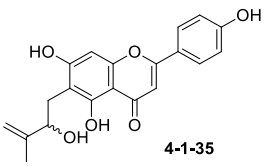
Table 4-1-10 (continued)

No.	Compounds	MFs	Test solvents	References
4-1-39	6,5′-diprenylluteolin	$C_{25}H_{26}O_6$	CD_3COCD_3	[15]
4-1-40	artochamin D	$C_{26}H_{28}O_7$	CD_3COCD_3	[16]
4-1-41	artocarpin	$C_{26}H_{28}O_6$	CD_3COCD_3	[16]
4-1-42	breviflavone A	$C_{25}H_{26}O_7$	CD_3OD	[17]
4-1-43	artelasticinol①	$C_{26}H_{28}O_7$	$CDCl_3$	[18]
4-1-44	dorsilurin A	$C_{30}H_{34}O_6$	$CDCl_3$	[19]
4-1-45	artelasticin	$C_{30}H_{34}O_6$	$CDCl_3$	[20]
4-1-46	dorsilurin D	$C_{30}H_{34}O_7$	$CDCl_3$	[21]
4-1-47	artocommunol CD	$C_{30}H_{34}O_6$	CD_3COCD_3	[22]

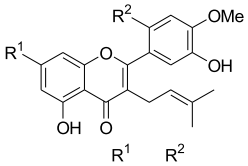
① There is structural error in the literature. Based on the NMR and MS data, there is not hydroxyl substitution on C-5′.



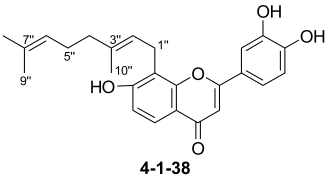
4-1-34



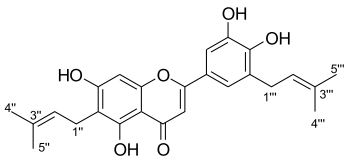
4-1-35



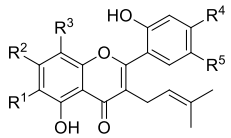
	R^1	R^2
4-1-36	OMe	OH
4-1-37	OH	OMe



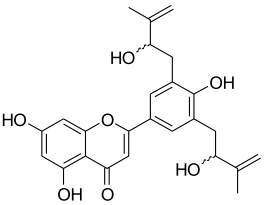
4-1-38



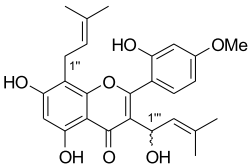
4-1-39



	R^1	R^2	R^3	R^4	R^5
4-1-40	H	OH	Prenyl	OMe	OH
4-1-41	Prenyl	OMe	H	OH	H

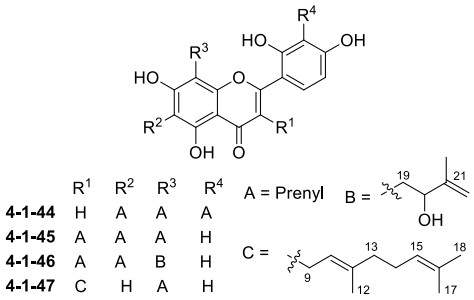


4-1-42



4-1-43

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	R^1	R^2	R^3	R^4
4-1-44	H	A	A	A
4-1-45	A	A	A	H
4-1-46	A	A	B	H
4-1-47	C	H	A	H

Table 4-1-11: ^{1}H NMR spectroscopic data of flavone-type flavones **4-1-34**~**4-1-38**.

H	4-1-34	4-1-35	4-1-36	4-1-37	4-1-38
3	6.57 s	6.57 s			6.71 s
5	13.24 s(OH)		13.10 s(OH)	13.13 s(OH)	7.49 d(8.4)
6			6.29 d(2.3)	6.24 d(2.1)	6.66 d(8.4)
7			3.88 s(OMe)	9.67 s(OH)	
8	6.65 s	6.48 s	6.45 d(2.3)	6.32 d(2.1)	
2′	7.55 d(2.1)	7.84 dd(1.0, 8.8)	8.29 s(OH)	3.96 s(OMe)	7.39 d(2.2)
3′	3.96 s(OMe)	6.93 dd(1.0, 8.8)	6.67 s	6.88 s	
4′			3.87 s(OMe)	3.81 s(OMe)	
5′	6.95 d(8.2)	6.93 dd(1.0, 8.8)	7.41 s(OH)	7.60 s(OH)	6.90 d(8.3)
6′	7.54 dd(8.2, 2.1)	7.84 dd(1.0, 8.8)	6.84 s	6.89 s	7.45 dd(8.3, 2.2)
1″	3.30 d(7.0)	2.89 dd(7.3, 13.6) 3.02 dd(5.8, 13.6)	3.13 br d(7.1)	3.03 br d(7.0)	3.54 d(7.3)
2″	5.23 br t(7.0)	4.41 t(6.5)	5.13 t(7.1, 1.4)	5.08 t(7.0, 1.4)	5.38 td(7.3, 1.2)
4″	1.60 s	4.73 br s, 4.81 br s	1.57 br d(1.4)	1.57 br d(1.4)	1.99 m
5″	1.78 s	1.85 s	1.45 br d(1.4)	1.41 br d(1.4)	2.01 m
6″					5.05 td(6.7, 1.4)
8″					1.60 s
9″					1.53 s
10″					1.87 s

Table 4-1-12: ^{1}H NMR spectroscopic data of flavone-type flavones **4-1-39**~**4-1-43**.

H	4-1-39	4-1-40	4-1-41	4-1-42	4-1-43
3	6.53 s			6.52 s	
5	13.31 s(OH)	13.08 s(OH)	13.97 s(OH)		12.78 br s(OH)
6		6.32 s		6.15 d(2.0)	6.32 s
7		8.63 br s(OH)	3.96 s(OMe)		
8	6.56 s		6.56 s	6.40 d(2.0)	

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Table 4-1-12 (continued)

H	4-1-39	4-1-40	4-1-41	4-1-42	4-1-43
2′	7.37 d(2.1)	8.63 br s(OH)	8.84 s(OH)	7.59 s	
3′		6.71 s	6.57 d(1.7)		6.48 d(2.4)
4′		3.76 s(OMe)	8.84 s(OH)		3.84 s(OMe)
5′		8.63 br s(OH)	6.53 dd(1.7, 8.4)		6.61 dd(8.8, 2.4)
6′	7.38 d(2.1)	6.91 s	7.22 d(8.4)	7.59 s	7.66 d(8.8)
1″	3.35 d(7.1)	3.34 br d(7.3)	6.60 br d(16.4)	2.94 m	3.57 d(6.4)
2″	5.28 m	5.18 br t(7.3)	6.72 dd(7.0, 16.4)	4.37 ddd(4.0, 4.0, 3.4)	5.30 t(6.4)
3″			2.43 br dq(6.7, 7.0)		
4″	1.78 br s	1.59 br s	1.08 d(6.7)	4.92 d(2.5)	1.76 s
				4.80 d(2.5)	
5″	1.65 d(0.9)	1.57 br s	1.08 d(6.7)	1.80 s	1.87 s
1‴	3.42 d(7.3)	3.05 br d(7.0)	3.12 br d(7.0)	2.94 m	6.27 d(9.2)
2‴	5.40 m	5.10 br t(7.0)	5.12 br t(7.0)	4.37 ddd(4.0, 4.0, 3.4)	5.45 d(9.2)
4‴	1.76 br s	1.57 br s	1.57 br s	4.92 d(2.5)	1.70 s
				4.80 d(2.5)	
5‴	1.75 d(1.1)	1.42 br s	1.43 br s	1.80 s	1.98 s

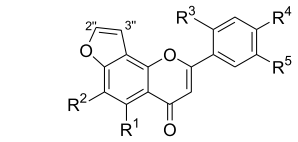
Table 4-1-13: ^{1}H NMR spectroscopic data of flavone-type flavones **4-1-44**~**4-1-47**.

H	4-1-44	4-1-45	4-1-46	4-1-47
3	6.53 s			
6				6.31 s
2′	7.16 d(8.2)			
3′	6.51 d(8.2)	6.52 s	6.50 br d(8.5)	6.54 d(2.0)
5′		6.49 dd(8.2, 2.2)	6.50 br d(8.5)	6.47 dd(8.0, 2.0)
6′		7.12 d(8.2)	7.16 d(8.5)	7.17 d(8.0)
10	5.16 m	5.14 m	5.13 m	5.10 m
15		5.14 m	5.13 m	5.00 m
13				1.87 m
14				1.96 m
20		5.14 m	4.37 d(8.0)	5.20 m
22			4.87 s, 4.99 s	
Ar-CH_2	3.40 d(4H, 6.9)	3.37 d(4H, 6.8)	2.85 dd(14.6, 8.0, H-11)	3.11 d(7.2, H-9)
	3.14 d(2H, 6.5)	3.12 d(2H, 6.5)	3.14 d(6.4, H-21)	3.35 d(7.2, H-19)
			3.40 d(6.8, H-16)	
Olefinic Methyl	1.83 s, 1.75 s	1.79 s, 1.71 s	1.47 s, 1.61 s	1.41 s(H-18)
	1.69 s, 1.60 s	1.65 s, 1.65 s	1.63 s, 1.65 s	1.50 s(H-17)
	1.68 s, 1.41 s	1.54 s, 1.36 s	1.86 s	1.55 s(H-22,23)
				1.57 s(H-12)
OH	13.03 br s(5-OH)	13.06 s(5-OH)	13.02 br s(5-OH)	13.05 s(5-OH)
	6.38 br s	6.35 br s	3.10 s, 9.15 br s	

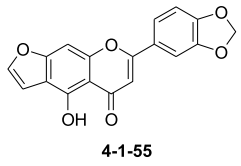
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Table 4-1-14: Cos, MFs, and TSs of flavone-type flavones **4-1-48**~**4-1-58**.

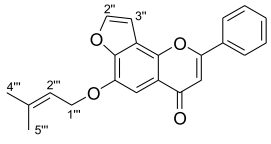
No.	Compounds	MFs	Test solvents	References
4-1-48	millettocalyxin C	$C_{19}H_{14}O_5$	$CDCl_3$	[23]
4-1-49	pongol methyl ether	$C_{18}H_{12}O_4$	$CDCl_3$	[23]
4-1-50	methylenedioxy-(3′,4′)-5,6-dimethoxyfurano-(7,8:2″,3″)-flavone	$C_{20}H_{14}O_7$	$CDCl_3$	[24]
4-1-51	[2″,3″:7,8]furanoflavone	$C_{17}H_{10}O_3$	$CDCl_3$	[25]
4-1-52	3′,4′-dimethylpyrano[2″,3″:7,8]furanoflavone	$C_{18}H_{10}O_5$	$CDCl_3$	[25]
4-1-53	6, 3′-dimethoxy-[2″,3″:7,8]furanoflavone	$C_{19}H_{14}O_5$	$CDCl_3$	[26]
4-1-54	2′-methoxy-4′,5′-methylenedioxyfurano-[7,8:4″,5″]-flavone	$C_{19}H_{12}O_6$	$CDCl_3$	[27]
4-1-55	pongamone D	$C_{18}H_{10}O_6$	$CDCl_3$	[28]
4-1-56	ovalifolin	$C_{22}H_{18}O_4$	$CDCl_3$	[25]
4-1-57	sanaganone	$C_{22}H_{16}O_4$	$CDCl_3$	[29]
4-1-58	breviflavone B	$C_{25}H_{26}O_7$	CD_3OD	[17]



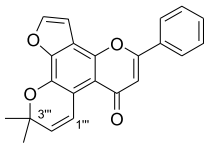
	R^1	R^2	R^3	R^4	R^5
4-1-48	H	H	OMe	H	OMe
4-1-49	H	H	H	H	OMe
4-1-50	OMe	OMe	H	OCH_2O	
4-1-51	H	H	H	H	H
4-1-52	H	H	H	OCH_2O	
4-1-53	H	OMe	H	H	OMe
4-1-54	H	H	OMe	OCH_2O	



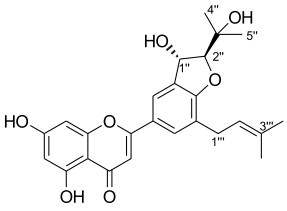
4-1-55



4-1-56



4-1-57



4-1-58

Table 4-1-15: ^{1}H NMR spectroscopic data of flavone-type flavones **4-1-48**~**4-1-51**.

H	4-1-48	4-1-49	4-1-50	4-1-51
3	7.23 s	6.92 s	6.62 s	6.90 s
5	8.16 d(9.0)	8.22 d(9.0)		8.18 d(9)

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Table 4-1-15 (continued)

H	4-1-48	4-1-49	4-1-50	4-1-51
6	7.54 d(9.0)	7.61 d(9.0)		7.58 m
2′	3.95 s(OMe)	7.60 br d(7.8)	7.42~7.44 d(2.5)	7.98 m
3′	6.99 d(9.0)	7.52 dd(7.8, 7.8)		7.58 m
4′	7.04 dd(9.0, 3.0)	7.15 dd(7.8, 2.1)		7.58 m
5′	3.91 s(OMe)	3.98 s(OMe)	6.95 d(8.0)	7.58 m
6′	7.50 d(3.0)	7.53 br d(3.6)	7.50~7.60 q(2.5)	7.98 m
2″	7.75 d(2.0)	7.82 d(2.1)	7.68 d(2.0)	7.79 d(2)
3″	7.16 d(2.0)	7.26 d(2.1)	7.0~7.10 d(2.0)	7.26 br d(2)
OMe			4.30 s, 4.14 s	
OCH_2O			6.10 s	

Table 4-1-16: ^{1}H NMR spectroscopic data of flavone-type flavones **4-1-52**~**4-1-55**.

H	4-1-52	4-1-53	4-1-54	4-1-55
3		7.02 s	7.30 s	6.62 s
5	8.16 d(9)	7.52 s	8.16 d(9.0)	13.64 s(OH)
6	7.56 dd(9, 1)	4.09 s(OMe)	7.55 dd(9.0, 0.5)	
8				7.14 d(0.8)
2′	7.41 d(2)	7.46 d(2.4)	3.93 s(OMe)	7.40 d(1.8)
3′		3.89 s(OMe)	6.67 s	
4′		7.08 dd(7.9, 2.4)		
5′	6.76 d(8)	7.45 dd(7.9, 7.9)		6.98 d(8.5)
6′	7.53 dd(8, 2)	7.54 br d(7.9)	7.46 s	7.54 dd(1.8, 8.5)
2″	7.78 d(2)	7.78 d(2.1)	7.76 d(2.0)	7.62 d(2.0)
3″	7.20 dd(2, 1)	7.21 d(2.1)	7.18 dd(2.0, 0.5)	7.04 dd(0.8, 2.0)
OCH_2O	6.10 s		6.06 s	6.03 s

Table 4-1-17: ^{1}H NMR spectroscopic data of flavone-type flavones **4-1-56**~**4-1-58**.

H	4-1-56	4-1-57	4-1-58
3	6.89 s	6.74 s	6.57 s
5	7.56 m		
6			6.20 d(2.1)
8			6.43 d(2.1)
2′	7.96 m	7.88 m	7.84 br s
3′ ~ 5′	7.56 m	7.50 m	
6′	7.96 m	7.88 m	7.67 br s
1″			5.39 d(4.2)
2″	7.78 d(2.0)	7.20 d(1.8)	4.36 d(4.2)
3″	7.22 d(2.0)	7.12 d(1.8)	

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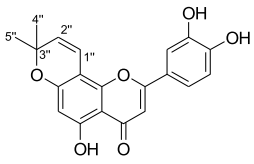
Table 4-1-17 (continued)

H	4-1-56	4-1-57	4-1-58
4″			1.30 s
5″			1.23 s
1‴	4.82 br d(7.0)	8.11 d(10.3)	3.39 d(7.3)
2‴	5.63 m	5.72 d(10.3)	5.36 m
4‴	1.81 br s	1.53 s	1.76 s
5‴	1.83 br s	1.53 s	1.76 s

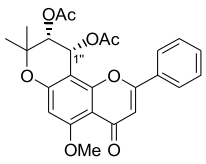
Table 4-1-18: Cos, MFs, and TSs of flavone-type flavones **4-1-59**~**4-1-67**.

No.	Compounds	MFs	Test solvents	References
4-1-59	artochamin C	$C_{20}H_{16}O_6$	DMSO-d_6	[16]
4-1-60	5-methoxy-(3″,4″-dihydro-3″,4″-diacetoxy)-2″,2″-dimethylpyrano-[7,8:5″,6″]-flavone	$C_{25}H_{24}O_8$	$CDCl_3$	[30][31]
4-1-61	5,4′,1″-trihydroxy-6,7-(3″,3″-dimethylchroman)flavone	$C_{20}H_{18}O_6$	DMSO-d_6	[32]
			C_5D_5N	[32]
4-1-62	dinklagin B	$C_{20}H_{18}O_6$	CD_3COCD_3	[12]
4-1-63	vogelin J	$C_{20}H_{16}O_5$	$CDCl_3$	[33]
4-1-64	artocommunol CE①	$C_{25}H_{24}O_7$	CD_3COCD_3	[22]
4-1-65	artelastoheterol	$C_{30}H_{32}O_8$	$CDCl_3$	[18]
4-1-66	dorsilurin B	$C_{30}H_{34}O_7$	CD_3OD	[19]
4-1-67	artocommunol CB	$C_{35}H_{40}O_6$	$CDCl_3$	[22]

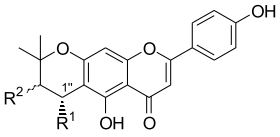
① There is structural error in the literature. Based on the NMR and MS data and the structural identification details in the literature, this structure should be identified as 2′, 4′-dihydroxyl substitution, rather than 4′-methoxyl substitution.



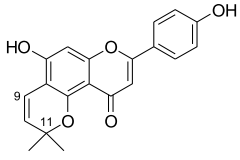
4-1-59



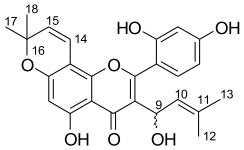
4-1-60



	R^1	R^2
4-1-61	OH	H
4-1-62	H	OH

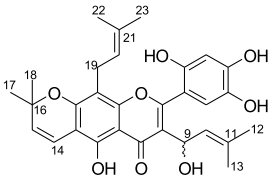


4-1-63

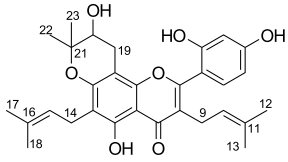


4-1-64

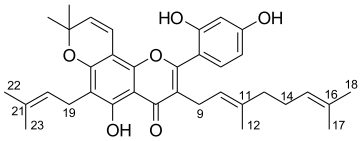
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4-1-65



4-1-66



4-1-67

Table 4-1-19: ^{1}H NMR spectroscopic data of flavone-type flavones **4-1-59**~**4-1-62**.

H	4-1-59	4-1-60	4-1-61(DMSO-d_6)	4-1-61(C_5D_5N)	4-1-62
3	6.75 s	6.72 s	6.78 s	6.89 s	6.65 s
5	13.11 s(OH)	3.97 s(OMe)	13.2 s(OH)	14.13 s(OH)	13.36 s(OH)
6	6.23 s	6.35 s			
8			6.58 s	6.81 s	6.48 s
2′	7.48 br s	7.78 m	7.91 dd(2.0, 9.0)	7.91 dd(2.0, 9.0)	7.95 dd(1.9, 8.8)
3′	9.75 br s(OH)	7.47~7.49 m	6.91 dd(2.0, 9.0)	7.23 dd(2.0, 9.0)	7.03 dd(1.9, 8.7)
4′	9.75 br s(OH)	7.47~7.49 m	10.31 s(OH)		4.40 br s(OH)
5′	6.92 d(8.6)	7.47~7.49 m	6.91 dd(2.0, 9.0)	7.23 dd(2.0, 9.0)	7.03 dd(1.9, 8.7)
6′	7.47 br d(8.6)	7.78 m	7.91 dd(2.0, 9.0)	7.91 dd(2.0, 9.0)	7.95 dd(1.9, 8.8)
1″	6.84 d(10.0)	6.63 d(4.6)	4.73 t(8.7)	5.01 dd(5.1, 7.2)	2.62 dd(7.3, 17.0)
		1.97 s(OAc)	4.73 s(OH)	5.29 s(OH)	2.96 dd(5.2, 17.0)
2″	5.83 d(10.0)	5.30 d(4.6)	3.04 d(8.7)	3.56 dd(5.1, 13.8)	3.88 br t(6.5)
		2.13 s(OAc)		3.48 dd(7.2, 13.8)	
4″	1.46 s	1.46 s	1.13 s	1.12 s	1.34 s
5″	1.46 s	1.51 s	1.14 s	1.13 s	1.41 s

Table 4-1-20: ^{1}H NMR spectroscopic data of flavone-type flavones **4-1-63**~**4-1-67**.

H	4-1-63	4-1-64	4-1-65	4-1-66	4-1-67
3	6.46 s				
5			12.80 s(OH)		
6		6.15 s			
8	6.34 s				
2′	7.60 d(8.9)				
3′	6.85 d(8.9)	6.43 d(2.4)	6.45 s	6.35 d(2.2)	6.55 d(2.0)
5′	6.85 d(8.9)	6.63 dd(8.8, 2.4)		6.39 dd(8.5, 2.2)	6.51 d(8.4)

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Table 4-1-20 (continued)

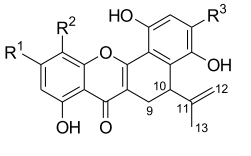
H	4-1-63	4-1-64	4-1-65	4-1-66	4-1-67
6′	7.60 d(8.9)	7.79 d(8.8)	7.25 s	7.03 d(8.5)	7.16 d(8.4)
9	6.62 d(10.0)	6.19 d(9.6)	6.18 d(9.2)	3.08 d(6.6)	3.14 d(6.4)
10	5.54 d(10.0)	5.48 d(9.6)	5.44 d(9.2)	5.12 br t(7.0)	5.08 d(6.4)
12	1.40 s	1.68 d(1.6)	1.66 s		1.25 s
13	1.40 s	1.94 d(1.6)	1.92 s		1.69 m, 1.75 m
14		6.91 dd(10.0)	6.69 d(10.0)	3.39 d(7.1)	2.08 m
15		5.77 d(10.0)	5.59 d(10.0)	5.12 brt(7.0)	5.06 t(7.2)
17		1.47 s	1.45 s		1.57 s
18		1.47 s	1.44 s		1.69 s
19			3.45 m	2.93 dd(16.8, 5.8)	3.32 d(6.8)
				2.58 dd(16.8, 7.6)	
20			5.22 t(6.4)	3.79 dd(7.6, 5.8)	5.21 t(6.8)
22			1.66 s		1.57 s
23			1.81 s		1.69 s
24					6.69 d(10.0)
25					5.44 d(10.0)
27					1.27 s
28					1.76 s
Me				1.58 s, 1.51 s	
				1.46 s, 1.44 s	
				1.37 s, 1.31 s	

Table 4-1-21: Cos, MFs, and TSs of flavone-type flavones **4-1-68**~**4-1-81**.

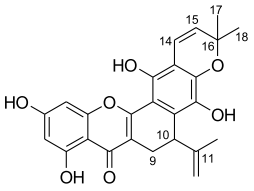
No.	Compounds	MFs	Test solvents	References
4-1-68	artoindonesianin S	$C_{22}H_{20}O_7$	CD_3COCD_3	[13]
4-1-69	artoindonesianin T	$C_{21}H_{18}O_7$	CD_3COCD_3	[13]
4-1-70	cyclocomunomethonol	$C_{21}H_{18}O_7$	CD_3COCD_3	[34]
4-1-71	dihydroartomunoxanthone	$C_{26}H_{26}O_7$	CD_3COCD_3	[34]
4-1-72	artochamin E	$C_{25}H_{24}O_7$	CD_3COCD_3	[16]
4-1-73	artelastoxanthone	$C_{35}H_{38}O_7$	CD_3COCD_3	[18]
4-1-74	artochamin B	$C_{25}H_{24}O_7$	CD_3COCD_3	[16]
4-1-75	artomunoisoxanthone	$C_{30}H_{30}O_7$	CD_3COCD_3	[34]
4-1-76	artochamin A	$C_{25}H_{22}O_7$	CD_3COCD_3	[16]
4-1-77	artocommunol CA	$C_{26}H_{24}O_6$	$CDCl_3$	[22]
4-1-78	cycloartelastoxanthendiol①	$C_{26}H_{28}O_9$	C_5D_5N	[18]
4-1-79	cycloartelastoxanthone	$C_{35}H_{38}O_7$	CD_3COCD_3	[18]
4-1-80	artelastocarpin	$C_{30}H_{34}O_7$	DMSO-d_6	[35]
4-1-81	carpelastofuran	$C_{30}H_{34}O_8$	DMSO-d_6	[35]

① There is structural error in the literature. Based on the NMR and MS data, a single bond exists between C14 and C15, rather than the double bond.

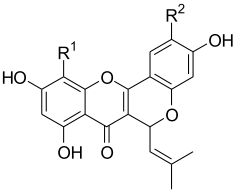
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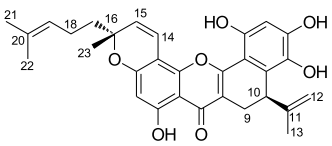
	R^1	R^2	R^3
4-1-68	OMe	H	OMe
4-1-69	OH	H	OMe
4-1-71	OH	Prenyl	OMe
4-1-72	OH	Prenyl	OH



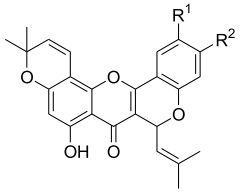
4-1-73



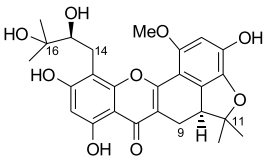
	R^1	R^2
4-1-70	H	OMe
4-1-74	Prenyl	OH



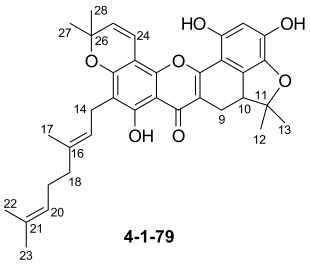
4-1-75



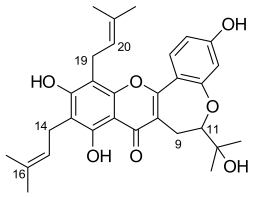
	R^1	R^2
4-1-76	OH	OH
4-1-77	H	OMe



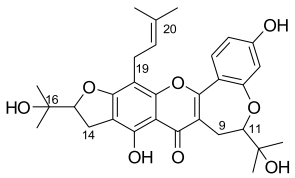
4-1-78



4-1-79



4-1-80



4-1-81

Table 4-1-22: ^{1}H NMR spectroscopic data of flavone-type flavones **4-1-68**~**4-1-70**.

H	4-1-68	4-1-69	4-1-70
5	13.18 s(OH)	13.21 s(OH)	12.90 s(OH)
6	6.30 d(2.3)	6.24 d(2.1)	6.25 d(2.0)
7	3.90 s(OMe)		

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Table 4-1-22 (continued)

H	4-1-68	4-1-69	4-1-70
8	6.69 d(2.3)	6.50 d(2.1)	6.51 d(2.0)
9	2.45 dd(16.0, 6.6)	2.43 dd(16.0, 6.6)	6.16 d(9.2)
	3.40 dd(16.0, 1.7)	3.39 dd(16.0, 1.6)	
10	4.17 br d(6.6)	4.00 br d(6.6)	5.49 br d(9.2)
12	4.27 br s, 4.64 br s	4.26 m, 4.63 m	1.68 d(1.2)
13	1.77 br m	1.76 m	1.93 d(1.2)
2′	7.47 s(OH)		
3′	6.56 s	6.55 s	6.46 s
4′	3.91 s(OMe)	3.90 s(OMe)	
5′	8.20 br s(OH)		3.91 s(OMe)
6′			7.37 s

Table 4-1-23: ^{1}H NMR spectroscopic data of flavone-type flavones **4-1-71**~**4-1-74**.

H	4-1-71	4-1-72	4-1-73	4-1-74
5	13.20 s(OH)	13.22 s(OH)	13.17 s(OH)	12.84 s(OH)
6	6.31 s	6.31 s	6.28 d(2.4)	6.31 s
7	9.47 s(OH)		9.63 s(OH)	
8			6.58 d(2.4)	
9	2.44 dd(16.0, 6.8)	3.42 dd(1.5, 16.0)	α 2.45 dd(16.0, 6.4)	6.13 d(9.4)
	3.41 dd(16.0, 2.0)	2.45 dd(6.5, 16.0)	β 3.38 dd(16.0, 2.0)	
10	4.01 br d(6.4)	4.00 br d(6.5)	3.98 d(6.4)	5.50 br d(9.4)
12	1.78 s	4.65 br s, 4.32 br s	α 4.31 s, β 4.64 s	1.92 s
13	4.29 s, 4.64 s	1.78 s	1.77 s	1.66 s
14	3.43 dd(14.8, 6.4)	3.67 br dd(7.5, 14.7)	6.76 d(10.0)	3.56 br dd(7.2, 14.6)
	3.66 dd(14.8, 7.6)	3.44 br dd(7.5, 14.7)		3.40 br dd(7.2, 14.6)
15	5.28 br t(7.5)	5.29 br t(7.5)	5.75 d(10.0)	5.33 br t(7.2)
17	1.62 s	1.61 s	1.47 s	1.66 s
18	1.78 s	1.76 s	1.45 s	1.84 s
2′	8.34 s(OH)	8.29 s(OH)	8.02 s(OH)	
3′	6.60 s	6.56 s		6.46 s
4′	3.91 s(OMe)			
5′	7.38 s(OH)		7.58 s(OH)	
6′				7.30 s
OH		9.29 s, 7.15 br s		

Table 4-1-24: ^{1}H NMR spectroscopic data of flavone-type flavones **4-1-75**~**4-1-78**.

H	4-1-75	4-1-76	4-1-77	4-1-78
5	13.37 s(OH)	13.00 s(OH)	12.83 s(OH)	13.28 s(OH)
6	6.13 s	6.15 s	6.25 s	6.28 s
9	2.44 dd(16.0, 6.8)	6.14 d(9.0)	6.26 d(9.6)	α 3.23 dd(15.2, 7.2)
	3.41 dd(16.0, 2.0)			β 3.43 dd(15.2, 7.2)
10	4.00 br d(6.8)	5.51 br d(9.0)	5.44 d(9.6)	2.44 t(15.2)

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Table 4-1-24 (continued)

H	4-1-75	4-1-76	4-1-77	4-1-78
12	1.78 s	1.68 s	1.70 s	1.35 s
13	4.30 s, 4.65 s	1.93 s	1.98 s	1.68 s
14	6.97 d(10.4)	6.86 d(10.0)	6.67 d(10.0)	α 2.00 dd(14.4, 6.4) β 2.31 dd(14.4, 6.4)
15	5.64 d(10.4)	5.78 d(10.0)	5.61 d(10.0)	5.01 t(6.4)
17	α 1.71 m, β 1.76 m	1.47 s	1.47 s	1.36 s
18	2.12 m	1.47 s	1.47 s	1.48 s
19	5.12 br t(7.5)			
21	1.56 s			
22	1.63 s			
23	1.41 s			
2′	8.64 s(OH)			3.38 s(OMe)
3′	6.59 s	6.46 s	6.48 d(2.8)	6.34 s
4′			3.84 s(OMe)	
5′			6.61 dd(8.4, 2.8)	
6′		7.33 s	7.66 d(8.4)	
OH		8.89 s, 8.09 s		

Table 4-1-25: ^{1}H NMR spectroscopic data of flavone-type flavones **4-1-79**~**4-1-81**.

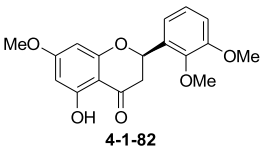
H	4-1-79	4-1-80	4-1-81
5	13.70 s(OH)	13.21 s(OH)	13.11 s(OH)
7		9.66 s(OH)	10.35 s(OH)
9	α 2.34 t(15.2)	3.38 dd(16.7, 1.6)	3.38 br
	β 3.20 dd(15.2, 7.2)	2.44 dd(16.7, 9.9)	2.48 dd(16.8, 10.0)
10	3.39 dd(15.2, 7.2)	3.86 dd(9.9, 1.6)	3.85 dd(10.0, 1.6)
11		4.76 s(OH)	4.77 s(OH)
12	1.31 s	1.25 s	1.25 s
13	1.64 s	1.21 s	1.21 s
14	3.31 d(7.2)	3.31 d(6.7)	3.07 d(8.8)
15	5.23 t(7.2)	5.12 m	4.71 dd(9.0, 7.0)
17	1.44 s	1.73 s	1.16 s
18	1.73 m	1.62 s	1.11 s
19	2.13 m	3.50 br s	3.38 br
20	5.12 m	5.12 m	5.18 t(6.9)
22	1.63 s	1.75 s	1.74 s
23	1.79 s	1.62 s	1.62 s
24	6.99 d(10.0)		
25	5.63 d(10.0)		
27	1.42 s		
28	1.42 s		
3′	6.39 s	6.53 d(2.3)	6.53 d(2.4)
4′		10.32 br s(OH)	
5′		6.64 dd(8.9, 2.3)	6.66 dd(8.9, 2.4)
6′		7.83 d(8.9)	7.84 d(8.9)

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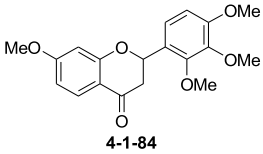
4.1.2 Flavanone-type flavones

Table 4-1-26: Cos, MFs, and TSs of flavanone-type flavones **4-1-82**~**4-1-91**.

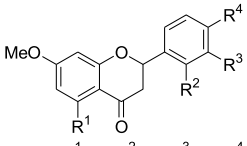
No.	Compounds	MFs	Test solvents	References
4-1-82	(2*R*)-5-hydroxy-7,2′,3′-trimethoxyflavanone	$C_{18}H_{18}O_6$	$CDCl_3$	[36]
4-1-83	hetranthin A	$C_{16}H_{14}O_5$	CD_3OD	[37]
4-1-84	7,2′,3′,4′-tetramethoxyflavanone	$C_{19}H_{20}O_6$	$CDCl_3$	[6]
4-1-85	(2*S*)-5,7,2′,3′,4′-pentamethoxyflavanone	$C_{20}H_{22}O_7$	$CDCl_3$	[4]
4-1-86	5,7-dimethoxy-3′,4′-methylenedioxyflavanone	$C_{18}H_{16}O_6$	$CDCl_3$	[38]
4-1-87	7,4′-dihydroxy-8,3′-dimethoxyflavanone	$C_{17}H_{16}O_6$	CD_3OD	[39]
4-1-88	7,4′-dihydroxy-3′-methoxyflavanone	$C_{16}H_{14}O_5$	CD_3OD	[39]
4-1-89	dihydroskullcapflavone I	$C_{17}H_{16}O_6$	$CDCl_3$	[40]
4-1-90	(2*S*)-8-formyl-5-hydroxy-7-methoxy-6-methylflavanone	$C_{18}H_{16}O_5$	$CDCl_3$	[41]
4-1-91	(2*S*)-5,7-dimethoxy-8-formylflavanone	$C_{18}H_{16}O_5$	$CDCl_3$	[30]



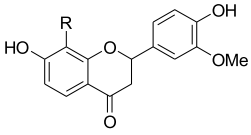
4-1-82



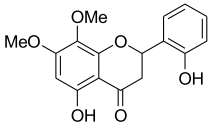
4-1-84



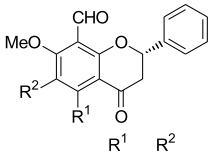
	R^1	R^2	R^3	R^4
4-1-83	H	H	OH	OH
4-1-85	OMe	OMe	OMe	OMe
4-1-86	OMe	H	OCH_2O	



4-1-87 R = OMe
4-1-88 R = H



4-1-89



	R^1	R^2
4-1-90	OH	Me
4-1-91	OMe	H

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Table 4-1-27: ^{1}H NMR spectroscopic data of flavanone-type flavones **4-1-82**~**4-1-85**.

H	4-1-82	4-1-83	4-1-84	4-1-85
2	5.76 dd(13.2, 2.7)	5.20 dd(12.6, 3.1)	5.65 dd(12.5, 3.1)	5.64 dd(13.3, 2.8)
3	*α* 3.04 dd(17.2, 13.2)	2.81 dd(17.0, 12.6)	ax 3.01 dd(17.1, 12.5)	ax 3.03 dd(16.6, 13.3)
	β 2.80 dd(17.2, 2.7)	2.44 dd(17.0, 3.1)	eq 2.75 dd(17.1, 3.1)	eq 2.71 dd(16.6, 2.8)
5	12.08 s(OH)	7.71 d(8.5)	7.84 d(8.8)	3.87 s(OMe)
6	6.08 d(2.1)	6.46 dd(8.5, 1.8)	6.58 dd(8.6, 2.3)	6.06 d(2.3)
7	3.80 s(OMe)	3.90 s(OMe)	3.98 s(OMe)	3.78 s(OMe)
8	6.05 d(2.1)	6.59 d(1.8)	6.40 d(2.3)	6.10 d(2.3)
2′	3.87 s(OMe)	6.67 d(1.8)	3.90 s(OMe)	3.88 s(OMe)
3′	3.89 s(OMe)		3.83 s(OMe)	3.84 s(OMe)
4′	7.13 d(8.1)		3.74 s(OMe)	3.85 s(OMe)
5′	6.94 t(8.1)	6.62 d(8.0)		6.71 d(8.7)
6′	7.13 d(8.1)	6.44 d(8.0, 1.8)		7.18 d(8.7)

Table 4-1-28: ^{1}H NMR spectroscopic data of flavanone-type flavones **4-1-86**~**4-1-89**.

H	4-1-86	4-1-87	4-1-88	4-1-89
2	5.31 dd(13.0, 3.0)	5.45 dd(13, 3)	5.47 dd(13, 3)	5.73 dd(13.5, 3.1)
3	2.98 dd(17.0, 13.0)	ax 3.16 dd(17, 13)	ax 3.18 dd(17, 13)	ax 3.12 dd(17.3, 13.5)
	2.78 dd(17.0, 3.0)	eq 2.75 dd(17, 3)	eq 2.79 dd(17, 3)	eq 3.07 dd(17.3, 3.1)
5	3.89 s(OMe)	7.51 d(9)	7.82 d(8)	11.90 s(OH)
6	6.10 d(1.5)	6.56 d(9)	6.58 dd(9, 2)	6.11 s
7	3.82 s(OMe)			3.88 s(OMe)
8	6.14 d(1.5)	3.87 s(OMe)	6.44 d(2)	3.78 s(OMe)
2′	6.95 d(1.5)	7.13 d(2)	7.18 d(2)	6.85 s(OH)
3′		3.81 s(OMe)	3.44 s(OMe)	6.86 dd(8.1, 1.1)
4′				7.22 ddd(7.7, 7.7, 1.7)
5′	6.82 d(8.0)	6.82 d(8)	6.91 d(8)	6.94 ddd(7.7, 7.7, 1.7)
6′	6.91 dd(8.0, 1.5)	6.96 dd(8, 2)	7.02 dd(8, 2)	7.33 dd(7.7, 1.7)
OCH_2O	5.99 s			

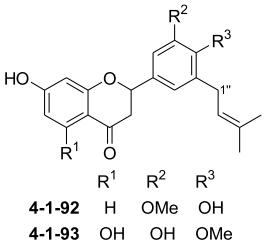
Table 4-1-29: ^{1}H NMR spectroscopic data of flavanone-type flavones **4-1-90** and **4-1-91**.

H	4-1-90	4-1-91	H	4-1-90	4-1-91
2	5.50 dd(12.8, 2.9)	5.57 dd(11.0, 3.8)	7	3.90 s(OMe)	4.01 s(OMe)
3	ax 3.12 dd(16.9, 12.8)	3.06 m	8	10.20 s(CHO)	10.40 s(CHO)
	eq 2.82 dd(16.9, 2.9)				
5	12.70 s(OH)	4.02 s(OMe)	2′, 6′	7.60 m	7.41~7.46 m
6	2.08 s(Me)	6.12 s	3′ ~ 5′	7.45 m	7.41~7.46 m

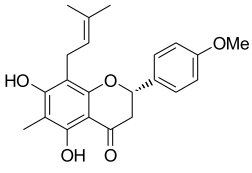
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Table 4-1-30: Cos, MFs, and TSs of flavanone-type flavones **4-1-92**~**4-1-114**.

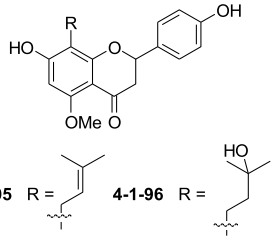
No.	Compounds	MFs	Test solvents	References
4-1-92	5-deoxyabyssinin II	$C_{21}H_{22}O_5$	CD_3COCD_3	[42]
4-1-93	4′-*O*-methylsigmoidin B	$C_{21}H_{22}O_6$	$CDCl_3$	[43]
4-1-94	(2*S*)-4′-*O*-methyl-6-methyl-8-prenylnaringenin	$C_{22}H_{24}O_5$	$CDCl_3$	[32]
4-1-95	isoxanthohumol-8-(3″-methyl-3″-hydroxybutyl)-4′,6-dihydroxy-5′-methoxyflavanone	$C_{21}H_{22}O_5$	CD_3CN-D_2O	[44]
		$C_{21}H_{24}O_6$	CD_3OD	[44]
4-1-96		$C_{21}H_{24}O_6$	CD_3OD	[44]
4-1-97	brosimacutin A	$C_{20}H_{22}O_6$	CD_3OD	[45]
4-1-98	brosimacutin B	$C_{20}H_{22}O_6$	CD_3OD	[45]
4-1-99	brosimacutin C	$C_{20}H_{22}O_5$	CD_3OD	[45]
4-1-100	(2*S*)-5,7-dimethoxy-8-(2*S*-hydroxy-3-methyl-3-butenyl)-3′,4′-methylenedioxyflavanone	$C_{23}H_{24}O_7$	$CDCl_3$	[30]
4-1-101	(2*S*)-5,7-dimethoxy-8-(2*S*-hydroxy-3-methyl-3-butenyl) flavanone	$C_{22}H_{24}O_5$	$CDCl_3$	[30]
4-1-102	(2*S*)-5,7-dimethoxy-8-(2*R*-hydroxy-3-methyl-3-butenyl) flavanone	$C_{22}H_{24}O_5$	$CDCl_3$	[30]
4-1-103	abyssinone V 4′-*O*-methyl ether	$C_{26}H_{30}O_5$	$CDCl_3$	[43]
4-1-104	abyssinone V	$C_{25}H_{28}O_5$	$CDCl_3$	[43]
4-1-105	6,8-bis-(3,3-dimethylallyl)-5,7,3′,4′-tetrahydroxyflava-none	$C_{25}H_{28}O_6$	$CDCl_3$	[11]
4-1-106	(2*S*)-5,7,2′,6′-tetrahydroxy-6,8-di(*γ*,*γ*-dimethylally1)-flavanone	$C_{25}H_{28}O_6$	DMSO-d_6	[46]
4-1-107	abyssinone IV 4′-*O*-methyl ether	$C_{26}H_{30}O_4$	$CDCl_3$	[47]
4-1-108	sophoraflavanone L	$C_{25}H_{28}O_6$	CD_3COCD_3	[48]
4-1-109	7-hydroxy-4′-methoxy-3′-(3-hydroxy-3-methyl-*trans*-but-1-enyl)-5′-(3-methylbut-2-enyl)flavanone	$C_{26}H_{30}O_5$	$CDCl_3$	[47]
4-1-110	burttinone	$C_{26}H_{30}O_6$	$CDCl_3$	[43]
4-1-111	dorsmanin H	$C_{25}H_{28}O_7$	CD_3COCD_3	[49]
4-1-112	sophoraflavanone K	$C_{26}H_{30}O_7$	CD_3COCD_3	[48]
4-1-113	(2*S*)-5,7,2′,6′-tetrahydroxy-6-lavandulylated flavanone	$C_{25}H_{28}O_6$	DMSO-d_6	[46]
4-1-114	3′-geranyl-4′,5,7-trihydroxyflavanone	$C_{25}H_{28}O_5$	$CDCl_3$	[14]



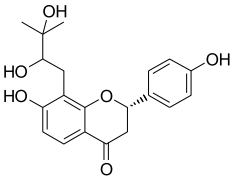
	R^1	R^2	R^3
4-1-92	H	OMe	OH
4-1-93	OH	OH	OMe



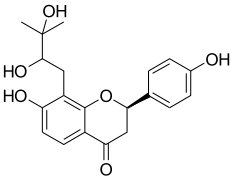
4-1-94



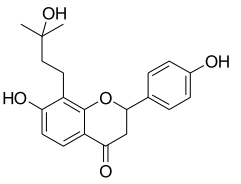
4-1-95 R = **4-1-96** R =



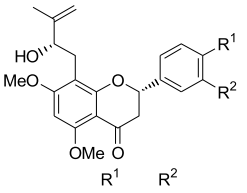
4-1-97



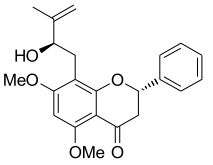
4-1-98



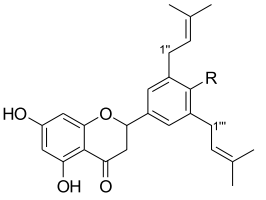
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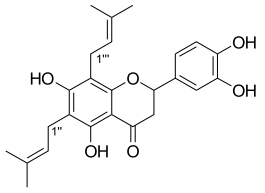
4-1-100 OCH_2O
4-1-101 H H



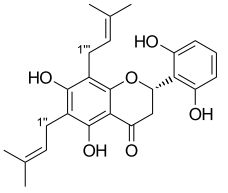
4-1-102



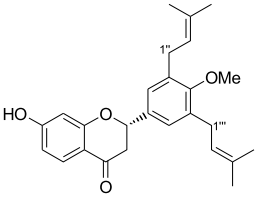
4-1-103 R = OMe
4-1-104 R = OH



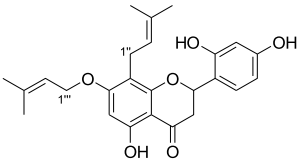
4-1-105



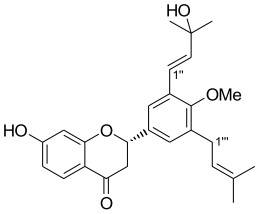
4-1-106



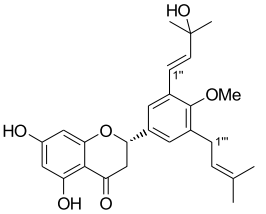
4-1-107



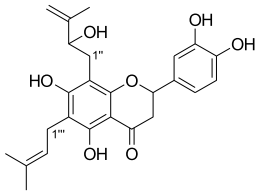
4-1-108



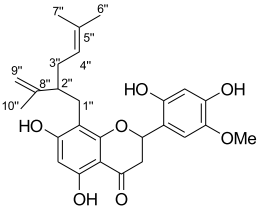
4-1-109



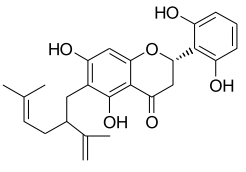
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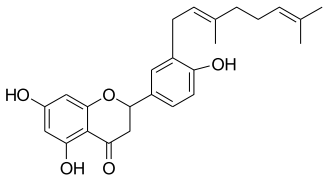
4-1-111



4-1-112



4-1-113



4-1-114

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Table 4-1-31: ^{1}H NMR spectroscopic data of flavanone-type flavones **4-1-92** and **4-1-93**.

H	4-1-92	4-1-93	H	4-1-92	4-1-93
2	5.42 dd(13.2, 2.7)	5.30 dd(13.2, 2.7)	3′	3.89 s(OMe)	
3	*α* 2.71 dd(17.0, 2.7)	3.06 dd(17.1, 13.2)	4′		3.81 s(OMe)
	β 3.04 dd(17.0, 13.2)	2.77 dd(17.1, 2.7)			
5	7.73 d(8.5)	12.03 s(OH)	6′	6.92 d(2.0)	6.75 d(2.1)
6	6.85 dd(8.5, 2.5)	5.99 s	1″	3.35 d(7.2)	3.37 d(7.2)
8	6.42 d(2.5)	5.99 s	2″	5.35 t(7.2)	5.28 t(7.2)
2′	7.06 d(2.0)	6.91 d(2.1)	4″, 5″	1.70 s, 1.71 s	1.73 s, 1.75 s

Table 4-1-32: ^{1}H NMR spectroscopic data of flavanone-type flavones **4-1-94**~**4-1-97**.

H	4-1-94	4-1-95	4-1-96	4-1-97
2	5.30 dd(12.6, 3.2)	5.34 dd(12.8, 3.1)	5.30 dd(12.7, 2.9)	5.41 dd(13.0, 2.9)
3	3.00 dd(17.2, 12.6)	ax 2.98 dd(17.1, 12.8)	ax 2.95 dd(17.8, 12.7)	3.01 dd(16.8, 13.0)
	2.70 dd(17.2, 3.2)	eq 2.70 dd(17.1, 3.1)	eq 2.67 dd(17.8, 2.9)	2.74 dd(16.8, 2.9)
5	12.29 s(OH)	3.76 s(OMe)	3.79 s(OMe)	7.66 d(8.7)
6	1.94 s(Me)	6.16 s	6.10 s	6.56 d(8.7)
2′, 6′	7.32 d(8.8)	7.31 d(8.5)	7.33 d(8.6)	7.35 d(8.6)
3′, 5′	6.89 d(8.8)	6.85 d(8.5)	6.80 d(8.6)	6.81 d(8.6)
4′	3.78 s(OMe)			
1″	3.31 d(7.2)	3.17 d(6.9)	2.60 m	2.70 dd(13.8, 10.0)
				3.01 dd(13.8, 2.2)
2″	5.18 t(7.0)	5.10 t(6.9)	1.61 m	3.60 dd(10.0, 2.2)
4″, 5″	1.77 s, 1.70 s	1.60 s, 1.56 s	1.15 s, 1.15 s	1.18 s, 1.17 s

Table 4-1-33: ^{1}H NMR spectroscopic data of flavanone-type flavones **4-1-98**~**4-1-101**.

H	4-1-98	4-1-99	4-1-100	4-1-101
2	5.39 dd(13.1, 2.8)	5.39 dd(13.0, 2.7)	5.27 dd(12.9, 2.9)	5.37 dd(3.2, 3.1)
3	3.04 dd(17.0, 13.1)	3.01 dd(17.2, 13.0)	2.88 m	2.82 m
	2.73 dd(17.0, 2.8)	2.75 dd(17.2, 2.7)		
5	7.65 d(8.7)	7.60 d(8.7)	3.95 s(OMe)	3.95 s(OMe)
6	6.55 d(8.7)	6.51 d(8.7)	6.15 s	6.16 s
7			3.92 s(OMe)	3.92 s(OMe)
2′	7.36 d(8.6)	7.36 d(8.4)	6.95 d(1.5)	7.40 m
3′	6.81 d(8.6)	6.82 d(8.4)		7.40 m
4′				7.40 m
5′	6.81 d(8.6)	6.82 d(8.4)	6.82 d(8.0)	7.40 m
6′	7.36 d(8.6)	7.36 d(8.4)	6.88 dd(8.7, 1.5)	7.40 m
1″	2.71 dd(13.8, 9.8)	2.68 m	2.84 m	2.98 m
	2.98 dd(13.8, 2.7)			
2″	3.58 dd(9.8, 2.7)	1.65 m	4.25 br s	4.21 dd(4.6, 4.7)
4″	1.16 s	1.18 s	4.78 s, 4.89 s	4.83 s, 4.75 s
5″	1.14 s	1.18 s	1.72 s	1.69 s
OCH_2O			5.99 s	

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Table 4-1-34: ^{1}H NMR spectroscopic data of flavanone-type flavones **4-1-102**~**4-1-105**.

H	4-1-102	4-1-103	4-1-104	4-1-105
2	5.39 dd(3.2, 3.2)	5.33 dd(13.2, 2.7)	5.30 dd(13.2, 2.7)	5.26 dd(12.6, 3.1)
3	2.93 m	3.11 dd(17.1, 13.2)	3.09 dd(17.1, 13.2)	3.00 dd(17.1, 12.6)
		2.76 dd(17.1, 2.7)	2.74 dd(17.1, 2.7)	2.78 dd(17.1, 3.1)
5	3.95 s(OMe)	12.05 s(OH)	12.07 s(OH)	12.26 s(OH)
6	6.16 s	5.98 s	5.97 s	
7	3.93 s(OMe)			
8		5.98 s	5.97 s	
2′	7.41 m	7.09 s	7.05 s	6.95 d(1.8)
3′	7.41 m			
4′	7.41 m	3.80 s(OMe)		
5′	7.41 m			6.88 d(8.2)
6′	7.41 m	7.09	7.05 s	6.85 dd(8.2, 1.8)
1″	2.93 m	3.39 d(7.2)	3.35 d(7.2)	3.31 d(7.2)
2″	4.28 m	5.29 t(7.2)	5.28 t(7.2)	5.20 br t(7.2)
4″	4.89 s, 4.78 s	1.73 s	1.76 s	1.71, 1.75 or 1.81 s
5″	1.72 s	1.74 s	1.76 s	1.71, 1.75 or 1.81 s
1‴		3.39 d(7.2)	3.35 d(7.2)	3.31 d(7.2)
2‴		5.29 t(7.2)	5.28 t(7.2)	5.20 br t(7.2)
4‴, 5‴		1.73 s, 1.74 s	1.76 s	1.71, 1.75 or 1.81 s

Table 4-1-35: ^{1}H NMR spectroscopic data of flavanone-type flavones **4-1-106**~**4-1-109**.

H	4-1-106	4-1-107	4-1-108	4-1-109
2	5.80 dd(13.0, 3.0)	5.38 dd(13.6, 2.8)	5.67 dd(12.8, 2.8)	5.39 dd(13.6, 2.8)
3	3.89 dd(17.0, 13.0)	ax 3.06 dd(16.8, 13.6)	*α* 2.77 dd(17.2, 2.8)	ax 3.05 dd(16.8, 13.6)
	2.44 dd(17.0, 3.0)	eq 2.80 dd(16.8, 2.8)	*β* 3.11 dd(17.2, 12.8)	eq 2.81 dd(16.8, 2.8)
5	12.47 br s(OH)	7.87 d(8.4)	12.26 s(OH)	7.87 d(8.4)
6		6.54 dd(8.4, 2.4)	6.13 s	6.55 dd(8.4, 2.0)
8		6.47 d(2.4)		6.48 d(2.0)
2′		7.12 s		7.46 d(2.0)
3′	6.35 d(8.0)		6.47 d(2.4)	
4′	6.93 t	3.76 s(OMe)		3.75 s(OMe)
5′	6.35 d(8.0)		6.43 dd(8.4, 2.4)	
6′		7.12 s	7.33 d(8.4)	7.16 d(2.0)
1″	3.12 d(7.0)	3.40 br d(7.2)	3.20 d(7.2)	6.91 d(16.4)
2″	5.11 m	5.30 m	5.15 t(7.2)	6.37 d(16.4)
4″	1.70 s	1.76 s	1.58 s	1.49 br s
5″	1.60 s	1.74 s	1.61 s	1.49 br s
1‴	3.11 dd(8.0, 8.0)	3.40 br d(7.2)	4.63 d(6.8)	3.39 br d(6.8)
2‴	5.06 m	5.30 m	5.49 t(6.8)	5.28 m
4‴, 5‴	1.55 s, 1.47 s	1.76 s, 1.74 s	1.76 s, 1.78 s	1.76 s, 1.74 s

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Table 4-1-36: ^{1}H NMR spectroscopic data of flavanone-type flavones **4-1-110** and **4-1-111**.

H	4-1-110	4-1-111	H	4-1-110	4-1-111
2	5.28 dd(13.2, 2.7)	5.36 dd(12.6, 3.0)	1″	6.84 d(16.2)	2.83 dd(14.8, 7.8) 3.04 dd(14.8, 2.3)
3	3.04 dd(17.1, 13.2) 2.71 dd(13.2, 2.7)	*α* 3.13 dd(16.8, 12.6) *β* 2.74 dd(16.8, 3.0)	2″	6.40 d(16.2)	4.35 br t(6.5)
5	12.02 s(OH)	12.50 br s(OH)	4″	1.45 s	1.75 s
6	5.99 s		5″	1.45 s	4.79 br s, 4.90 br s
8	5.99 s		1‴	3.35 d(7.2)	3.31 br d(7.2)
2′	7.37 d(2.1)	7.10 br s	2‴	5.32 t(7.2)	5.27 br t(7.2)
4′	3.71 s(OMe)		4‴	1.70 s	1.76 br s
5′		6.83 br s	5‴	1.70 s	1.66 br s
6′	7.09 d(2.1)	6.83 br s			

Table 4-1-37: ^{1}H NMR spectroscopic data of flavanone-type flavones **4-1-112**~**4-1-114**.

H	4-1-112	4-1-113	4-1-114
2	5.57 dd(13.0, 2.5)	5.86 dd(14.0, 3.0)	5.27 dd(12.7, 3.1)
3	*α* 2.55 dd(17.0, 2.5)	3.92 dd(17.0, 14.0)	3.05 dd(17.1, 12.7)
	β 3.08 dd(17.0, 13.0)	2.47 dd(17.0, 3.0)	2.67 dd(17.1, 3.1)
5	12.40 s(OH)	12.30 br s(OH)	
6	5.89 s		5.87 d(2.2)
8		5.97 s	5.87 d(2.2)
2′			7.15 d(2.2)
3′	6.35 s	6.93 d(8.0)	
4′		6.98 t(8.0)	
5′	3.67 s(OMe)	6.93 d(8.0)	6.77 d(8.2)
6′	6.98 s		7.10 dd(8.2, 2.2)
1″	2.53 m	2.46 m	3.29 m
2″	2.49 m	2.45 m	5.32 dt(7.3, 4.1)
3″	2.01 m	1.96 m	
4″	4.93 t(2.5)	4.93 br s	2.03 m
5″			2.09 m
6″	1.44 s	1.47 s	5.09 td(6.9, 1.3)
7″	1.50 s	1.58 s	
8″			1.60 s
9″	4.47 d(1.0), 4.43 br s	4.56 s, 4.53 s	1.55 s
10″	1.58 d(1.0)	1.51 s	1.69 s

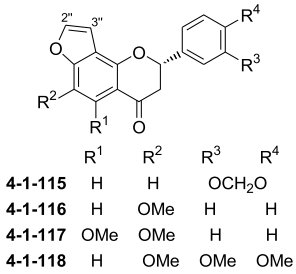
Table 4-1-38: Cos, MFs, and TSs of flavanone-type flavones **4-1-115**~**4-1-123**.

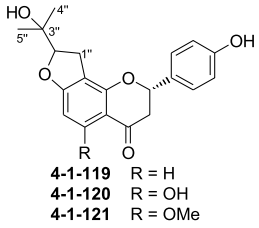
No.	Compounds	MFs	Test solvents	References
4-1-115	3,4-methylenedioxy-(2″,3″:7,8)-furanoflavanone	$C_{18}H_{12}O_5$	$CDCl_3$	[50]
4-1-116	(–)-(2*S*)-6-methoxy-[2″,3″:7,8]-furanoflavanone	$C_{18}H_{14}O_4$	$CDCl_3$	[51]

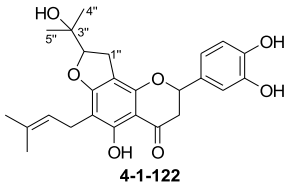
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Table 4-1-38 (continued)

No.	Compounds	MFs	Test solvents	References
4-1-117	(2*S*)-5,6-dimethoxy-[2″,3″:7,8]-furanoflavanone	$C_{19}H_{16}O_5$	$CDCl_3$	[52]
4-1-118	(–)-(2*S*)-6,3′,4′-trimethoxy-[2″,3″:7,8]-furanoflavanone	$C_{20}H_{18}O_6$	$CDCl_3$	[26]
4-1-119	brosimacutin E	$C_{20}H_{20}O_5$	CD_3OD	[45]
4-1-120	phellodensin D	$C_{20}H_{20}O_6$	CD_3COCD_3	[53]
4-1-121	(2*S*)-2″-(2‴-hydroxyisopropyl)-dihydrofurano-[2″,3″:7,8]-4′-hydroxy-5-methoxyflavanone	$C_{21}H_{22}O_6$	$CDCl_3$	[54]
4-1-122	7,8-[2″-(1-hydroxy-1-methylethyl)-dihydrofurano]-6-prenyl-5,3′,4′-trihydroxyflavanone	$C_{25}H_{28}O_7$	CD_3OD	[49]
4-1-123	6,7-[2″-(1-hydroxy-1-methylethyl)-dihydrofurano]-8-prenyl-5,3′,4′-trihydroxyflavanone	$C_{25}H_{28}O_7$	$CDCl_3$ CD_3OD	[49] [49]







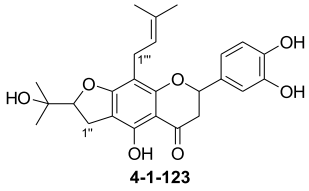


Table 4-1-39: ^{1}H NMR spectroscopic data of flavanone-type flavones **4-1-115**~**4-1-118**.

H	4-1-115	4-1-116	4-1-117	4-1-118
2	5.35 dd(13, 3)	5.57 dd(13.2, 3.0)	5.56 dd(13.1, 2.9)	5.51 dd(13.4, 3.1)
3	ax 3.10 dd(17, 13)	3.12 dd(16.8, 13.2)	ax 3.13 dd(16.5, 13.1)	ax 3.16 dd(17.1, 13.4)
	eq 2.90 dd(17, 3)	2.90 dd(16.8, 3.0)	eq 2.90 dd(16.5, 13.1)	eq 2.89 dd(17.1, 3.1)
5	7.89 d(9)	7.27 s	3.97 or 4.07 s(OMe)	7.28 s
6	7.20 dd(9, 1)	3.99 s(OMe)	3.97 or 4.07 s(OMe)	3.99 s(OMe)
2′	7.05 d(2)	7.51 m	7.45 m	7.03 d(2.1)
3′		7.41 m	7.45 m	3.91 s(OMe)
4′		7.41 m	7.45 m	3.90 s(OMe)
5′	6.87 d(8)	7.41 m	7.45 m	6.91 d(8.8)

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Table 4-1-39 (continued)

H	4-1-115	4-1-116	4-1-117	4-1-118
6′	6.97 dd(8, 2)	7.51 m	7.45 m	7.04 dd(8.8, 2.1)
2″	7.60 d(2)	7.61 d(2.1)	7.59 d(2.2)	7.61 d(2.1)
3″	6.93 dd(2, 1)	6.91 d(2.1)	6.90 d(2.2)	6.92 d(2.1)
OCH_2O	6.03 s			

Table 4-1-40: ^{1}H NMR spectroscopic data of flavanone-type flavones **4-1-119**~**4-1-121**.

H	4-1-119	4-1-120	4-1-121
2	5.43 dd(12.9, 2.9)	5.49 dd(12.7, 2.9)	5.26 dd(8.2, 1.8)
3	3.09 dd(16.7, 12.9)	*α* 3.18 dd(17.2, 12.7)	2.93 m
	2.72 dd(16.7, 2.9)	*β* 2.75 dd(17.2, 2.9)	2.70 br d(16.2)
5	7.72 d(8.4)	12.43 s(OH)	3.80 s(OMe)
6	6.51 d(8.4)	5.87 s	6.04 s
2′	7.34 d(8.4)	7.39 d(8.4)	7.21 d(8.1)
3′	6.82 d(8.4)	6.89 d(8.4)	6.84 d(8.1)
4′		8.55 br s(OH)	
5′	6.82 d(8.4)	6.89 d(8.4)	6.84 d(8.1)
6′	7.34 d(8.4)	7.39 d(8.4)	7.21 d(8.1)
1″	3.10 d(9.0)	2.97 dd(15.2, 9.6)	3.00 m
		3.05 dd(15.2, 7.7)	
2″	4.74 t(9.0)	4.74 dd(9.6, 7.7)	4.68 dd(14.0, 8.4)
4″, 5″	1.27 s, 1.20 s	1.25 s, 1.18 s	1.29 s, 1.19 s
OH		3.76 br s(OH)	

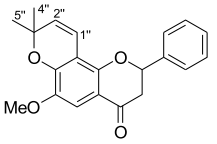
Table 4-1-41: ^{1}H NMR spectroscopic data of flavanone-type flavones **4-1-122** and **4-1-123**.

H	4-1-122	4-1-123 ($CDCl_3$)	4-1-123 (CD_3OD)
2	5.28 dd(12.6, 3.2)	5.16 dd(12.6, 3.0)	5.20 br d(12.6)
3	*α* 3.05 dd(17.2, 12.6)	*α* 2.88 dd(17.0, 12.6)	*α* 3.00 dd(17.1, 12.6)
	β 2.70 dd(17.2, 3.2)	*β* 2.67 dd(17.0, 3.0)	*β* 2.68 dd(17.0, 3.0)
5		12.04 br s(OH)	
2′	6.91 br s	6.89 d(2.2)	6.92 br s
5′	6.7~6.8 m	6.83 d(8.3)	6.79 br s
6′	6.7~6.8 m	6.76 dd(8.3, 2.2)	6.79 br s
1″	3.04 dd(15.5, 8.7)	*α* 3.05 dd(14.0, 8.5)	3.01~3.04 br d like m
		β 3.08 dd(14.0, 8.5)	
2″	4.67 t(8.7)	4.17 d(8.5)	4.68 br t(8.0)
4″, 5″	1.29 s, 1.27 s	1.22 s, 1.34 s	1.21 s, 1.24 s
1‴	3.18 br d like t(7.4)	3.13 d(7.0)	3.14 d(7.0)
2‴	5.21 t like m(7.4)	5.12 t like m	5.15 t(7.0)
4‴, 5‴	1.78 s, 1.68 s	1.61 s, 1.61 s	1.60 s, 1.62 s

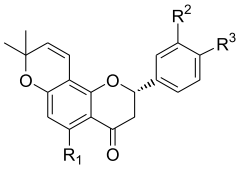
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Table 4-1-42: Cos, MFs, and TSs of flavanone-type flavones **4-1-124**~**4-1-140**.

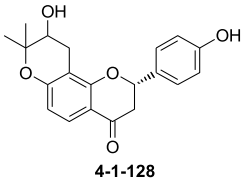
No.	Compounds	MFs	Test solvents	References
4-1-124	6-methoxy-6″,6″-dimethylchromeno-[2″,3″:7,8]-flavanone	$C_{21}H_{20}O_4$	$CDCl_3$	[52]
4-1-125	(2*S*)-3′,4′-methylenedioxy-6″,6″-dimethylchromeno-[2″,3″:7,8]-flavanone	$C_{21}H_{18}O_5$	$CDCl_3$	[52]
4-1-126	(2*S*)-3′,4′-dimethoxy-6″,6″-dimethylchromeno-[2″,3″:7,8]-flavanone	$C_{22}H_{22}O_5$	$CDCl_3$	[52]
4-1-127	5-hydroxy-4′-methoxy-2″,2″-dimethylpyrano-[7,8:6″,5″]-flavanone	$C_{21}H_{20}O_5$	$CDCl_3$	[55]
4-1-128	brosimacutin D	$C_{20}H_{20}O_5$	CD_3OD	[45]
4-1-129	pongamone B	$C_{24}H_{24}O_7$	$CDCl_3$	[28]
4-1-130	pongamone C	$C_{26}H_{26}O_5$	$CDCl_3$	[28]
4-1-131	dorsmanin I	$C_{25}H_{26}O_6$	CD_3COCD_3	[56]
4-1-132	dorsmanin J	$C_{25}H_{28}O_6$	CD_3COCD_3	[56]
4-1-133	dinklagin A	$C_{25}H_{26}O_4$	$CDCl_3$	[12]
4-1-134	euchrenone a_5	$C_{25}H_{26}O_4$	$CDCl_3$	[57]
4-1-135	cycloaltilisin 7	$C_{25}H_{26}O_5$	CD_3COCD_3	[58]
4-1-136	dorsamin B	$C_{25}H_{28}O_4$	$CDCl_3$	[11]
4-1-137	sophoranodichromane B	$C_{25}H_{28}O_5$	$CDCl_3$	[59]
			CD_3COCD_3	[59]
4-1-138	5,6-7,8-bis-(2,2-dimethylchromano)-3′,4′-dihydroxy-flavanone	$C_{25}H_{28}O_6$	CD_3OD	[49]
4-1-139	tonkinochromane B	$C_{30}H_{36}O_4$	CD_3COCD_3	[60]
4-1-140	tonkinochromane A	$C_{30}H_{36}O_4$	CD_3COCD_3	[60]



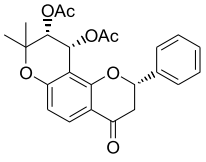
4-1-124



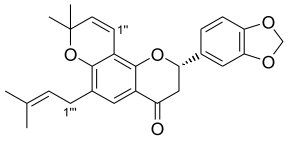
	R^1	R^2	R^3
4-1-125	H	OCH_2O	
4-1-126	H	OMe	OMe
4-1-127	OH	H	OMe



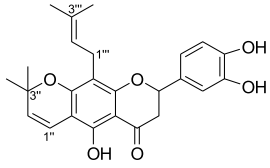
4-1-128



4-1-129

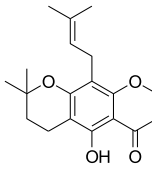


4-1-130

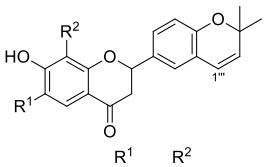


4-1-131

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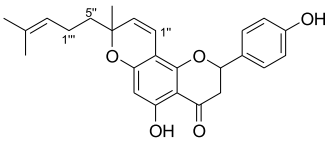


4-1-132

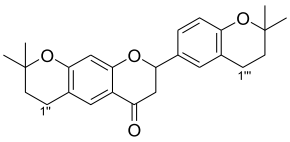


	R^1	R^2
4-1-133	Prenyl	H
4-1-134	H	Prenyl

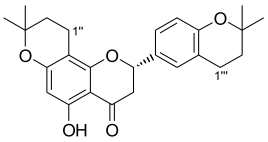
Note: Prenyl =



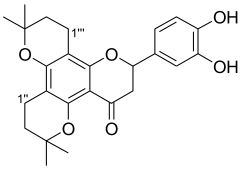
4-1-135



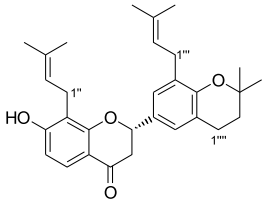
4-1-136



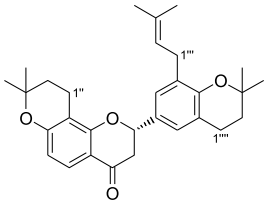
4-1-137



4-1-138



4-1-139



4-1-140

Table 4-1-43: ^{1}H NMR spectroscopic data of flavanone-type flavones **4-1-124**~**4-1-127**.

H	4-1-124	4-1-125	4-1-126	4-1-127
2	5.46 dd(13.1, 3.1)	5.37 dd(13.0, 3.0)	5.42 dd(12.9, 3.0)	5.36 dd(13.0, 3.0)
3	ax 3.02 dd(16.8, 13.1)	ax 2.98 dd(16.8, 13.0)	ax 3.04 dd(16.8, 12.9)	3.04 dd(17.2, 13.0)
	eq 2.84 dd(16.8, 3.1)	eq 2.79 dd(16.8, 3.0)	eq 2.82 dd(16.8, 3.0)	2.78 dd(17.2, 3.0)
5	7.28 s	7.74 d(8.4)	7.74 d(8.7)	12.10 br s(OH)
6	3.87 s(OMe)	6.50 d(8.4)	6.50 d(8.7)	6.00 s
2′	7.39 m	6.99 d(1.6)	7.08 m	7.38 d(8.7)
3′	7.39 m			6.95 d(8.7)
4′	7.39 m			
5′	7.39 m	6.84 d(7.9)	6.91 d(9.0)	6.95 d(8.7)
6′	7.39 m	6.91 dd(7.9, 1.6)	7.08 m	7.38 d(8.7)

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Table 4-1-43 (continued)

H	4-1-124	4-1-125	4-1-126	4-1-127
1″	6.65 d(9.9)	6.63 d(10.0)	6.64 d(10.0)	6.52 d(10.1)
2″	5.60 d(9.9)	5.57 d(10.0)	6.57 d(10.0)	5.45 d(10.1)
4″, 5″	1.58 s, 1.58 s	1.47 s, 1.44 s	1.47 s, 1.44 s	1.44 s, 1.42 s
OCH_2O		6.00 s		
OMe			3.91 s, 3.92 s	3.84 s

Table 4-1-44: ^{1}H NMR spectroscopic data of flavanone-type flavones **4-1-128**~**4-1-131**.

H	4-1-128	4-1-129	4-1-130	4-1-131
2	5.42 dd(13.3, 3.3)	5.51 dd(10.5, 3.0)	5.38 dd(13.0, 3.0)	5.41 dd(12.6, 3.0)
3	3.06 dd(16.7, 13.3)	3.06 dd(17.0, 10.5)	3.00 dd(16.5, 13.0)	3.13 dd(17.1, 12.6)
	2.74 dd(16.7, 3.3)	2.90 dd(17.0, 3.0)	2.79 dd(16.5, 3.0)	2.78 dd(17.1, 3.0)
5	7.62 d(8.7)	7.90 d(8.5)	7.62 s	12.46 br s(OH)
6	6.46 d(8.7)	6.60 d(8.5)		
2′	7.35 d(8.5)	7.48 m	7.01 d(1.5)	6.88 br s
3′	6.82 d(8.4)	7.43 m		
4′		7.38 m		
5′	6.82 d(8.4)	7.43 m	6.86 d(8.0)	6.88 br s
6′	7.35 d(8.5)	7.48 m	6.92 dd(8.0, 1.5)	7.06 br s
1″	2.63 dd(15.0, 6.0)	6.36 d(4.5)	6.65 d(10.0)	6.58 br d(10.2)
	2.89 dd(15.0, 4.5)			
2″	3.78 dd(6.0, 4.5)	5.22 d(4.5)	5.59 d(10.0)	5.62 br d(10.2)
4″, 5″	1.31 s, 1.32 s	1.44 s, 1.48 s	1.46 s, 1.49 s	1.45 br s, 1.43 br s
1‴			3.38 d(7.5)	3.20 br d(7.5)
2‴			5.26 t(7.5)	5.14 br dt(7.5, 1.2)
4‴, 5‴			1.75 s, 1.75 s	1.62 br s, 1.66 br s
OCH_2O			6.03 s	
OAc		1.99 s, 2.09 s		

Table 4-1-45: ^{1}H NMR spectroscopic data of flavanone-type flavones **4-1-132**~**4-1-135**.

H	4-1-132	4-1-133	4-1-134	4-1-135
2	5.35 dd(12.6, 3.1)	5.35 dd(13.4, 2.8)	5.35 dd(13.2, 2.9)	5.49 dd(13.0, 3.0)
3	3.07 dd(17.2, 12.4)	3.00 dd(16.8, 13.3)	2.77 dd(16.7, 2.9)	3.18 dd(17.0, 13.0)
	2.74 dd(17.2, 3.1)	2.78 dd(16.9, 2.8)	3.01 dd(16.7, 13.2)	2.76 dd(17.0, 3.0)
5	12.47 br s(OH)	7.71 s	7.72 d(8.4)	12.18 s(OH)
6			6.52 d(8.4)	5.87 s
7		6.02 br s(OH)		
8		6.45 s		
2′	6.87 br s	7.09 d(2.1)	7.05 d(2.2)	7.40 d(8.6)
3′				6.90 d(8.6)

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Table 4-1-45 (continued)

H	4-1-132	4-1-133	4-1-134	4-1-135
5′	6.87 br s	6.82 d(8.3)	6.79 d(8.4)	6.90 d(8.6)
6′	7.10 br s	7.20 dd(8.3, 2.1)	7.15 dd(8.4, 2.2)	7.40 d(8.6)
1″	1.80 br t(6.9)	3.34 d(7.1)	3.42 br d(7)	6.54 d(10.2)
2″	2.57 br dt(6.9, 1.2)	5.30 br t(7.1)	5.29 br t(7)	5.53 d(10.2)
4″	1.34 br s	1.79 s	1.75 or 1.48 s	1.37 s
5″	1.33 br s	1.79 s	1.75 or 1.48 s	1.72 m, 1.64 m
1‴	3.17 br d(7.2)	6.35 d(9.9)	6.32 d(9.9)	2.07 m
2‴	5.15 br t(7.2)	5.76 d(9.8)	5.65 d(9.9)	5.09 tm(7.2)
4‴, 5‴	1.60 br s, 1.64 br s	1.46 s	1.48 or 1.75 s	1.55 dm(0.8), 1.63 dm(1.3)

Table 4-1-46: ^{1}H NMR spectroscopic data of flavanone-type flavones **4-1-136**~**4-1-138**.

H	4-1-136	4-1-137 (CD_3COCD_3)	4-1-137($CDCl_3$)	4-1-138
2	5.31 dd(13.2, 2.7)	5.47 dd(13.0, 3.0)	5.32 dd(13.2, 3.0)	5.24 dd(12.7, 3.0)
3	3.04 dd(17.0, 13.2)	3.16 dd(17.0, 13.0)	3.05 dd(17.0, 13.2)	α 2.90 dd(16.5, 12.7)
	2.74 dd(17.0, 2.7)	2.78 dd(17.0, 3.0)	2.76 dd(17.0, 3.0)	β 2.64 dd(16.5, 3.0)
5	7.68 br s	11.88 s(OH)	11.78 s(OH)	
6		5.82 s	5.96 s	
8	6.39 s			
2′	7.17 br s	7.28 m	7.20 d(2.2)	6.92 br s
5′	6.82 d(9.0)	6.77 d(9.0)	6.82 d(8.2)	6.77 br s
6′	7.19 br d(9.0)	7.28 m	7.17 dd(8.2, 2.2)	6.77 br s
1″	2.78 q(6.8)	2.59 m	2.58 m	2.51 t(6.8)
2″	1.82 t(6.8)	1.79 m	1.75 m	1.77 t(6.8)
4″, 5″	1.35 s	1.33 s, 1.31 s	1.34 s, 1.32 s	1.33, 1.35, 1.36 or 1.38 s
1‴	2.78 q(6.8)	2.83 t(6.8)	2.81 t(6.9)	2.60 t(6.6)
2‴	1.82 t(6.8)	1.84 t(6.8)	1.83 t(6.9)	1.83 t(6.6)
4‴, 5‴	1.35 s	1.32 s, 1.32 s	1.35 s, 1.35 s	1.33, 1.35, 1.36 or 1.38 s

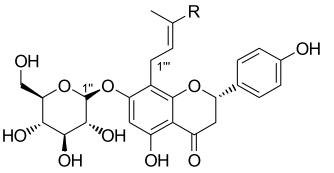
Table 4-1-47: ^{1}H NMR spectroscopic data of flavanone-type flavones **4-1-139** and **4-1-140**.

H	4-1-139	4-1-140	H	4-1-139	4-1-140
2	5.39 dd(12.8, 2.7)	5.40 dd(12.9, 2.8)	1‴	3.28 d(7.3)	3.27 d(7.4)
3	2.98 dd(16.7, 12.8)	2.98 dd(16.7, 12.9)	2‴	5.31 t(7.3)	5.30 t(7.4)
	2.70dd(16.7, 2.7)	2.68 dd(16.7, 2.8)			
5	7.59 d(8.6)	7.59 d(8.8)	4‴, 5‴	1.73 s, 1.70 s	1.72 s, 1.69 s
6	6.62 d(8.6)	6.43 d(8.8)	1⁗	2.82 t(6.7)	2.80 t(6.6)
2′	7.16 br s	7.15 br s	2⁗	1.84 t(6.7)	1.81 t(6.6)
6′	7.11 br s	7.10 br s	4⁗, 5⁗	1.34 s, 1.34 s	1.33 s, 1.33 s
1″	3.35 d(7.1)	2.65 m	OH	9.20 br s	
2″	5.26 t(7.1)	1.80 m			
4″, 5″	1.64 s, 1.66 s	1.31 s, 1.33 s			

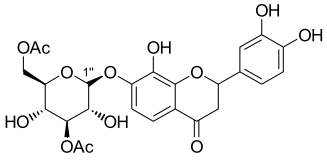
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Table 4-1-48: Cos, MFs, and TSs of flavanone-type flavones **4-1-141**~**4-1-144**.

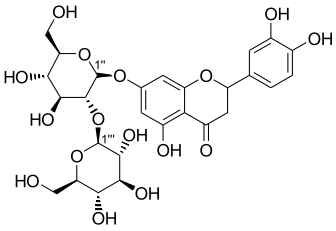
No.	Compounds	MFs	Test solvents	References
4-1-141	phellodensin E	$C_{26}H_{30}O_{11}$	CD_3COCD_3	[53]
4-1-142	phellodensin F	$C_{26}H_{30}O_{10}$	CD_3COCD_3	[53]
4-1-143	bidenoside F	$C_{25}H_{26}O_{13}$	CD_3OD	[61]
4-1-144	eriodictyol 7-*O*-sophoroside	$C_{27}H_{32}O_{16}$	DMSO-d_6	[62]



4-1-141 R = CH_2OH
4-1-142 R = Me



4-1-143



4-1-144

Table 4-1-49: ^{1}H NMR spectroscopic data of flavanone-type flavones **4-1-141**~**4-1-144**.

H	4-1-141	4-1-142	4-1-143	4-1-144
2	5.48 dd(12.6, 2.8)	5.47 dd(12.6, 3.0)	5.40 dd(13.0, 3.0)	5.34 dd(11.0, 5.0)
3	*α* 3.17 dd(17.1, 12.6)	*α* 3.18 dd(17.0, 12.6)	3.10 dd(17.0, 13.0)	2.78 dd(17.0, 11.0)
	β 2.78~2.84 m	*β* 2.70~2.90 m	2.79 dd(17.0, 3.0)	3.17 dd(17.0, 5.0)
5	12.08 s(OH)	12.08 s(OH)	7.37 d(9.0)	
6	6.29 s	6.29 s	6.86 d(9.0)	6.92 d(2.0)
8				6.36 d(2.0)
2′	7.40 d(8.6)	7.40 d(8.6)	6.98 d(2.0)	6.22 d(2.5)
3′	6.89 d(8.6)	6.89 d(8.6)		
4′	8.49 br s(OH)	8.49 br s(OH)		
5′	6.89 d(8.6)	6.89 d(8.6)	6.79 d(8.2)	6.39 d(8.5)
6′	7.40 d(8.6)	7.40 d(8.6)	6.84 dd(8.2, 2.0)	7.26 dd(8.5, 2.5)
1″	5.06 d(7.6)	5.05 d(7.5)	5.06 d(7.9)	5.20 d(7.8)
2″	3.43~3.65 m	3.51~3.57 m	3.68 dd(8.4, 7.9)	3.70 m
3″	3.43~3.65 m	3.51~3.57 m	5.04 dd(9.5, 8.4)	3.50 m
4″	3.43~3.65 m	3.44~3.51 m	3.55 dd(9.5, 9.6)	3.65 m
5″	3.43~3.65 m	3.57~3.62 m	3.78 m	3.69 m
6″	3.65~3.75 m	3.71 m	4.26 dd(12.0, 6.4)	3.89 dd(11.8, 2.0)
	3.84~3.90 m	3.90 m	4.41 dd(12.0, 2.7)	3.70 m

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Table 4-1-49 (continued)

H	4-1-141	4-1-142	4-1-143	4-1-144
1‴	3.23 dd(14.4, 7.6) 3.41 dd(14.4, 7.6)	3.18 dd(13.9, 7.5) 3.36 dd(13.9, 7.5)		4.65 d(7.8)
2‴	5.43~5.48 m	5.20 t(7.3)		3.23 m
3‴				3.40 m
4‴	3.86 br s	1.60 s		3.53 m
5‴	1.64 s	1.60 s		3.42 m
6‴				3.68 m, 3.65 m
OAc			2.05 s, 2.13 s	

4.1.3 Flavone *O*-glycoside-type flavones

Table 4-1-50: Cos, MFs, and TSs of flavone O-glycoside-type flavones **4-1-145**~**4-1-187**.

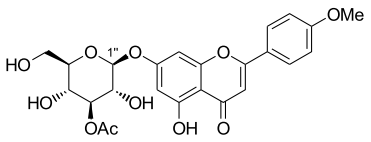
No.	Compounds	MFs	Test solvents	References
4-1-145	acacetin 7-*O*-(3-*O*-acetyl-*β*-D-glucopyranoside)	$C_{24}H_{24}O_{11}$	DMSO-d_6	[63]
4-1-146	5,7,2′-trihydroxy-8-methoxyflavone-7-*O*-*β*-D-gluco-pyranoside	$C_{22}H_{22}O_{11}$	DMSO-d_6	[64]
4-1-147	5,7-dihydroxy-8,2′-dimethoxyflavone-7-*O*-*β*-D-gluco-pyranoside	$C_{23}H_{24}O_{11}$	DMSO-d_6	[64]
4-1-148	5,7,2′,5′-tetrahydroxyflavone-7-*O*-*β*-D-glucuronopyranoside	$C_{21}H_{18}O_{12}$	DMSO-d_6	[64]
4-1-149	tricetin 3′,4′,5′-trimethyl ether 7-*O*-*β*-D-glucopyranoside	$C_{24}H_{26}O_{12}$	DMSO-d_6	[65]
4-1-150	apigenin-7-(6″-malonyl-Glu)	$C_{24}H_{22}O_{13}$	CD_3OD	[66]
4-1-151	apigenin-7-(6″-caffeoyl-Glu)	$C_{30}H_{26}O_{13}$	CD_3OD	[66]
4-1-152	apigenin-7-(6″-acetyl-Glu)	$C_{23}H_{22}O_{11}$	CD_3OD	[66]
4-1-153	apigenin-7-(4″-acetyl, 6″-malonyl-Glu)	$C_{25}H_{24}O_{14}$	CD_3OD	[66]
4-1-154	apigenin-7-(4″,6″-di-acetyl-Glu)	$C_{24}H_{24}O_{12}$	CD_3OD	[66]
4-1-155	3′-hydroxyscutellarein-7-*O*-(6″-*O*-protocatechuoyl)-*β*-glucopyranoside	$C_{28}H_{24}O_{15}$	CD_3OD	[67]
4-1-156	3′-hydroxyscutellarein-7-*O*-(6″-*O*-*trans*-feruloyl)-*β*-glucopyranoside	$C_{31}H_{28}O_{15}$	CD_3OD	[67]
4-1-157	6-hydroxyluteolin-7-*O*-(6″-*O*-(*E*)-caffeoyl)-*β*-glucopyra-noside	$C_{30}H_{26}O_{15}$	DMSO-d_6	[68]
4-1-158	3′-demethoxysudachiin C	$C_{29}H_{32}O_{16}$	CD_3OD	[69]
4-1-159	6-hydroxyluteolin-7-*O*-laminaribioside	$C_{27}H_{30}O_{17}$	DMSO-d_6	[62]
4-1-160	5,6,4′-trihydroxyflavone-7-*O*-*α*-L-2,3-di-*O*-acetylrhamno-pyranosyl-(1→6)-*β*-D-glucopyranoside	$C_{31}H_{34}O_{17}$	CD_3OD	[70]
4-1-161	apigenin-7-*O*-*α*-L-3-O-acetylrhamnopyranosyl-(1→6)-*β*-D-glucopyranoside	$C_{29}H_{32}O_{15}$	CD_3OD	[70]
4-1-162	apigenin-7-*O*-*α*-L-2,3-di-*O*-acetylrhamnopyranosyl-(1→6)-*β*-D-glucopyranoside	$C_{31}H_{34}O_{16}$	CD_3OD	[70]

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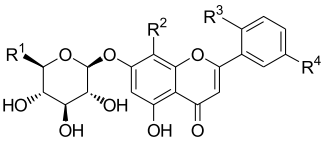
Table 4-1-50 (continued)

No.	Compounds	MFs	Test solvents	References
4-1-163	6-hydroxyluteolin-4′-methyl-ether-7-*O*-*α*-rhamnopyranosyl(1‴ → 2‴)[6″-*O*-aceyl-*β*-glucopyranoside]	$C_{30}H_{34}O_{17}$	DMSO-d_6	[68]
4-1-164	isoscutellarein-7-*O*-(6‴-O-acetyl)-*β*-allopyranosyl(1‴ → 2″)-*β*-glucopyranoside	$C_{29}H_{32}O_{17}$	DMSO-d_6	[68]
4-1-165	isoscutellarein-4′-methyl-ether-7-*O*-(6‴-*O*-acetyl)-*β*-allo-pyranosyl(1‴ → 2″)-*β*-glucopyranoside	$C_{30}H_{34}O_{17}$	DMSO-d_6	[68]
4-1-166	luteolin-7-*O*-[2″-*O*-(4‴-*O*-acetyl-*α*-L-rhamnopyranosyl)]-*β*-D-glucuronopyranoside	$C_{29}H_{30}O_{17}$	CD_3OD	[71]
4-1-167	ozturkoside A	$C_{39}H_{40}O_{20}$	DMSO-d_6	[72]
4-1-168	ozturkoside B	$C_{37}H_{38}O_{19}$	DMSO-d_6	[72]
4-1-169	ozturkoside C	$C_{39}H_{40}O_{19}$	DMSO-d_6	[72]
4-1-170	echioidinin 2′-*O*-*β*-D-(6″-*O*-acetyl)glucopyranoside	$C_{24}H_{24}O_{11}$	DMSO-d_6	[4]
4-1-171	5,7,2′-trihydroxy-8-methoxyflavone-2′-*O*-*β*-D-glucopyra-noside	$C_{22}H_{22}O_{11}$	DMSO-d_6	[64]
4-1-172	5,7,2′-trihydroxyflavone-2′-*O*-*β*-D-glucopyranoside	$C_{21}H_{20}O_{10}$	DMSO-d_6	[64]
4-1-173	5,2′,6′-trihydroxy-7-methoxyflavone-2′-*O*-*β*-D-(2″-*O*-acetyl)glucopyranoside	$C_{24}H_{24}O_{12}$	DMSO-d_6	[73]
4-1-174	5,2′,6′-trihydroxy-7-methoxyflavone-2′-*O*-*β*-D-(2″,6″-di-*O*-acetyl)glucopyranoside	$C_{26}H_{26}O_{13}$	CD_3COCD_3	[73]
4-1-175	5,2′,6′-trihydroxy-7-methoxyflavone-2′-*O*-*β*-D-(3″,6″-di-*O*-acetyl)glucopyranoside	$C_{26}H_{26}O_{13}$	CD_3COCD_3	[73]
4-1-176	5,2′,6′-trihydroxy-7-methoxyflavone-2′-*O*-*β*-D-(6″-*O*-*trans*-crotonyl)glucopyranoside	$C_{26}H_{26}O_{12}$	DMSO-d_6	[73]
4-1-177	pongamoside A	$C_{23}H_{20}O_9$	DMSO-d_6	[74]
4-1-178	pongamoside B	$C_{24}H_{22}O_{10}$	DMSO-d_6	[74]
4-1-179	7,8,3′,4′-tetrahydroxyl-6-*C*-[*α*-L-rhamnopyranosyl-(1→2)]-*β*-D-glucopyranosyl flavone	$C_{27}H_{30}O_{15}$	CD_3OD	[75]
4-1-180	5,2′,6′-trihydroxy-7-methoxyflavone-5-*O*-*β*-D-(6″-*O*-acetyl) glucopyranoside	$C_{24}H_{24}O_{12}$	CD_3COCD_3	[73]
4-1-181	5-hydroxy-7,3′,4′,5′-tetra-methoxyflavone-5-*O*-*β*-D-xylo-pyranosyl-(1→2)-*α*-L-rhamnopyranoside	$C_{30}H_{36}O_{15}$	$CDCl_3$	[76]
4-1-182	apigenin-4′-*O*-(2″-*O*-*p*-coumaroyl)-*β*-D-glucopyranoside	$C_{30}H_{26}O_{12}$	CD_3COCD_3	[77]
4-1-183	apigenin-4′-*O*-(6″-*O*-*p*-coumaroyl)-*β*-D-glucopyranoside	$C_{30}H_{26}O_{12}$	CD_3COCD_3	[77]
4-1-184	–	$C_{52}H_{46}O_{21}$	$CDCl_3$	[78]
4-1-185	–	$C_{52}H_{46}O_{21}$	$CDCl_3$	[78]
4-1-186	–	$C_{51}H_{44}O_{20}$	$CDCl_3$	[78]
4-1-187	–	$C_{51}H_{44}O_{20}$	$CDCl_3$	[78]

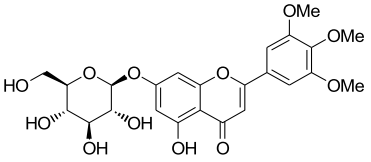
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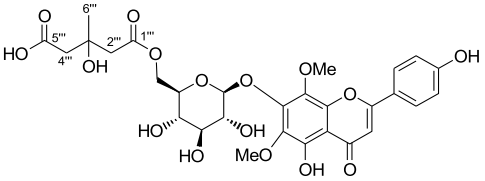
4-1-145



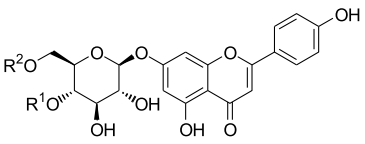
	R^1	R^2	R^3	R^4
4-1-146	CH_2OH	OMe	OH	H
4-1-147	CH_2OH	OMe	OMe	H
4-1-148	COOH	H	OH	OH



4-1-149



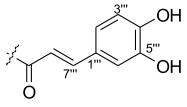
4-1-158

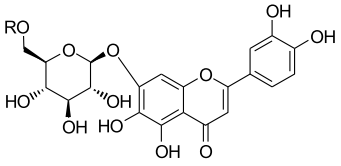


	R^1	R^2
4-1-150	H	Mal
4-1-151	H	Caff
4-1-152	H	Ac
4-1-153	Ac	Malonyl
4-1-154	Ac	Ac

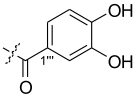
Mal = $COCH_2COOH$

Caff =

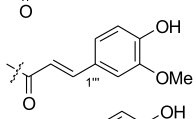




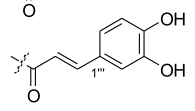
4-1-155 R =

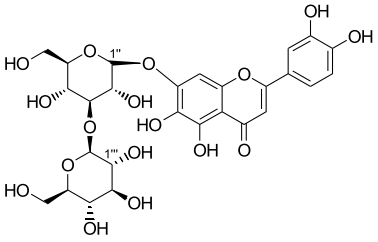


4-1-156 R =

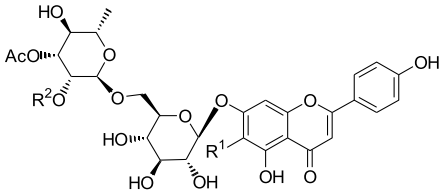


4-1-157 R=



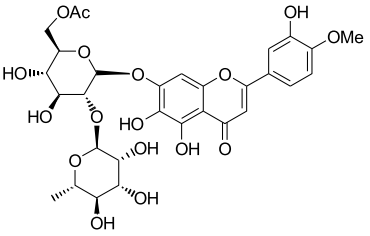


4-1-159

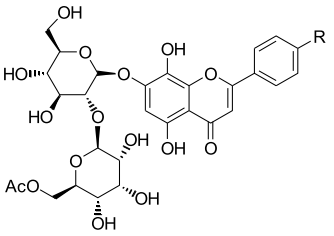


	R^1	R^2
4-1-160	OH	Ac
4-1-161	H	H
4-1-162	H	Ac

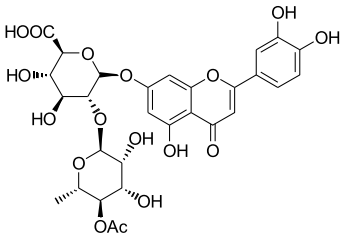
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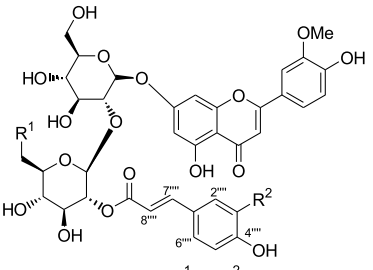
4-1-163



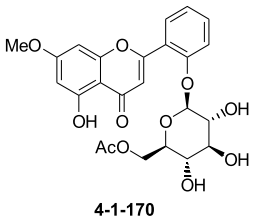
4-1-164 R = OH
4-1-165 R = OMe



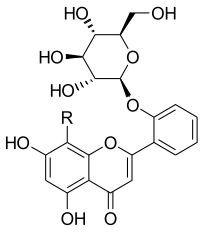
4-1-166



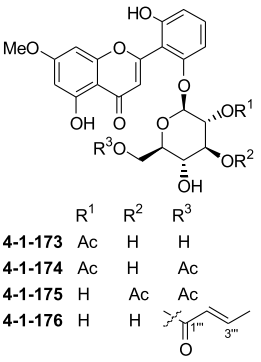
	R^1	R^2
4-1-167	OAc	OH
4-1-168	OH	OH
4-1-169	OAc	H



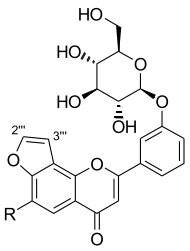
4-1-170



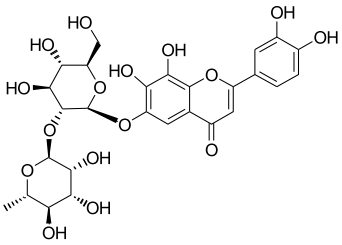
4-1-171 R = OMe
4-1-172 R = H



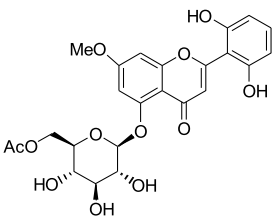
	R^1	R^2	R^3
4-1-173	Ac	H	H
4-1-174	Ac	H	Ac
4-1-175	H	Ac	Ac
4-1-176	H	H	



4-1-177 R = H
4-1-178 R = OMe

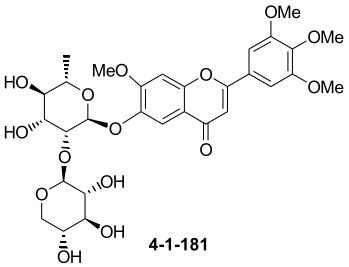


4-1-179

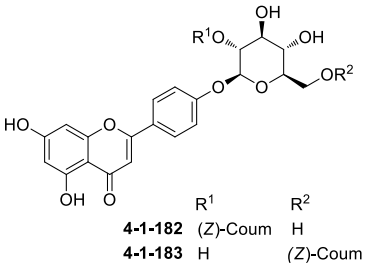


4-1-180

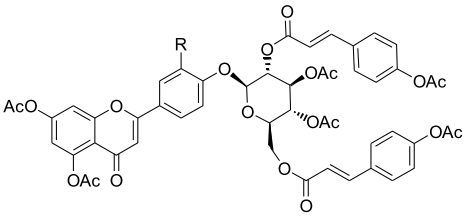
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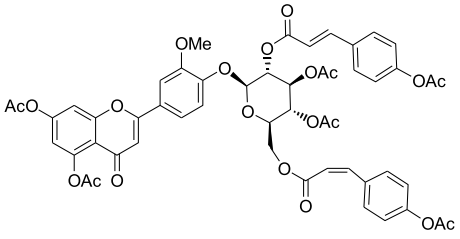
4-1-181



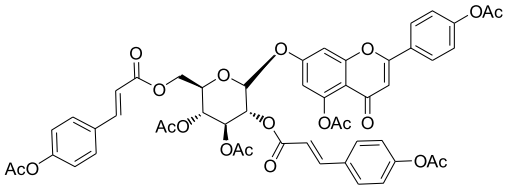
	R^1	R^2
4-1-182	(*Z*)-Coum	H
4-1-183	H	(*Z*)-Coum



4-1-184 R = OMe
4-1-186 R = H



4-1-185



4-1-187

Table 4-1-51: ^{1}H NMR spectroscopic data of flavone O-glycoside-type flavones **4-1-145**~**4-1-148**.

H	4-1-145	4-1-146	4-1-147	4-1-148
3	6.95 s	7.13 s	6.91 s	7.14 s
5	12.92 s(OH)	12.59 s(OH)	12.53 s(OH)	12.91 s(OH)
6	6.87 d(2.0)	6.66 s	6.68 s	6.44 d(2.2)
8	6.47 d(2.0)	3.87 s(OMe)	3.85 s(OMe)	6.78 d(2.2)
2′	8.06 d(8.8)	10.91 s(OH)	3.94 s(OMe)	10.22 s(OH)

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Table 4-1-51 (continued)

H	4-1-145	4-1-146	4-1-147	4-1-148
3′	7.13 d(8.8)	7.08 br d(8.0)	7.28 br d(8.0)	6.90 d(8.8)
4′	3.87 s(OMe)	7.43 ddd(8.0, 8.0, 2.0)	7.61 br dd(8.0, 8.0)	6.85 dd(2.4, 8.8)
5′	7.13 d(8.8)	7.05 br dd(8.0, 8.0)	7.19 br dd(8.0, 8.0)	9.24 s(OH)
6′	8.06 d(8.8)	7.89 dd(8.0, 2.0)	7.88 br d(8.0)	7.28 d(2.4)
1″	5.23 d(7.8)	5.07 d(7.6)	5.08 d(7.6)	5.18 d(7.4)
2″	3.41 dd(9.5, 7.8)	3.18~3.55 m	3.18~3.40 m	3.16~3.50 m
3″	4.92 t(9.5)	3.18~3.55 m	3.18~3.40 m	3.16~3.50 m
	2.06 s(OAc)			
4″	3.41 dd(9.5, 8.8)	3.18~3.55 m	3.18~3.40 m	3.16~3.50 m
5″	3.53 m	3.42 m	3.45 m	3.80 d(9.0)
6″	3.71 dd(11.7, 6.1)	3.84 m	3.48 m	
	3.46 dd(11.7, 3.9)	3.71 dd(5.8, 11.0)	3.71 m	
		4.61 t(5.8, OH)	4.62 t(5.8, OH)	
2″,3″,4″-OH		5.06 d(5.0)	5.08 br s	5.31 d(4.0)
		5.14 d(4.5)	5.14 br s	5.48 d(5.2)
		5.40 d(5.0)	5.41 br s	

Table 4-1-52: ^{1}H NMR spectroscopic data of flavone O-glycoside-type flavones **4-1-149**, **4-1-150**, **4-1-152**, and **4-1-153**.

H	4-1-149	4-1-150	4-1-152	4-1-153
3	7.13 s	6.86 s	6.69 s	6.87 s
5	12.81 br s(OH)			
6	6.49 d(2.1)	6.44 d(2.3)	6.53 d(1.5)	6.47 d(2.0)
8	6.94 d(2.1)	6.81 d(2.3)	6.82 d(1.5)	6.82 d(2.0)
2′, 6′	7.37 s	7.69 d(8.9)	7.90 d(8.0)	7.96 d(8.9)
3′, 5′	3.91 s(OMe)	6.94 d(8.9)	6.96 d(8.0)	6.94 d(8.9)
4′	3.77 s(OMe)			
1″	5.05 d(7.3)	5.11 d(7.3)	5.07 d(7.5)	5.24 d(7.9)
2″	3.29 m	3.38 m	3.53 m	3.40 dd(7.9, 9.3)
3″	3.32 m	3.38 m	3.53 m	3.57 dd(9.3, 9.3)
4″	3.17 m	3.20 dd(8.9, 8.9)	3.40 dd(9.0, 9.0)	4.68 dd(9.3, 9.3)
5″	3.46 m	3.76 ddd(8.9, 6.9, 8.9)	3.80 ddd(2.5, 4.5, 9.0)	4.11 m
6″	3.74 m	4.16 dd(6.9, 11.8)	4.27 dd(4.5, 11.5)	4.11 m
	3.48 m	4.40 dd(1.5, 11.8)	4.48 dd(2.5, 11.5)	
OH	5.32 d(4.8, 2″-OH)			
	5.04 d(4.6, 3″-OH)			
	4.99 d(5.3, 4″-OH)			
	4.57 t(5.6, 6″-OH)			
OAc			2.10 s	2.07 s
Mal		3.38 s		3.33 s

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Table 4-1-53: ^{1}H NMR spectroscopic data of flavone O-glycoside-type flavones **4-1-151** and **4-1-154**~**4-1-156**.

H	4-1-151	4-1-154	4-1-155	4-1-156
3	6.57 s	6.56 s	6.54 s	6.35 s
6	6.54 d(1.5)	6.43 d(1.5)		
8	6.77 d(1.5)	6.71 d(1.5)	6.83 s	6.79 s
2′	7.80 d(8.0)	7.80 d(8.0)	7.27 d(2.1)	7.23 br s
3′	6.89 d(8.0)	6.92 d(8.0)		
5′	6.89 d(8.0)	6.92 d(8.0)	6.82 d(8.5)	6.80 d(8.5)
6′	7.80 d(8.0)	7.80 d(8.0)	7.21 dd(8.5, 2.1)	7.21 dd(8.0, 2.1)
1″	5.12 d(7.5)	5.09 d(7.5)	5.12 d(7.6)	5.09 d(7.6)
2″	3.56 m	3.63 dd(7.5, 9.0)	3.64 t(9.1)	3.63 dd(9.1, 7.0)
3″	3.56 m	3.77 dd(9.0, 9.0)	3.59 t(9.1)	3.58 t(9.1)
4″	3.44 dd(9.0, 9.0)	4.92 dd(9.0, 9.0)	3.52 t(9.1)	3.43 t(9.2)
5″	3.87 ddd(2.5, 4.5, 9.0)	3.99 m	3.88 m	3.88 m
6″	4.30 dd(4.5, 11.5)	4.28 m	4.76 dd(11.9, 2.4)	4.75 dd(11.9, 2.4)
	4.68 dd(2.5, 11.5)		4.37 dd(12.2, 6.7)	4.27 dd(11.9, 8.5)
2‴	6.48 d(1.5)		7.34 d(2.4)	6.71 d(1.8)
5‴	6.62 d(8.0)		6.51 d(7.9)	6.49 d(8.2)
6‴	6.71 dd(8.0, 1.5)		7.36 dd(8.2, 2.1)	6.55 dd(8.2, 1.8)
7‴	7.46 d(16.0)			7.43 d(15.8)
8‴	6.24 d(16.0)			6.21 d(15.8)
OMe				3.63 s
OAc		2.20 s, 2.20 s		

Table 4-1-54: ^{1}H NMR spectroscopic data of flavone O-glycoside-type flavones **4-1-157**~**4-1-160**.

H	4-1-157	4-1-158	4-1-159	4-1-160
3	6.61 s	6.64 s	6.71 s	6.61 s
5	12.74 br s(OH)			
6		4.04 s(OMe)		
8	6.91 s	3.95 s(OMe)	6.98 s	6.89 s
2′	7.38 d(2.3)	7.86 br d(7.9)	7.42 m	7.81 d(7.8)
3′		6.93 br d(7.9)		6.92 d(7.8)
5′	6.83 d(8.8)	6.93 br d(7.9)	6.91 dd(2.5, 8.0)	6.92 d(7.8)
6′	7.38 dd(8.8, 2.3)	7.86 br d(7.9)	7.42 m	7.81 d(7.8)
1″	5.12 d(7.1)	5.43 d(7.2)	5.27 d(8.0)	5.10 d(7.8)
2″	3.41 m	3.47~3.58 m	3.57 m	3.59 dd(9.0, 7.8)
3″	3.40 m	3.47~3.58 m	3.54 m	3.53 t(9.0)
4″	3.32 m	3.47~3.58 m	3.69 m	3.45 t(9.0)
5″	3.83 m	3.47~3.58 m	3.30 m	3.75 dd(9.0,6.0)
6″	4.44 dd(11.9, 2.1)	4.43 br d(11.9)	3.29 dd(12.0, 2.0)	4.05 d(9.6)
	4.26 dd(11.9, 6.1)	4.26 dd(11.9, 5.8)	3.24 dd(12.0, 6.0)	3.77 dd(9.6, 6.0)
1‴			4.64 d(8.0)	4.74 d(1.8)
2‴	6.90 d(2.0)	2.66 d(14.6)	3.20 m	5.18 dd(3.6, 1.8)
		2.54 d(5.1)		1.94 s(OAc)
3‴			3.16 m	5.03 dd(9.6, 3.6)
				1.78 s(OAc)

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Table 4-1-54 (continued)

H	4-1-157	4-1-158	4-1-159	4-1-160
4‴		2.57 d(14.6) 2.54 d(5.1)	3.04 m	3.41 t(9.6)
5‴	6.56 d(8.3)		3.16 m	3.78 dd(9.6, 6.0)
6‴	6.74 dd(8.3, 2.0)	1.25 s	3.16 m 3.07 dd(11.6, 2.0)	1.77 d(6.0)
7‴	7.40 d(15.9)			
8‴	6.20 d(15.9)			

Table 4-1-55: ^{1}H NMR spectroscopic data of flavone O-glycoside-type flavones **4-1-161**~**4-1-164**.

H	4-1-161	4-1-162	4-1-163	4-1-164
3	6.63 s	6.65 s	6.76 s	6.80 s
5			12.69 s(OH)	12.33 s(OH)
6	6.47 d(1.8)	6.49 d(1.8)		6.70 s
8	6.75 d(1.8)	6.47 d(1.8)	6.94 s	
2′	7.85 d(8.4)	7.88 d(9.0)	7.44 d(2.3)	7.97 d(8.9)
3′	6.91 d(8.4)	6.93 d(9.0)		6.95 d(8.9)
4′			3.88 s(OMe)	
5′	6.91 d(8.4)	6.93 d(9.0)	7.11 d(8.7)	6.95 d(8.9)
6′	7.85 d(8.4)	7.88 d(9.0)	7.54 dd(8.6, 2.3)	7.97 d(8.9)
1″	5.06 d(7.2)	5.08 d(7.2)	5.36 d(7.6)	5.05 d(7.5)
2″	3.46 m	3.45 m	3.65 dd(9.5, 7.6)	3.60 m
3″	3.48 m	3.49 m	3.52 m	3.52 m
4″	3.38 t(9.0)	3.41 t(9.0)	3.25 m	3.27 m
5″	3.71 dd(9.0,6.0)	3.73 m	3.75 m	3.46 m
6″	4.02 d(9.6)	4.04 d(9.6)	4.32 dd(11.9, 1.9)	3.75 dd(11.5, 1.5)
	3.65 d(9.6, 6.0)	3.69 d(9.6, 6.0)	4.06 dd(12.0, 7.0)	3.52 m
1‴	4.69 d(1.8)	4.71 d(1.8)	5.17 d(1.4)	4.93 d(8.0)
2‴	3.99 dd(3.6, 1.8)	4.01 dd(3.0,1.8)	3.74 m	3.27 dd(8.0, 2.6)
3‴	3.47 dd(9.6, 3.6)	4.95 dd(10.0, 3.0)	3.40 dd(9.4, 3.2)	3.93 t(2.6)
4‴	3.48 t(9.6)	3.50 t(10.0)	3.17 m	3.43 dd(10.0, 2.8)
5‴	3.73 m	3.70 m	3.72 m	3.88 ddd(10.0, 4.8, 2.3)
6‴	1.16 d(6.0)	1.18 d(6.6)	1.09 d(6.1)	4.10 dd(12.0, 2.3) 4.04 dd(12.0, 4.8)
OAc	1.92 s(3‴-OAc)	2.01 s(2‴-OAc) 1.94 s(3‴-OAc)	1.94 s	1.88 s

Table 4-1-56: ^{1}H NMR spectroscopic data of flavone O-glycoside-type flavones **4-1-165**, **4-1-166**, **4-1-179**, and **4-1-181**.

H	4-1-165	4-1-166	4-1-179	4-1-181
3	6.89 s	6.73 s	6.54 s	6.78 s
5	12.28 s(OH)		6.48 s	

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Table 4-1-56 (continued)

H	4-1-165	4-1-166	4-1-179	4-1-181
6	6.71 s	6.36 d(2.0)		6.86 d(2.5)
7				3.83 s(OMe)
8		6.71 d(2.0)		6.98 d(2.5)
2′	8.09 d(8.9)	7.40 d(2.1)	7.36 s	7.22 s
3′	7.14 d(8.9)			3.84 s(OMe)
4′	3.88 s(OMe)			3.70 s(OMe)
5′	7.14 d(8.9)	6.86 d(8.7)	6.90 d(8.4)	3.84 s(OMe)
6′	8.09 d(8.9)	7.39 dd(8.7, 2.1)	7.38 d(8.4)	7.22 s
1″	5.06 d(7.6)	5.23 d(7.5)	4.87 d(8.6)	5.36 br s
2″	3.60 m	3.50 (ov)	4.56 s	4.14 br d(3.8)
3″	3.52 m	3.48 t(9.0)	3.40 s	3.83 dd
4″	3.27 m	3.19 t(9.0)	3.88	3.26 dd
5″	3.46 m	3.65 d(9.0)	3.40 s	3.68 d
6″	3.76 dd(11.5, 1.5)		3.71 s	1.04 d(6.0)
	3.52 m		3.89	
1‴	4.93 d(8.0)	5.22 d(1.8)	5.23 d(1.8)	4.36 d(7.6)
2‴	3.27 dd(8.0, 3.0)	3.70 br s	3.56 d	3.26 dd
3‴	3.93 t(2.7)	3.50 (ov)	3.40 s	3.34 dd
4‴	3.42 dd(10.0, 2.7)	4.77 t(9.7)	3.11 s	3.36
5‴	3.88 m	3.99 m	2.53 m	3.14 dd
6‴	4.10 dd(12.0, 2.3)	1.10 d(6.3)	0.75 d	
	4.03 dd(12.0, 4.9)			
OAc	1.88 s	1.98 s		

Table 4-1-57: ^{1}H NMR spectroscopic data of flavone O-glycoside-type flavones **4-1-167**~**4-1-169**.

H	4-1-167	4-1-168	4-1-169
3	6.93 s	6.93 s	6.94 s
6	6.42 d(2.0)	6.46 d(2.0)	6.42 d(2.0)
8	6.76 d(2.0)	6.85 d(2.0)	6.74 d(2.0)
2′	7.58 d(2.2)	7.56 d(2.0)	7.56 (ov)
3′	3.90 s(OMe)	3.89 s(OMe)	3.89 s(OMe)
5′	6.94 (ov)	6.94 d(8.0)	6.94 d(7.7)
6′	7.56 dd(8.2, 2.2)	7.57 dd(2.0, 8.0)	7.57 (ov)
1″	5.20 d(7.8)	5.20 d(8.1)	5.20 d(7.8)
2″	3.52 dd(7.8, 8.9)	3.56 dd(8.1, 9.5)	3.50 dd(7.8, 8.8)
3″	3.38 (ov)	3.40 (ov)	3.37 (ov)
4″	3.26 (ov)	3.22 (ov)	3.25 (ov)
5″	3.46 (ov)	3.44 (ov)	3.44 (ov)
6″	3.45 dd(4.6, 10.5)	3.49 dd(4.8, 11.5)	3.44 (ov)
	3.68 (ov)	3.58 (ov)	3.66 br d(12.0)
1‴	4.91 d(8.1)	4.92 d(8.1)	4.91 d(8.1)
2‴	4.61 dd(8.1, 9.4)	4.59 dd(8.1, 9.5)	4.61 dd(8.1, 9.3)
3‴	3.43 (ov)	3.41 (ov)	3.43 (ov)
4‴	3.20 (ov)	3.17 (ov)	3.18 (ov)

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Table 4-1-57 (continued)

H	4-1-167	4-1-168	4-1-169
5‴	3.44 (ov)	3.19 (ov)	3.45 (ov)
6‴	4.13 (ov)	3.65 dd(2.0, 12.2)	4.13 dd(2.0, 12.2)
	4.19 dd(1.9, 12.2)	3.43 (ov)	4.20 br d(12.2)
2⁗	7.02 d(2.0)	6.99 d(1.8)	7.49 d(8.5)
3⁗			6.79 d(8.5)
5⁗	6.74 d(8.1)	6.71 d(8.1)	6.79 d(8.5)
6⁗	6.95 dd(2.0, 8.1)	6.92 dd(1.8, 8.1)	7.49 d(8.5)
7⁗	7.44 d(15.9)	7.40 d(15.9)	7.50 d(15.9)
8⁗	6.24 d(15.9)	6.20 d(15.9)	6.32 d(15.9)
OAc	2.00 s		2.01 s

Table 4-1-58: ^{1}H NMR spectroscopic data of flavone O-glycoside-type flavones **4-1-170**~**4-1-172**.

H	4-1-170	4-1-171	4-1-172
3	7.04 s	7.02 s	7.01 s
5	12.87 s(OH)	12.58 s(OH)	12.90 s(OH)
6	6.38 d(2.2)	6.31 s	6.21 d(2.0)
7	3.85 s(OMe)	10.79 s(OH)	10.88 s(OH)
8	6.74 d(2.2)	3.82 s(OMe)	6.47 d(2.0)
3′	7.32 dd(7.8, 1.6)	7.37 br d(8.0)	7.35 br d(8.0)
4′	7.56 ddd(7.8, 7.8, 1.6)	7.57 ddd(8.0, 8.0, 2.0)	7.55 ddd(2.0, 8.0, 8.0)
5′	7.21 ddd(7.8, 7.8, 1.6)	7.25 br dd(8.0, 8.0)	7.21 br dd(8.0, 8.0)
6′	7.91 dd(7.8, 1.6)	7.88 dd(2.0, 8.0)	7.88 dd(2.0, 8.0)
1″	5.15 d(7.3)	5.14 d(7.6)	5.07 d(7.6)
2″	3.21~3.32 m	3.18~3.35 m	3.18~3.40 m
3″	3.21~3.32 m	3.18~3.35 m	3.18~3.40 m
4″	3.21~3.32 m	3.18~3.35 m	3.18~3.40 m
5″	3.60 ddd(9.5, 6.6, 1.9)	3.40 m	3.40 m
6″	4.05 dd(11.9, 6.6)	3.48 td(6.0, 12.0)	3.47 td(6.0, 12.0)
	4.27 dd(11.9, 1.8)	3.71 br d(12.0)	3.69 br d(12.0)
	1.98 s(OAc)	4.60 t(6.0, OH)	4.58 t(6.0, OH)
OH		5.08 d(5.0)	5.08 br s
		5.11 d(4.0)	5.13 br s
		5.33 d(4.4)	5.23 br s

Table 4-1-59: ^{1}H NMR spectroscopic data of flavone O-glycoside-type flavones **4-1-173**~**4-1-175** and **4-1-180**.

H	4-1-173	4-1-174	4-1-175	4-1-180
3	6.18 s	6.20 s	6.37 s	6.30 s
5	12.86 br s(OH)	12.94 br s(OH)	12.92 br s(OH)	
6	6.40 d(2.0)	6.32 d(2.0)	6.30 d(2.0)	6.39 d(2.0)
7	3.86 s(OMe)	3.88 s(OMe)	3.84 s(OMe)	3.86 s(OMe)

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Table 4-1-59 (continued)

H	4-1-173	4-1-174	4-1-175	4-1-180
8	6.61 d(2.0)	6.50 d(2.0)	6.48 d(2.0)	6.54 d(2.0)
2′				8.86~9.12 br s(OH)
3′	6.68 dd(8.0, 2.0)	6.84 dd(8.0, 2.0)	6.92 dd(8.0, 2.0)	6.84 dd(8.0, 2.0)
4′	7.28 t(8.0)	7.32 t(8.0)	7.36 t(8.0)	7.36 t(8.0)
5′	6.64 dd(8.0, 2.0)	6.78 dd(8.0, 2.0)	6.78 dd(8.0, 2.0)	6.78 dd(8.0, 2.0)
6′	10.11 br s(OH)	9.12 br s(OH)	9.16 br s(OH)	8.86 ~9.12br s(OH)
1″	5.04 d(7.8)	5.18 d(7.8)	5.20 d(7.8)	5.06 d(7.8)
2″	4.61 dd(9.0, 7.8)	4.84 dd(9.0, 7.8)	3.52 br dd(9.0, 7.8)	3.40~3.34 m
3″	3.50 ~ 3.41 m	3.66 br t(9.0)	5.02 t(9.0)	3.52 br t(9.0)
4″	3.22 td(9.0, 6.0)	3.54 br t(9.0)	3.58 br t(9.0)	3.40~3.34 m
5″	3.50 ~ 3.41 m	3.82 ddd(9.0, 6.0, 2.0)	3.83 ddd(9.0, 6.0, 2.0)	3.70 ddd(9.0, 6.0, 2.0)
6″	3.72 br dd(12.0, 6.0)	4.44 dd(12.0, 2.0)	4.41 dd(12.0, 2.0)	4.42 dd(12.0, 2.0)
	3.52 ddd(12.0, 9.0, 6.0)	4.23 dd(12.0, 6.0)	4.22 dd(12.0, 6.0)	4.21 dd(12.0, 6.0)
OAc	1.76 s	1.84 s(2″-Oac) 2.02 s(6″-Oac)	1.98 s(3″-Oac) 2.03 s(6″-Oac)	2.03 s
OH	5.23 d(6.0, 3″-OH) 5.21 d(6.0, 4″-OH) 4.64 t(6.0, 6″-OH)	4.72 br s(3″-OH) 4.68 br s(4″-OH)	4.72~4.62 br s (2″, 4″-OH)	4.56~4.28 br s (2″, 3″, 4″-OH)

Table 4-1-60: ^{1}H NMR spectroscopic data of flavone O-glycoside-type flavones **4-1-176**~**4-1-178**.

H	4-1-176	4-1-177	4-1-178
3	6.31 s	7.10 s	7.09 s
5	12.92 br s(OH)	7.99 d(8.7)	7.39 s
6	6.40 d(2.0)	7.77 d(8.7)	4.04 s(OMe)
7	3.88 s(OMe)		
8	6.61 d(2.0)		
2′		7.75 br s	7.73 br s
3′	6.74 dd(8.0, 2.0)		
4′	7.24 t(8.0)	7.29 dd(7.5, 1.5)	7.26 dd(7.8, 2.1)
5′	6.66 dd(8.0, 2.0)	7.52 t(7.5)	7.52 t(7.8)
6′	10.21 br s(OH)	7.85 d(7.5)	7.83 d(7.8)
1″	4.96 d(7.8)	5.12 d(6.6)	5.09 d(6.9)
2″	3.18 ddd(9.0, 7.8, 6.0)	3.28~3.56 m	3.28~3.50 m
3″	3.30 td(9.0, 6.0)	3.28~3.56 m	3.28~3.50 m
4″	3.22 td(9.0, 6.0)	3.28~3.56 m	3.28~3.50 m
5″	3.62 br dd(9.0, 6.0)	3.19 m	3.18 m
6″	4.34 br d(12.0)	3.75 br d(11.1)	3.72 br d(11.2)
	4.05 dd(12.0, 6.0)	3.28~3.56 m	3.28~3.50 m
2‴	5.90 d(14.0)	8.25 d(2.1)	8.24 d(2.1)
3‴	6.92 m	7.58 d(2.1)	7.58 d(2.1)
4‴	1.88 d(7.0)		

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Table 4-1-60 (continued)

H	4-1-176	4-1-177	4-1-178
OH	5.20 d(6.0, 2″-OH) 5.24 d(6.0, 3″-OH) 5.12 d(6.0, 4″-OH)	5.38 d(4.5) 5.12 d(4.2)5.08 d(5.1) 4.66 t(5.1)	5.27 5.12 5.06 4.66

Table 4-1-61: ^{1}H NMR spectroscopic data of flavone O-glycoside-type flavones **4-1-182** and **4-1-183**.

H	4-1-182	4-1-183	H	4-1-182	4-1-183
3	6.68 s	6.60 s	4″	3.61 t(9.0)	3.56 t(9.0)
6	6.54 d(2.1)	6.50 d(2.1)	5″	3.71 m	3.89 m
8	6.25 d(2.1)	6.26 d(2.1)	6″	3.96 dd(12.1, 1.6) 3.76 dd(12.1, 5.8)	4.56 br d(11.9) 4.34 dd(11.9, 6.3)
2′, 6′	7.99 d(8.7)	7.96 d(8.7)	2‴, 6‴	7.54 d(8.5)	7.53 d(8.4)
3′, 5′	7.20 d(8.7)	7.25 d(8.7)	3‴, 5‴	6.88 d(8.5)	6.86 d(8.4)
1″	5.39 d(8.1)	5.16 d(8.0)	7‴	7.66 br d(15.9)	7.62 br d(15.9)
2″	5.17 dd(9.4, 8.1)	3.50 t(9.0)	8‴	6.37 br d(15.9)	6.38 br d(15.9)
3″	3.82 t(9.0)	3.60 t(9.0)			

Table 4-1-62: ^{1}H NMR spectroscopic data of flavone O-glycoside-type flavones **4-1-184**~**4-1-187**.

H	4-1-184	4-1-185	4-1-186	4-1-187
3	6.52 s	6.55 s	6.49 s	6.49 s
6	6.83 d(2.2)	6.83 d(2.2)	6.83 d(2.3)	6.71 d(2.5)
8	7.27 d(2.2)	7.33 d(2.2)	7.24 d(2.3)	7.00 d(2.5)
2′	7.27 d(2.2)	7.28 d(2.2)	7.74 d(9.1)	7.79 d(8.8)
3′	3.80 s(OMe)	3.79 s(OMe)	7.11 d(9.1)	7.19 d(8.8)
5′	7.23 d(8.4)	7.18 d(8.5)	7.11 d(9.1)	7.19 d(8.8)
6′	7.35 dd(8.4, 2.2)	7.34 dd(8.5, 2.2)	7.74 d(9.1)	7.79 d(8.8)
1″	5.17 d(7.4)	5.12 d(7.4)	5.29 d(7.2)	5.35 d(7.4)
2″	5.49 dd(9.2, 7.4)	5.45 dd(9.0, 7.4)	5.49 dd(9.3, 7.2)	5.50 dd(9.1, 7.4)
3″	5.43 dd(9.6, 9.2)	5.41 dd(9.5, 9.0)	5.45 dd(9.3, 9.0)	5.46 dd(9.3, 9.1)
4″	5.28 dd(9.6, 9.6)	5.17 dd(9.5, 9.5)	5.29 dd(9.0, 10.0)	5.26 dd(9.6, 9.3)
5″	3.97 ddd(9.6, 5.0, 2.7)	3.88 ddd(9.5, 6.9, 3.0)	4.06 ddd(10.0, 5.5, 2.7)	4.14 ddd(9.6, 6.4, 2.4)
6″	4.39 dd(9.6, 5.0) 4.43 dd(5.0, 2.7)	4.32 dd(12.0, 6.9) 4.28 dd(12.0, 3.0)	4.46 dd(12.4, 2.7) 4.39 dd(12.4, 5.5)	4.52 dd(12.0, 2.4) 4.32 dd(12.0, 6.4)
2‴, 6‴	7.55 d(8.9)	7.55 d(8.5)	7.54 d(8.5)	7.55 d(8.6)
3‴, 5‴	7.14 d(8.9)	7.13 d(8.5)	7.12 d(8.5)	7.13 (8.6)
7‴	7.73 d(15.9)	7.73 d(15.9)	7.72 d(15.8)	7.72 d(15.9)
8‴	6.39 d(15.9)	6.39 d(15.9)	6.36 d(15.8)	6.36 d(15.9)
2⁗, 6⁗	7.54 d(8.7)	7.66 d(8.5)	7.51 d(8.5)	7.37 d(8.6)
3⁗, 5⁗	7.11 d(8.7)	7.07 d(8.5)	7.10 d(8.5)	7.01 d(8.6)
7⁗	7.68 d(15.9)	6.99 d(12.6)	7.66 d(15.9)	7.62 d(15.9)

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Table 4-1-62 (continued)

H	4-1-184	4-1-185	4-1-186	4-1-187
8′′′′	6.40 d(15.9)	5.97 d(12.6)	6.38 d(15.9)	6.34 d(15.9)
5-OAc	2.44 s	2.43 s	2.44 s	2.36 s
7-OAc	2.30 s	2.29 s	2.29 s	
4′-OAc				2.30 s
3′′-OAc	2.03 s	2.31 s	2.03 s	2.04 s
4′′-OAc	2.08 s	2.29 s	2.09 s	2.10 s
4′′′-OAc	2.32 s	2.31 s	2.31 s	2.31 s
4′′′′-OAc	2.35 s	2.35 s	2.35 s	2.34 s

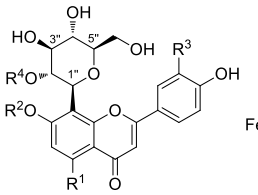
4.1.4 Flavone C-glycoside-type flavones

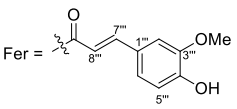
Table 4-1-63: Cos, MFs, and TSs of flavone C-glycoside-type flavones **4-1-188**~**4-1-208**.

No.	Compounds	MFs	Test solvents	References
4-1-188	vijayoside	$C_{21}H_{20}O_{10}$	DMSO-d_6	[79]
4-1-189	7-*O*-feruloylorientin	$C_{31}H_{28}O_{14}$	DMSO-d_6	[80]
4-1-190	7-methoxyl 2′′-*O*-(2′′′-methylbutyryl)orientin	$C_{27}H_{30}O_{12}$	DMSO-d_6	[81]
4-1-191	2′′-*O*-*p*-hydroxybenzoylorientin	$C_{28}H_{24}O_{13}$	DMSO-d_6	[82]
4-1-192	2′′-*O*-vanilloylvitexin	$C_{29}H_{26}O_{13}$	DMSO-d_6	[83]
4-1-193	2′′-*O*-feruloylorientin	$C_{31}H_{28}O_{14}$	DMSO-d_6	[83]
4-1-194	7-*O*-*trans*-sinapoylisovitexin	$C_{32}H_{30}O_{14}$	DMSO-d_6	[84]
4-1-195	chrysoeriol-6-*C*-β-D-glucopyranosyl-(1→3)-β-glucopyranoside	$C_{28}H_{32}O_{16}$	DMSO-d_6 CD_3OD	[85] [85]
4-1-196	apigenin-6-*C*-β-glucopyranosyl-(1→3)-β-glucopyranoside	$C_{27}H_{30}O_{15}$	CD_3OD	[85]
4-1-197	7,8,3′,4′-tetrahydroxy-6-*C*-[α-L-rhamnopyranosyl-(1→2)]-β-D-glucopyranosyl flavone	$C_{27}H_{30}O_{15}$	CD_3OD	[75]
4-1-198	2′′-*O*-β-L-galactopyranosylvitexin	$C_{27}H_{30}O_{15}$	DMSO-d_6	[83]
4-1-199	2′′-*O*-β-L-galactopyranosylorientin	$C_{27}H_{30}O_{16}$	DMSO-d_6	[83]
4-1-200	5,3′,4′-trihydroxyl-6,7-dimethoxyl-8-*C*-[β-D-xylocopyranosyl-(1→2)]-β-D-glucopyranosyl flavone	$C_{28}H_{32}O_{16}$	CD_3OD	[86]
4-1-201	5,4′-dihydroxyl-6,7-dimethoxyl-8-*C*-[β-D-xylocopyranosyl-(1→2)]-β-D-glucopyranosyl flavone	$C_{28}H_{32}O_{15}$	CD_3COCD_3	[86]
4-1-202	diandraflavone A①	$C_{28}H_{32}O_{13}$	C_5D_5N	[87]
4-1-203	rhamnellaflavoside A	$C_{27}H_{30}O_{13}$	C_5D_5N	[88]
4-1-204	rhamnellaflavoside B	$C_{27}H_{30}O_{13}$	C_5D_5N	[88]
4-1-205	rhamnellaflavoside C	$C_{27}H_{30}O_{13}$	C_5D_5N	[88]
4-1-206	6,8-di-*C*-β-glucosylchrysin	$C_{27}H_{30}O_{14}$	DMSO-d_6	[89]
4-1-207	6,8-di-*C*-β-glucosylapigenin	$C_{27}H_{30}O_{15}$	DMSO-d_6	[90]
4-1-208	7-*O*-*trans*-sinapoylisovitexin-4′-*O*-β-D-glucopyra-noside	$C_{38}H_{40}O_{19}$	DMSO-d_6 CD_3OD	[84] [84]

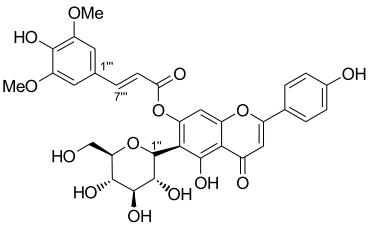
① There is structural error in the literature. Judged based on the NMR and MS data, C-4′ should be an *O*-glycoside, one oxygen being missed.

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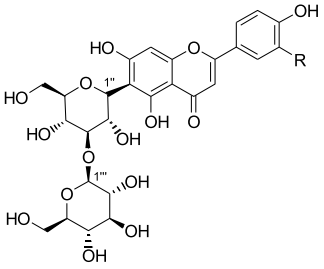




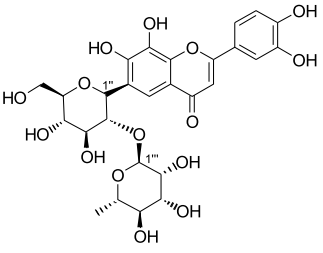
	R^1	R^2	R^3	R^4
4-1-188	H	H	OH	H
4-1-189	OH	Fer	OH	H
4-1-190	OH	Me	OH	MeBu
4-1-191	OH	H	OH	*p*-HydrBZ
4-1-192	OH	H	H	Van
4-1-193	OH	H	OH	Fer



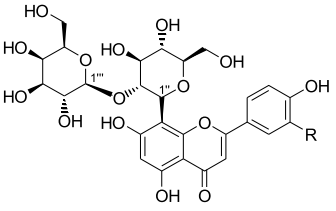
4-1-194



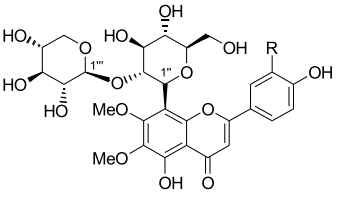
4-1-195 R = OMe
4-1-196 R = H



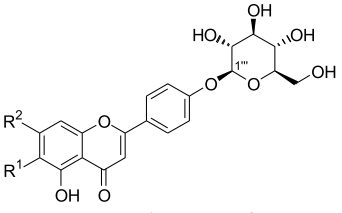
4-1-197

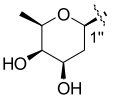
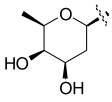


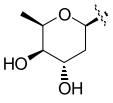
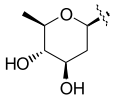
4-1-198 R = H
4-1-199 R = OH



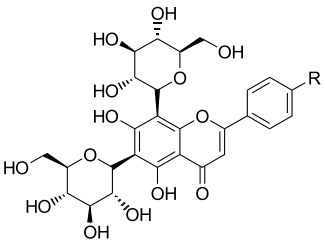
4-1-200 R = OH
4-1-201 R = H



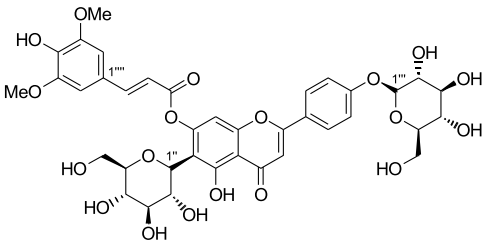
	R^1	R^2
4-1-202		OMe
4-1-203		OH

	R^1	R^2
4-1-204		OH
4-1-205		OH

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4-1-206 R = H
4-1-207 R = OH



4-1-208

Table 4-1-64: ^{1}H NMR spectroscopic data of flavone C-glycoside-type flavones **4-1-188**~**4-1-192**.

H	4-1-188	4-1-189	4-1-190	4-1-191	4-1-192
3	6.98 s	6.63 s	6.71 s	6.69 s	6.82 s
5	8.28 d(8.3)	13.63 s(OH)			13.12 s(OH)
6	6.95 d(8.3)	6.43 s	6.49 s	6.08 s	6.19 s
7			3.86 s(OMe)		10.99 s(OH)
2′	7.84 br d(2.1)	7.36 s	7.54 d(2.2)	7.57 br s	8.12 dd(9.0, 3.0)
3′					6.94 dd(9.0, 3.0)
4′					10.37 s(OH)
5′	6.99 br d(8.7)	6.86 d(8.0)	6.91 d(8.4)	6.92 d(8.5)	6.94 dd(9.0, 3.0)
6′	7.97 br dd(2.1, 8.7)	7.38 d(8.0)	7.63 dd(2.2, 8.4)	7.65 d(8.5)	8.12 dd(9.0, 3.0)
1″	5.16 d(9.5)	4.84 d(9.6)	4.86 d(9.8)	4.99 d(10.0)	5.02 d(10)
2″	4.25 t(9.1)	–	5.35 t(9.8)	5.50 t(9.5)	5.52 t(10)
3″	3.51~3.80 m	–	3.3~4.0 m	3.65 m	3.63 m
4″	3.51~3.80 m	–	3.3~4.0 m	3.50 m	3.55 m
5″	3.51~3.80 m	–	3.3~4.0 m	3.40 m	3.41 m
6″	4.04 br d(11.9)	–	3.3~4.0 m	3.87 m	3.84 m
	3.85 br dd(12.0, 4.6)			3.65 m	3.62 m
2‴		7.19 br s	2.0 m	7.59 d(8.5)	7.20 d(3.0)
3‴		3.76 s(OMe)	1.2 m	6.75 d(8.5)	3.75 s(OMe)
4‴			0.58 t(7.5)		9.84 s(OH)
5‴		6.73 d(8.0)	0.68 d(7.0)	6.75 d(8.5)	6.76 d(8.0)
6‴		6.99 d(8.0)		7.59 d(8.5)	7.25 dd(8.0, 3.0)
7‴		7.21 d(16.0)			
8‴		6.24 d(16.0)			

Table 4-1-65: ^{1}H NMR spectroscopic data of flavone C-glycoside-type flavones **4-1-193**~**4-1-195**.

H	4-1-193	4-1-194	4-1-195(CD_3OD)	4-1-195(DMSO-d_6)
3	6.68 s	6.73 s	6.65 s	6.90 s
5	13.16 s(OH)	13.62 br s(OH)		13.64 s(OH)
6	6.16 s			
7				10.72 br s(OH)

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Table 4-1-65 (continued)

H	4-1-193	4-1-194	4-1-195(CD_3OD)	4-1-195(DMSO-d_6)
8		6.45 s	6.51 s	6.55 s
2′	7.56 br s	7.89 d(8.8)	7.47 d(2.1)	7.52 br s
3′		6.90 d(8.8)	3.96 s(OMe)	3.88 s(OMe)
4′				9.96 s(OH)
5′	6.91 d(8.0)	6.90 d(8.8)	6.94 d(8.4)	6.93 d(8.3)
6′	7.63 dd(8.0, 2.0)	7.89 d(8.8)	7.52 dd(8.4, 2.1)	7.56 dd(8.3, 2.0)
1″	4.92 d(10)	4.86 d(10.0)	4.94 d(9.9)	4.66 d(10.0)
2″	5.45 t(10)	5.68 br m	4.42 dd(9.9, 9.5)	4.32 m, 4.82 d(4.1, OH)
3″	3.59 t(10)	3.48 (ov)	3.63 dd(9.5, 8.8)	3.36 m
4″	3.51 m	3.27 (ov)	3.57 dd(8.8, 8.8)	3.22 m, 4.67 br s(OH)
5″	3.38 m	3.27 (ov)	3.44 m	3.22 m
6″	3.86 m	3.46 (ov)	3.73 dd(12.0, 5.4)	3.41 m, 3.69 m
	3.64 m	3.75 (ov)	3.89 dd(12.0, 2.1)	4.54 t(6.0, OH)
1‴			4.61 d(7.8)	4.34 d
2‴	7.22 br s	6.89 s	3.30 (ov)	3.02 m, 5.04 d(3.2, OH)
3‴	3.79 s(OMe)	3.76 s(OMe)	3.39 dd(9.0, 9.0)	3.17 m, 5.00 d(4.6, OH)
4‴			3.29 (ov)	3.04 m, 4.98 d(5.5, OH)
5‴	6.75 d(8)	3.76 s(OMe)	3.42 m	3.21 m
6‴	7.02 br d(8)	6.89 s	3.64 dd(12.1, 5.3)	3.41 m, 3.69 m
			3.90 dd(12.1, 2.1)	4.56 t(6.0, OH)
7‴	7.29 d(16)	7.32 d(15.8)		
8‴	6.21d(16)	6.30 d(15.8)		

Table 4-1-66: ^{1}H NMR spectroscopic data of flavone C-glycoside-type flavones **4-1-196**~**4-1-199**.

H	4-1-196	4-1-197	4-1-198	4-1-199
3	6.61 s	6.54 s	6.74 s	6.61 s
5		6.48 s	13.15 s(OH)	13.14 s(OH)
6			6.20 s	6.20 s
8	6.50 s			
2′	7.86 d(8.7)	7.36 s	8.01 d(8.5)	7.45 d(2.0)
3′	6.93 d(8.7)		6.90 d(8.5)	
5′	6.93 d(8.7)	6.90 d(8.4)	6.90 d(8.5)	6.86 d(8)
6′	7.86 d(8.7)	7.38 d(8.4)	8.01 d(8.5)	7.50 dd(8, 2.0)
1″	4.92 d(9.9)	4.87 d(8.6)	4.81 d(10)	4.78 d(10)
2″	4.43 dd(9.9, 9.5)	4.56 s	4.04 t(9)	4.03 t(9)
3″	3.64 m	3.40 s	3.51 t(9)	3.49 t(9)
4″	3.56 dd(8.8, 8.8)	3.88 s	3.45 t(9)	3.42 t(9)
5″	3.44 m	3.40 s	3.26 m	3.27 m
6″	3.73 dd(12.0, 5.4)	3.71 s	3.76 br d(11)	3.78 br d(11)
	3.89 dd(12.0, 2.1)	3.89	3.54 m	3.57 m
1‴	4.62 d(7.8)	5.23 d(1.8)	3.91 d(7.5)	3.90 d(7.5)
2‴	3.29 m	3.56 d	3.15 m	3.13 m

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Table 4-1-66 (continued)

H	4-1-196	4-1-197	4-1-198	4-1-199
3‴	3.38 dd(9.0, 9.0)	3.40 s	3.07 m	3.06 m
4‴	3.28 m	3.11 s	3.47 m	3.45 m
5‴	3.34 m	2.53 m	2.78 m	2.77 m
6‴	3.65 m	0.75 d	3.12 m	3.09 m
	3.90 dd(12.1, 2.1)		2.50 m	2.70 m

Table 4-1-67: ^{1}H NMR spectroscopic data of flavone C-glycoside-type flavones **4-1-200**~**4-1-202**.

H	4-1-200	4-1-201	4-1-202
3	6.41 s	6.58 s	6.91 s
5			14.1 br s(OH)
6	3.82 s(OMe)	3.82 s(OMe)	
7	3.90 s(OMe)	3.90 s(OMe)	3.83 s(OMe)
8			6.74 s
2′	7.47 d(2)	8.12 d(8.8)	7.86 d(8.8)
3′		7.05 d(8.8)	7.45 d(8.8)
5′	6.83 d(8.5)	7.05 d(8.8)	7.45 d(8.8)
6′	7.45 dd(8.5, 2)	8.12 d(8.8)	7.86 d(8.8)
1″	4.86 d(10)	4.96 d(10.0)	5.50 dd(10.8, 2.4)
2″	4.01 t(10)	4.21 t(10.0)	2.13 ddd(12.0, 3.2, 2.4)
			3.39 ddd(12.0, 10.8, 3.2)
3″	3.62 t(10, 7.5)	3.72 t(10.0, 7.5)	4.21 m
4″	3.65 m	3.80 m	4.31 m
5″	3.39 m	3.49 m	3.78 q(6.0)
6″	3.96 br d(8), 3.83 m	3.97 br d(8.0), 3.90 m	1.50 d(6.0)
1‴	4.02 d(7.5)	4.12 d(7.2)	5.77 d(6.8)
2‴	2.82 d(7.5)	3.02 d(7.2)	4.36 m
3‴	3.04 m	3.14 m	4.33 m
4‴	3.06 m	3.18 m	3.98 br s
5‴	3.05 m, 2.52 d(9)	3.15 m, 2.52 d(9.0)	4.23 m
6‴			4.33 m, 4.63 d(11.2)

Table 4-1-68: ^{1}H spectroscopic data of flavone C-glycoside-type flavones **4-1-203**~**4-1-205**.

H	4-1-203	4-1-204	4-1-205
3	6.88 s	6.88 s	6.89 s
5	14.06 (OH)	13.40 (OH)	14.23 (OH)
8	6.74 s	6.78 s	6.77 s
2′, 6′	7.88 d(8.8)	7.89 d(8.8)	7.86 d(8.8)
3′, 5′	7.44 d(8.8)	7.44 d(8.8)	7.42 d(8.8)
1″	5.58 dd(12.0, 3.2)	6.24 dd(12.0, 2.0)	5.68 dd(11.6, 2.0)

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Table 4-1-68 (continued)

H	4-1-203	4-1-204	4-1-205
2″	2.85 q(12.0)	2.98 br t-like(12.0)	2.86 q(12.0)
	2.39 ddd(3.2, 3.6, 12.0)	2.29 br d-like(13.0)	2.73 ddd(2.0, 4.4, 12.0)
5″	3.79 q(6.4)	4.70 q(6.4)	3.78 q(5.6)
6″	1.15 d(6.4)	1.53 d(6.8)	1.67 d(5.6)
1‴	5.77 d(7.6)	5.77 d(7.2)	5.76 d(6.8)
6‴	4.63 br d(11.6)	–	4.63 br d(12.4)

Table 4-1-69: ^{1}H NMR spectroscopic data of flavone C-glycoside-type flavones **4-1-206**~**4-1-208**.

H	4-1-206	4-1-207	4-1-208(DMSO-d_6)	4-1-208(CD_3OD)
3	7.01 s	6.59 s	6.85 s	6.49 s
5	13.36 s(OH)		13.56 br s(OH)	
8			6.48 s	6.41 s
2′, 6′	8.18 br d(8.0)	7.92 d(8.7)	8.00 d(9.0)	7.79 d(8.3)
3′, 5′	7.60 m	6.91 d(8.5)	7.16 d(9.0)	7.17 d(8.3)
4′	7.60 m			
1″	4.83 d(9.8)	4.76 d(9.8)	4.86 d(10.0)	5.13 d(9.9)
2″	3.85 t(9.5)	3.86 t(8.7)	5.68 br m	5.68 br m
3″	3.32 t(9.0)	3.32 m	3.49 (ov)	3.77 (ov)
4″	3.42 t(9.0)	3.32 m	3.28 (ov)	3.62 (ov)
5″	3.37 m	3.30 m	3.28 (ov)	3.51 (ov)
6″	3.55 dd(12.0, 8.0)	3.58 dd(11.9, 7.8)	3.46 (ov)	3.94 d(11.9)
	3.70 d(12.0)	3.70 d(11.0)	3.75 (ov)	3.81 (ov)
1‴	4.78 d(9.8)	4.88 d(9.8)	5.01 d(7.3)	5.01 d(6.3)
2‴	3.85 t(9.5)	3.86 t(8.7)	3.27 (ov)	3.50 (ov)
3‴	3.30 t(9.0)	3.38 m	3.31 (ov)	3.50 (ov)
4‴	3.39 t(9.0)	3.42 m	3.18 (ov)	3.41 m
5‴	3.27 m	3.35 m	3.39 (ov)	3.50 (ov)
6‴	3.48 dd(12.0, 8.0)	3.58 dd(11.9, 7.8)	3.46 (ov)	3.92 d(12.1)
	3.70 d(12.0)	3.76 d(11.0)	3.69 (ov)	3.71 dd(5.7, 12.1)
2⁗, 6⁗			6.89 s	6.72 s
7⁗			7.32 d(15.8)	7.39 d(15.8)
8⁗			6.30 d(15.8)	6.17 d(15.8)
OMe			3.76 s	3.78 s

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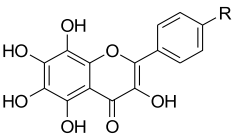
4.2 Flavonols

4.2.1 Flavonol-type flavonols

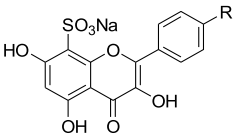
Table 4-2-1: Cos, MFs, and TSs of flavonol-type flavonols **4-2-1**~**4-2-34**.

No.	Compounds	MFs	Test solvents	References
4-2-1	3,5,6,7,8-pentahydroxy-4′-methoxyflavone	$C_{16}H_{12}O_8$	DMSO-d_6	[91]
4-2-2	3,5,6,7,8-pentahydroxyflavone	$C_{15}H_{10}O_7$	DMSO-d_6	[91]
4-2-3	galangin-8-sulfonate	$C_{15}H_9NaO_8S$	DMSO-d_6	[92]
4-2-4	kaempferol-8-sulfonate	$C_{15}H_9NaO_9S$	DMSO-d_6	[92]
4-2-5	2′,4′,7-trihydroxy-5-methoxyflavonol	$C_{16}H_{12}O_7$	DMSO-d_6	[93]
4-2-6	4′,7-dihydroxy-2′,5-dimethoxyflavonol	$C_{17}H_{14}O_7$	DMSO-d_6	[93]
4-2-7	3,8-dimethoxy-5,7-dihydroxy-3′,4′-methylenedioxy-flavone	$C_{18}H_{14}O_8$	C_5D_5N	[94]
4-2-8	3,6,8-trimethoxy-5,7-dihydroxy-3′,4′-methylenediox-yflavone	$C_{19}H_{16}O_9$	C_5D_5N	[94]
4-2-9	3,6,8,3′,4′-pentamethoxy-5,7-dihydroxyflavone	$C_{20}H_{20}O_9$	$CDCl_3$	[94]
4-2-10	3,7,8,3′-tetrahydroxy-4′-methoxyflavone	$C_{16}H_{12}O_7$	DMSO-d_6	[95]
4-2-11	3′,4′,6,7-tetramethoxy-3,5,8-trihydroxyflavone	$C_{19}H_{18}O_9$	DMSO-d_6	[96]
4-2-12	3,5,3′-trihydroxy-4′-methoxy-6,7-methylenedioxyfla-vone	$C_{17}H_{12}O_8$	DMSO-d_6	[97]
4-2-13	7-hydroxy-3,5,6,8-tetramethoxy-3′,4′-methylenediox-yflavone	$C_{20}H_{18}O_9$	$CDCl_3$	[98]
4-2-14	prolinalin A	$C_{20}H_{17}NO_9$	CD_3OD	[99]
4-2-15	prolinalin B	$C_{20}H_{17}NO_9$	CD_3OD	[99]
4-2-16	irisflavone A	$C_{17}H_{14}O_7$	$CDCl_3$	[100]
4-2-17	irisflavone B	$C_{18}H_{16}O_7$	$CDCl_3$	[100]
4-2-18	irisflavone D	$C_{17}H_{14}O_7$	DMSO-d_6	[100]
4-2-19	3,7,3′,5′-tetramethoxy-4′-hydroxyflavone	$C_{19}H_{18}O_7$	CD_3OD	[101]
4-2-20	3,7,3′-trimethoxy-4′,5′-dihydroxyflavone	$C_{18}H_{16}O_7$	CD_3OD	[101]
4-2-21	7,3′,5′-trimethoxy-3,4′-dihydroxyflavone	$C_{18}H_{16}O_7$	CD_3OD	[101]
4-2-22	5-hydroxy-3,7,8,3′,4′,5′-hexamethoxyflavone	$C_{21}H_{22}O_9$	$CDCl_3$	[102]
4-2-23	8-hydroxy-3,5,7,3′,4′,5′-hexamethoxyflavone	$C_{21}H_{22}O_9$	$CDCl_3$	[102]
4-2-24	5-hydroxy-3,7,8,3′,4′-pentamethoxyflavone	$C_{20}H_{20}O_8$	$CDCl_3$	[102]
4-2-25	6,8-di-*C*-methylkaempferol 3,4′-dimethyl ether	$C_{19}H_{18}O_6$	DMSO-d_6	[103]
4-2-26	6,8-di-*C*-methylquercetin 3-methyl ether	$C_{18}H_{16}O_7$	DMSO-d_6	[104]
4-2-27	6-*C*-methylquercetin 3,7-dimethyl ether	$C_{18}H_{16}O_7$	DMSO-d_6	[104]
4-2-28	6,8-di-*C*-methylquercetin 3,7-dimethyl ether	$C_{19}H_{18}O_7$	DMSO-d_6	[104]
4-2-29	6-*C*-methylquercetin 3-methyl ether	$C_{17}H_{14}O_7$	DMSO-d_6	[104]
4-2-30	6-*C*-methylquercetin 3,7,3′-trimethyl ether	$C_{18}H_{16}O_7$	DMSO-d_6	[104]
4-2-31	6,8-di-*C*-methylkaempferol 3-methyl ether	$C_{18}H_{16}O_8$	DMSO-d_6	[104]
4-2-32	tupichinol E	$C_{17}H_{14}O_6$	CD_3COCD_3	[105]
4-2-33	tupichinol F	$C_{17}H_{14}O_6$	CD_3COCD_3	[105]
4-2-34	5,7-dihydroxy-3,8,4′-trimethoxy-6-methylflavone	$C_{19}H_{18}O_7$	DMSO-d_6	[106]

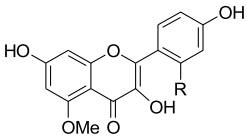
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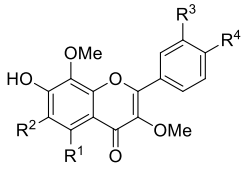
4-2-1 R = OMe
4-2-2 R = H



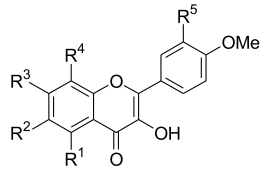
4-2-3 R = H
4-2-4 R = OH



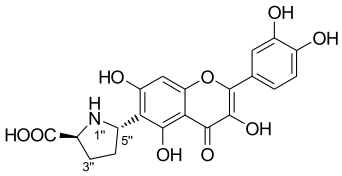
4-2-5 R = OH
4-2-6 R = OMe



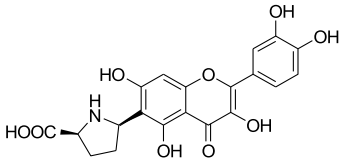
	R^1	R^2	R^3	R^4
4-2-7	OH	H	OCH_2O	
4-2-8	OH	OMe	OCH_2O	
4-2-9	OH	OMe	OMe	OMe
4-2-13	OMe	OMe	OCH_2O	



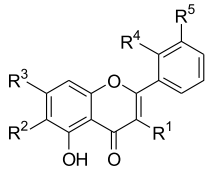
	R^1	R^2	R^3	R^4	R^5
4-2-10	H	H	OH	OH	OH
4-2-11	OH	OMe	OMe	OH	OMe
4-2-12	OH	OCH_2O		H	OH



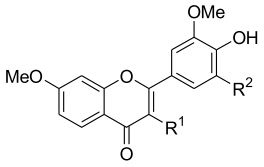
4-2-14



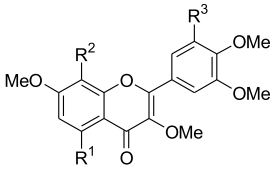
4-2-15



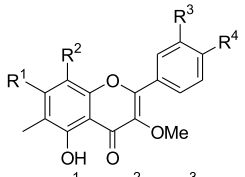
	R^1	R^2	R^3	R^4	R^5
4-2-16	OMe	OMe	OH	OH	H
4-2-17	OMe	OMe	OMe	OH	H
4-2-18	OH	H	OMe	OMe	OH



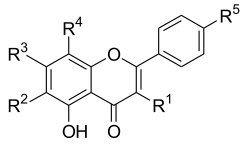
	R^1	R^2
4-2-19	OMe	OMe
4-2-20	OMe	OH
4-2-21	OH	OMe



	R^1	R^2	R^3
4-2-22	OH	OMe	OMe
4-2-23	OMe	OH	OMe
4-2-24	OH	OMe	H



	R^1	R^2	R^3	R^4
4-2-25	OH	Me	H	OMe
4-2-26	OH	Me	OH	OH
4-2-27	OMe	H	OH	OH
4-2-28	OMe	Me	OH	OH
4-2-29	OH	H	OH	OH
4-2-30	OMe	H	OMe	OH
4-2-31	OH	Me	H	OH



	R^1	R^2	R^3	R^4	R^5
4-2-32	OH	H	OMe	Me	OH
4-2-33	OMe	H	OH	Me	OH
4-2-34	OMe	Me	OH	OMe	OMe

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Table 4-2-2: ^{1}H NMR spectroscopic data of flavonol-type flavonols **4-2-1**~**4-2-5**.

H	4-2-1	4-2-2	4-2-3	4-2-4	4-2-5
5			12.50 br s(OH)	12.44 s(OH)	3.81 s(OMe)
6			6.16 s	6.13 s	6.33 d(2.1)
8					6.33 d(2.1)
2′	7.68 d(8.2)	7.71~7.73 m	8.50 dd(1.9, 8.1)	8.37 d(8.8)	
3′	6.62 d(8.2)	7.66~7.68 m	7.45~7.56 m	6.89 d(8.8)	6.33 d(2.1)
4′	3.75 s(OMe)	7.66~7.68 m	7.45~7.56 m		
5′	6.62 d(8.2)	7.66~7.68 m	7.45~7.56 m	6.89 d(8.8)	6.35 dd(8.4, 2.1)
6′	7.68 d(8.2)	7.71~7.73 m	8.50 dd(1.9, 8.1)	8.37 d(8.8)	7.19 d(8.4)

Table 4-2-3: ^{1}H NMR spectroscopic data of flavonol-type flavonols **4-2-6**~**4-2-9**.

H	4-2-6	4-2-7	4-2-8	4-2-9
3	8.00 s(OH)	3.98 s(OMe)	3.99 s(OMe)	3.98 s(OMe)
5	3.81 s(OMe)	13.01 s(OH)	13.15 s(OH)	12.58 s(OH)
6	6.33 d(2.1)	6.80 s	4.02 s(OMe)	3.88 s(OMe)
7	10.60 s(OH)			
8	6.30 d(2.1)	3.95 s(OMe)	4.03 s(OMe)	3.97 s(OMe)
2′	3.71 s(OMe)	7.84 d(1.8)	7.85 d(1.8)	7.79 d (1.9)
3′	6.51 d(2.1)			4.00 s(OMe)
4′	9.90 (OH)			4.05 s(OMe)
5′	6.44 dd(8.1, 2.1)	7.08 d(8.3)	7.09 d(8.3)	7.02 d(8.6)
6′	7.21 d(8.1)	7.92 dd(8.3, 1.8)	7.93 dd(8.3, 1.8)	7.83 dd(8.6, 1.9)
OCH_2O		6.11 s	6.11 s	

Table 4-2-4: ^{1}H NMR spectroscopic data of flavonol-type flavonols **4-2-10**~**4-2-13**.

H	4-2-10	4-2-11	4-2-12	4-2-13
3		9.63 s(OH)	9.34 s or 9.57 s(OH)	3.87 s(OMe)
5	7.42 d(8.7)	11.90 s(OH)	12.45 s(OH)	3.95 s(OMe)
6	6.92 d(8.7)	3.83 s(OMe)		4.01 s(OMe)
7		3.94 s(OMe)		6.54 s(OH)
8		9.24 s(OH)	6.88 s	4.01 s(OMe)
2′	7.76 s	7.87 d(2.1)	7.69 d(2.1)	7.64 d(1.8)
3′		3.86 s(OMe)	9.34 s or 9.57 s(OH)	
4′	3.83 s(OMe)	3.84 s(OMe)	3.84 s(OMe)	
5′	7.08 d(8.5)	7.17 d(8.7)	7.08 d(8.5)	6.94 d(8.3)
6′	7.74 d(8.5)	7.93 dd(8.7, 2.1)	7.65 dd(8.5, 2.1)	7.73 dd(8.3, 1.8)
OCH_2O			6.15 s	6.06 s

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Table 4-2-5: ^{1}H NMR spectroscopic data of flavonol-type flavonols **4-2-14**~**4-2-17**.

H	4-2-14	4-2-15	4-2-16	4-2-17
3			3.87 s(OMe)	3.88 s(OMe)
5			12.63 s(OH)	12.71 s(OH)
6			4.04 s(OMe)	3.94 s(OMe)
7				3.91 s(OMe)
8	6.45 s	6.38 s	6.56 s	6.50 s
2′	7.73 d(2.1)	7.74 br s		
3′			7.10 br d(8.3)	7.11 br d(8.3)
4′			7.47 br dt (8.3, 2.2)	7.45 br d(8.3, 2.2)
5′	6.88 d(8.5)	6.88 br s	7.09 br t(8.3)	7.07 br t(8.3)
6′	7.62 dd(2.1, 8.5)	7.62 br s	7.67 dd(8.3, 2.2)	7.66 dd(8.3, 2.2)
2″	4.30 dd(7.7, 9.6)	4.08 dd(5.1, 10.4)		
3″	2.12 dddd(7.1, 9.6, 11.1, 13.1)	2.33 m		
	2.62 dddd(2.1, 7.4, 7.7, 13.1)	2.51 m		
4″	2.30 dddd(2.1, 7.1, 7.3, 12.8)	2.24 m		
	2.40 dddd(7.4, 10.8, 11.1, 12.8)	2.27 m		
5″	5.27 dd(7.3, 10.8)	5.05 t(7.9)		

Table 4-2-6: ^{1}H NMR spectroscopic data of flavonol-type flavonols **4-2-18**~**4-2-21**.

H	4-2-18	4-2-19	4-2-20	4-2-21
3		3.84 s(OMe)	3.84 s(OMe)	
5	12.73 s(OH)	7.57 d(8)	7.57 d(8)	7.56 d(8)
6	6.37 d(2.1)	6.83 dd(8, 2)	6.85 dd(8, 2)	6.85 dd(8, 2)
7	3.82 s(OMe)	3.92 s s(OMe)	3.91 s(OMe)	3.90 s(OMe)
8	6.60 d(2.1)	7.32 d(2)	7.26 d(2)	7.25 d(2)
2′	3.70 s(OMe)	7.29 d(2)	7.59 d(2)	7.27 d(2)
3′		3.94 s(OMe)	3.95 s(OMe)	3.94 s(OMe)
4′	7.02 m			
5′	6.91 br t(8.1)	3.94 s(OMe)		3.94 s(OMe)
6′	7.02 m	7.29 d(2)	7.40 d(2)	7.27 d(2)

Table 4-2-7: ^{1}H NMR spectroscopic data of flavonol-type flavonols **4-2-22**~**4-2-24**.

H	4-2-22	4-2-23	4-2-24
5	12.38 s(OH)		12.47 s(OH)
6	6.43 s	6.42 s	6.43 s
2′	7.52 s	7.61 s	7.81 d(2.0)
5′			7.02 d(8.8)
6′	7.52 s	7.61 s	7.86 dd(8.8, 2.0)
OMe	3.90 s, 3.92 s, 3.94 s, 3.94 s, 3.95 s, 3.95 s	3.92 s, 3.93 s, 3.95 s, 3.95 s, 3.95 s, 4.02 s	3.89 s, 3.91 s, 3.93 s, 3.96 s, 3.98 s

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Table 4-2-8: ^{1}H NMR spectroscopic data of flavonol-type flavonols **4-2-25**~**4-2-29**.

H	4-2-25	4-2-26	4-2-27	4-2-28	4-2-29
3	3.85 s(OMe)	3.78 s(OMe)	3.91 s(OMe)	3.86 s(OMe)	3.93 s(OMe)
5		12.95 s(OH)	13.00 s(OH)	13.00 s(OH)	13.10 s(OH)
6	2.18 s(Me)	2.13 s(Me)	2.12 s(Me)	2.21 s(Me)	2.17 s(Me)
7			4.02 s(OMe)	3.91 s(OMe)	
8	2.32 s(Me)	2.33 s(Me)	6.91 s	2.42 s(Me)	6.67 s
2′	8.11 d(8.5)	7.70 d(2.3)	7.73 d(2.3)	7.75 d(2.3)	7.76 d(2.3)
3′	7.03 d(8.5)				
4′	3.89 s(OMe)				
5′	7.03 d(8.5)	6.92 d(8.6)	7.03 d(8.6)	7.03 d(8.6)	7.10 d(8.6)
6′	8.11 d(8.5)	7.60 dd(2.3, 8.6)	7.61 dd(2.3, 8.6)	7.63 dd(2.3, 8.6)	7.64 dd(2.3, 8.6)

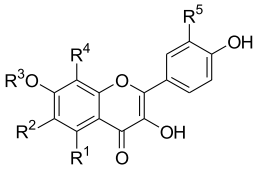
Table 4-2-9: ^{1}H NMR spectroscopic data of flavonol-type flavonols **4-2-30**~**4-2-34**.

H	4-2-30	4-2-31	4-2-32	4-2-33	4-2-34
3	3.92 s(OMe)	3.88 s(OMe)	9.24 br s(OH)	3.88 s(OMe)	3.80 s(OMe)
5	12.95 s(OH)	13.00 s(OH)	12.19 s(OH)	12.69 s(OH)	12.61 s(OH)
6	2.09 s(Me)	2.15 s(Me)	6.49 s	6.34 s	2.03 s(Me)
7	4.01 s(OMe)		3.97 s(OMe)	9.21 br s(OH)	
8	6.90 s	2.35 s(Me)	2.28 s(Me)	2.27 s(Me)	3.83 s(OMe)
2′	7.78 d(2.3)	8.05 d(9)	8.21 d(9.2)	8.09 d(8.8)	8.04 d(9.4)
3′	3.98 s(OMe)	7.10 d(9)	7.04 d(9.2)	7.05 d(8.8)	7.17 d(8.8)
4′	10.10 s(OH)		8.11 br s(OH)	8.01 br s(OH)	3.87 s(OMe)
5′	7.07 d(8.6)	7.10 d(9)	7.04 d(9.2)	7.05 d(8.8)	7.17 d(8.8)
6′	7.73 dd(2.3, 8.6)	8.05 d(9)	8.21 d(9.2)	8.09 d(8.8)	8.04 d(9.4)

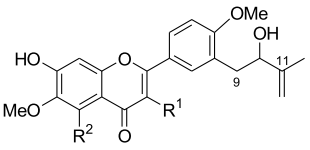
Table 4-2-10: Cos, MFs, and TSs of flavonol-type flavonols **4-2-35**~**4-2-46**.

No.	Compounds	MFs	Test solvents	References
4-2-35	sophoflavescenol	$C_{21}H_{20}O_6$	DMSO-d_6	[107]
4-2-36	3,5,8,4′-tetrahydroxy-7,3′-dimethoxy-6-(3″-methylbut-2″-enyl)flavone	$C_{22}H_{22}O_8$	DMSO-d_6	[108]
4-2-37	5,7-dihydroxy-3′-(2-hydroxy-3-methyl-3-butenyl)-3,6,4′-trimethoxyflavone	$C_{23}H_{24}O_8$	$CDCl_3$	[109]
4-2-38	3,7-dihydroxy-3′-(2-hydroxy-3-methyl-3-butenyl)-5,6,4′-trimethoxyflavone	$C_{23}H_{24}O_8$	$CDCl_3$	[109]
4-2-39	3,5,4′-trihydroxy-8,3′-dimethoxy-7-(3′-methylbut-2′-enoxy)flavone	$C_{22}H_{22}O_8$	DMSO-d_6	[108]
4-2-40	broussonol D	$C_{25}H_{26}O_7$	CD_3COCD_3	[110]
4-2-41	broussonol E	$C_{25}H_{26}O_7$	CD_3COCD_3	[110]
4-2-42	dorsmanin D	$C_{26}H_{28}O_7$	DMSO-d_6	[111]
4-2-43	8-lavandulylkaempferol	$C_{25}H_{26}O_6$	CD_3COCD_3	[112]
4-2-44	ugonin G	$C_{25}H_{26}O_6$	CD_3COCD_3	[113]
4-2-45	ugonin H	$C_{26}H_{28}O_7$	CD_3OD	[113]
4-2-46	3,7,4′-trihydroxy-3′-(8″-acetoxy-7″-methyloctyl)-5,6-dimethoxyflavone	$C_{28}H_{34}O_9$	CD_3OD	[114]

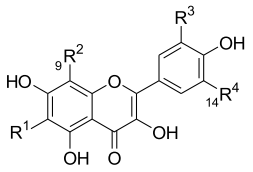
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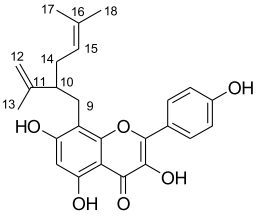
	R^1	R^2	R^3	R^4	R^5
4-2-35	OMe	H	H	Prenyl	H
4-2-36	OH	Prenyl	Me	OH	OMe
4-2-39	OH	H	Prenyl	OMe	OMe



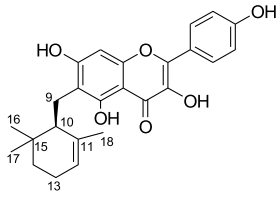
	R^1	R^2
4-2-37	OMe	OH
4-2-38	OH	OMe



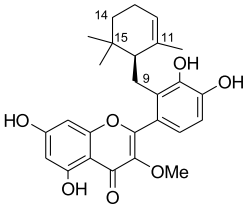
	R^1	R^2	R^3	R^4
4-2-40	H	Prenyl	OH	Prenyl
4-2-41	Prenyl	H	OH	Prenyl
4-2-42	Prenyl	Prenyl	OMe	H



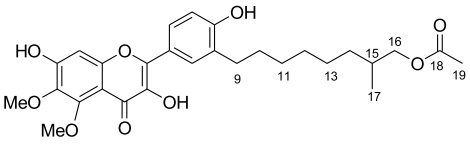
4-2-43



4-2-44



4-2-45



4-2-46

Table 4-2-11: ^{1}H NMR spectroscopic data of flavonol-type flavonols **4-2-35**~**4-2-38**.

H	4-2-35	4-2-36	4-2-37	4-2-38
3	8.57 br s(OH)	9.46 s(OH)	3.82 s(OMe)	
5	3.80 s(OMe)	12.41 s(OH)	12.94 s(OH)	4.05 s(OMe)
6	6.45 s		4.01 s(OMe)	4.02 s(OMe)
7	10.53 br s(OH)	3.85 s(OMe)		
8		10.24 s(OH)	6.54 s	6.56 s
9	3.46 d(6.3)	3.28 d(7.2)	3.02 dd(13.7, 4.3)	3.01 dd(13.8, 4.2)
			2.84 dd(13.7, 8.3)	2.83 dd(13.8, 8.3)
10	5.18 t-like* (6.0)	5.18 t(7.2)	4.33 dd(8.3, 4.3)	4.32 dd(8.3, 4.2)
12	1.63 s	1.74 s	4.90 s, 4.83 s	4.92 s, 4.84 s
13	1.76 s	1.63 s	1.82 s	1.83 s
2′	7.99 d(8.8)	7.78 d(2.0)	7.90 d(2.3)	7.91 d(2.4)
3′	6.92 d(8.8)	3.86 s(OMe)		

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Table 4-2-11 (continued)

H	4-2-35	4-2-36	4-2-37	4-2-38
4′	9.94 br s(OH)	9.48 s(OH)	3.91 s(OMe)	3.92 s(OMe)
5′	6.92 d(8.8)	6.98 d(8.4)	6.98 d(8.7)	6.97 d(8.6)
6′	7.99 d(8.8)	7.73 dd(8.4, 2.0)	7.99 dd(8.7, 2.3)	7.96 dd(8.6, 2.4)

*: t-like denotes a signal similar to triplet, and the same below.

Table 4-2-12: ^{1}H NMR spectroscopic data of flavonol-type flavonols **4-2-39**~**4-2-42**.

H	4-2-39	4-2-40	4-2-41	4-2-42
3	9.54 s(OH)	7.92 s(OH)	7.91 s(OH)	
5	12.24 s(OH)	12.09 s(OH)	12.42 s(OH)	12.66 s(OH)
6	6.58 s	6.33 s		
7		9.59 s(OH)	9.62 s(OH)	
8	3.83 s(OMe)		6.55 s	
9	4.68 d(6.7)	3.55 d(6.9)	3.35 d(6.9)	3.54 d(6.0)
10	5.47 t(6.7)	5.32 m	5.26 m	5.60 or t(6.0)
12	1.77 s	1.49 s	1.64 s	1.62 s or 1.74 s
13	1.74 s	1.74 s	1.75 s	1.62 s or 1.74 s
14		3.42 d(7.5)	3.40 d(7.5)	3.54 d(6.0)
15		5.39 m	5.39 m	5.60 br t(6.0)
17		1.74 s	1.74 s	1.62 s or 1.74 s
18		1.79 s	1.77 s	1.62 s or 1.74 s
2′	7.79 d(2.1)	7.83 d(2.1)	7.70 d(2.1)	7.73 d(1.8)
3′	3.85 s(OMe)	7.92 s(OH)	7.85 s(OH)	3.81 s(OMe)
4′	9.79 s(OH)	8.82 s(OH)	8.75 s(OH)	
5′	6.97 d(8.4)			6.94 d(8.5)
6′	7.75 dd(2.1, 8.4)	7.75 d(2.1)	7.60 d(2.1)	7.71 dd(8.5, 1.8)
OH				9.94, s, 9.80 s

Table 4-2-13: ^{1}H NMR spectroscopic data of flavonol-type flavonols **4-2-43**~**4-2-46**.

H	4-2-43	4-2-44	4-2-45	4-2-46
3			3.57 s(OMe)	
5	11.98 s(OH)	12.47 s(OH)	12.79 s(OH)	3.88 s(OMe)
6	6.20 s		6.19 d(2.0)	3.78 s(OMe)
8		6.58 s	6.26 d(2.0)	6.50 s
9	2.84 m	2.87 dd(6.5, 13.5)	3.10 dd(5.5, 13.0)	2.68 t(7.2)
		2.66 dd(7.0, 13.5)	2.50 dd(10.0, 13.0)	
10	2.52 m	2.28 t(7.0)	1.93 dd(5.5, 10.0)	1.48 m
11				1.48 m
12	4.50 s, 4.44 s	5.23 s	4.92 br s	1.54 m
13	1.59 s	2.01 m	1.75 m, 1.53 m	1.54 m
14	2.05 m	1.70 m, 1.16 m	1.44 m, 0.97 m	1.60 m
15	4.91 m			1.70 m

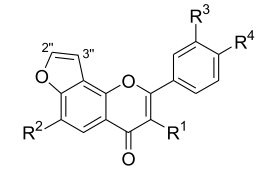
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Table 4-2-13 (continued)

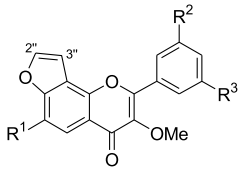
H	4-2-43	4-2-44	4-2-45	4-2-46
16		0.98 s	0.87 s	3.48 d(6.6)
17	1.46 s	0.88 s	0.73 s	1.01 d(6.7)
18	1.38 s	1.51 s	1.05 s	
19				1.92 s
2′	8.08 d(9.0)	8.11 br d(8.5)		7.88 d(1.9)
3′	6.90 d(9.0)	6.99 br d(8.5)		
5′	6.90 d(9.0)	6.99 br d(8.5)	6.76 d(8.5)	6.86 d(8.5)
6′	8.08 d(9.0)	8.11 br d(8.5)	6.79 d(8.5)	7.79 dd(8.5, 1.9)

Table 4-2-14: Cos, MFs, and TSs of flavonol-type flavonols **4-2-47**~**4-2-56**.

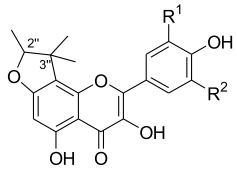
No.	Compounds	MFs	Test solvents	References
4-2-47	3,6-dimethoxyfurano[4″,5″: 8,7]flavone	$C_{19}H_{14}O_5$	$CDCl_3$	[115]
4-2-48	Karanjin	$C_{18}H_{12}O_4$	$CDCl_3$	[116]
4-2-49	pachycarin A	$C_{20}H_{16}O_6$	$CDCl_3$	[116]
4-2-50	3′,4′-methylenedioxy-[2″,3″:7,8]-furanoflavonol	$C_{18}H_{10}O_6$	$CDCl_3$	[117]
4-2-51	pongapinnol A	$C_{19}H_{14}O_6$	DMSO-d_6	[118]
4-2-52	pongapinnol B	$C_{20}H_{16}O_6$	$CDCl_3$	[118]
4-2-53	pongapinnol C	$C_{18}H_{12}O_5$	DMSO-d_6	[118]
4-2-54	pongapinnol D	$C_{18}H_{12}O_5$	DMSO-d_6	[118]
4-2-55	ugonin F	$C_{20}H_{18}O_6$	CD_3COCD_3	[113]
4-2-56	broussonol C	$C_{25}H_{26}O_7$	CD_3COCD_3	[110]



	R^1	R^2	R^3	R^4
4-2-47	OMe	OMe	H	H
4-2-48	OMe	H	H	H
4-2-49	OMe	H	OMe	OMe
4-2-50	OH	H	OCH_2O	



	R^1	R^2	R^3
4-2-51	H	OH	OMe
4-2-52	H	OMe	OMe
4-2-53	H	OH	H
4-2-54	OH	H	H



	R^1	R^2
4-2-55	H	H
4-2-56	OH	Prenyl

Table 4-2-15: ^{1}H NMR spectroscopic data of flavonol-type flavonols **4-2-47**~**4-2-51**.

H	4-2-47	4-2-48	4-2-49	4-2-50	4-2-51
3	3.93 s(OMe)	3.92 (OMe)			3.85 s(OMe)
5	7.56 s	8.2	8.2	8.20 d(8.8)	8.01 d(8.7)

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Table 4-2-15 (continued)

H	4-2-47	4-2-48	4-2-49	4-2-50	4-2-51
6	4.11 s(OMe)	7.48~7.6	7.56	7.58 dd(8.8, 0.9)	7.78 d(8.7)
2′	8.14 dd(7.9, 1.2)	8.09~8.15	7.80~7.82	7.43 d(1.8)	7.18 br t(1.5)
3′	7.56 (ov)	7.48~7.6			9.88 s(OH)
4′	7.53 (ov)	7.48~7.6			6.56 t(2.1)
5′	7.56 (ov)	7.48~7.6	7.05	6.98 d(8.2)	3.82 s(OMe)
6′	8.14 dd(7.9, 1.2)	8.09~8.15	7.80~7.82	7.53 dd(8.2, 1.8)	7.13 br t(1.8)
2″	7.77 d(1.9)	7.77	7.77	7.75 d(2.4)	8.27 d(2.1)
3″	7.18 d(1.9)	7.18	7.17	7.11 dd(2.4, 0.9)	7.43 br d(1.8)
OMe			3.99 s, 3.99 s, 3.93 s		
OCH_2O				6.09 s	

Table 4-2-16: ^{1}H NMR spectroscopic data of flavonol-type flavonols **4-2-52**~**4-2-56**.

H	4-2-52	4-2-53	4-2-54	4-2-55	4-2-56
3	3.93 s(OMe)	3.85 s(OMe)	3.84 s(OMe)		7.49 s(OH)
5	8.19 d(8.8)	7.94 d(8.8)	7.46 s	12.44 s(OH)	12.46 s(OH)
6	7.55 d(8.8)	7.65 d(8.8)	10.7 br s(OH)	6.18 s	6.18 s
9					3.43 d(7.5)
10					5.42 m
12					1.75 s
13					1.76 s
2′	7.32 d(2.2)	7.53 m	8.21~8.26 m	8.12 br d(8.5)	7.80 d(2.1)
3′	3.89 s(OMe)	10.0 br s(OH)	7.70~7.74 m	7.04 br d(8.5)	7.87 s(OH)
4′	6.63 t(2.2)	6.98 dd(8.1, 1.0)	7.70~7.74 m		8.86 s(OH)
5′	3.89 s(OMe)	7.41 t(8.1)	7.70~7.74 m	7.04 br d(8.5)	
6′	7.32 d(2.2)	7.53 m	8.21~8.26 m	8.12 br d(8.5)	7.56 d(2.1)
2″	7.76 d(2.1)	8.13 d(1.9)	8.31 d(2.0)	4.56 q(7.0)	4.57 q(6.6)
3″	7.17 br d(1.2)	7.32 br d(1.3)	7.57 d(2.0)		
2″-Me				1.40 d(7.0)	1.41 d(6.6)
3″-Me				1.60 s, 1.33 s	1.62 s, 1.34 s

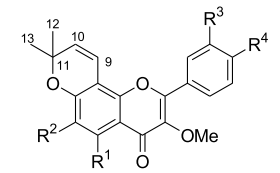
Table 4-2-17: Cos, MFs, and TSs of flavonol-type flavonols **4-2-57**~**4-2-70**.

No.	Compounds	MFs	Test solvents	References
4-2-57	7,8-(2″,2″-dimethylpyrano)-5,3′,4′-trihydroxy-3-methoxylflavone	$C_{21}H_{18}O_7$	DMSO-d_6	[119]
4-2-58	6-hydroxy-3-methoxy-6″,6″-dimethylchromeno-[2″,3″:7,8]-flavone	$C_{21}H_{18}O_5$	$CDCl_3$	[120]
4-2-59	flavenochromane C	$C_{21}H_{20}O_6$	DMSO-d_6	[121]
4-2-60	3-methoxy-(3″,4″-dihydro-3″,4″-diacetoxy)-2″,2″-dimethylpyrano-[7,8:5″,6″]-flavone	$C_{25}H_{24}O_8$	$CDCl_3$	[122]

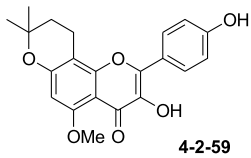
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Table 4-2-17 (continued)

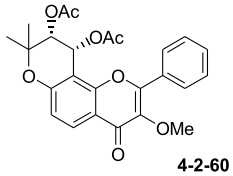
No.	Compounds	MFs	Test solvents	References
4-2-61	3,4-methylenedioxy-10-methoxy-7-oxo[2]benzo-pyrano[4,3-*b*]benzopyran	$C_{18}H_{12}O_6$	$CDCl_3$	[122]
4-2-62	3-methoxy-6-(3-methyl-but-2-enyloxy)-6″,6″-di-methylchromeno-[2″,3″:7,8]-flavone	$C_{26}H_{26}O_5$	$CDCl_3$	[120]
4-2-63	broussonol A	$C_{25}H_{24}O_7$	CD_3COCD_3	[110]
4-2-64	flavenochromane B	$C_{25}H_{26}O_6$	CD_3COCD_3	[121]
4-2-65	sophoranodichromane C	$C_{25}H_{26}O_6$	CD_3COCD_3	[123]
4-2-66	broussonol B	$C_{25}H_{24}O_7$	CD_3COCD_3	[110]
4-2-67	ugonin I	$C_{26}H_{26}O_7$	CD_3COCD_3	[113]
4-2-68	poinsettifolin A	$C_{30}H_{32}O_7$	$CDCl_3$-CD_3OD (9:1)	[124]
4-2-69	dorsilurin C	$C_{30}H_{32}O_6$	CD_3COCD_3	[125]
			$CDCl_3$	[125]
4-2-70	dorsmanin C	$C_{30}H_{32}O_7$	CD_3COCD_3	[111]



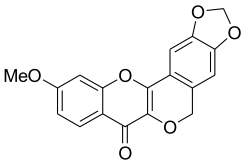
	R^1	R^2	R^3	R^4
4-2-57	OH	H	OH	OH
4-2-58	H	OH	H	H
4-2-62	H	OPrenyl	H	H



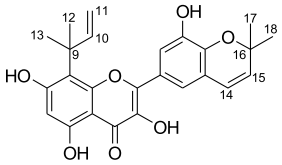
4-2-59



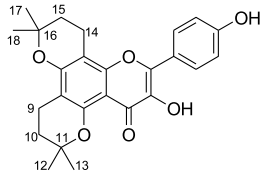
4-2-60



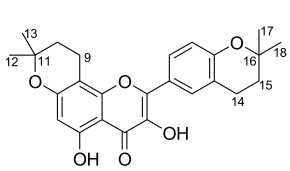
4-2-61



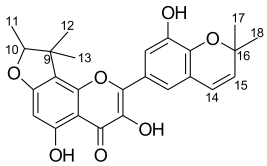
4-2-63



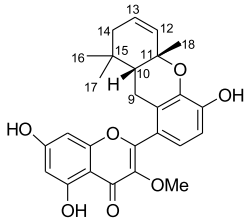
4-2-64



4-2-65

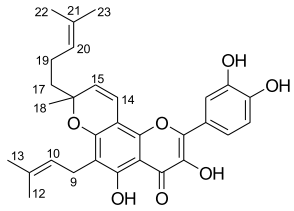


4-2-66

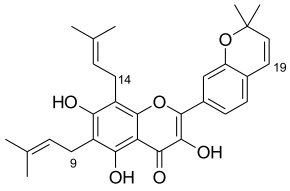


4-2-67

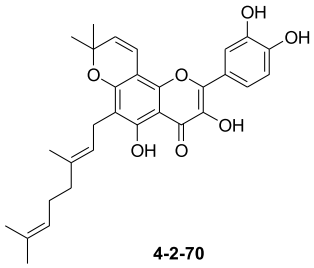
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4-2-68



4-2-69



4-2-70

Table 4-2-18: ^{1}H NMR spectroscopic data of flavonol-type flavonols **4-2-57**~**4-2-61**.

H	4-2-57	4-2-58	4-2-59	4-2-60	4-2-61
3	3.79 s(OMe)	3.90 s(OMe)	8.70 br s(OH)	3.89 s(OMe)	
5	13.07 s(OH)	7.65 s	3.81 s(OMe)	8.18 d(9.0)	8.19 d(9.0)
6	6.46 s	5.95 br s(OH)	6.33 s	6.93 d(9.0)	6.97 dd(9.0, 2.4)
7					3.93 s(OMe)
8					6.93 d(2.4)
9	6.60 d(10.0)	6.89 d(10.0)	2.87 t(6.6)	6.66 d(5.0)	
				1.88 s(OAc)	
10	5.78 d(10.0)	5.76 d(10.0)	1.88 t(6.6)	5.32 d(5.0)	
				2.11 s(OAc)	
12	1.43 s	1.56 s	1.35 s	1.46 s	
13	1.43 s	1.56 s	1.35 s	1.48 s	
2′	7.54 d(2.0)	8.08, 8.07 m	8.04 d(8.8)	7.98 m	5.16 s(CH_2)
3′		7.51~7.54 m	6.94 d(8.8)	7.49 m	7.30 s
4′		7.51~7.54 m	9.97 br s(OH)	7.49 m	
5′	6.90 d(8.5)	7.51~7.54 m	6.94 d(8.8)	7.49 m	
6′	7.42 dd(8.5, 2.0)	8.08, 8.07 m	8.04 d(8.8)	7.98 m	6.68 s
OCH_2O					6.07 s

Table 4-2-19: ^{1}H NMR spectroscopic data of flavonol-type flavonols **4-2-62**~**4-2-66**.

H	4-2-62	4-2-63	4-2-64	4-2-65	4-2-66
3	3.89 s(OMe)	7.80 s(OH)	7.76 br s(OH)	7.97 s(OH)	8.09 s(OH)
5	7.55 s	12.52 s(OH)		11.87 s(OH)	12.43 s(OH)
6		6.33 s		6.11 s	6.19 s
7		9.37 s(OH)			
9	6.86 d(10.0)		2.63 t(6.8)	2.93 t(6.6)	
10	5.75 d(10.0)	6.35 dd(10.0, 17.5)	1.82 t(6.8)	1.93 t(6.6)	4.57 q(6.6)
11		4.88 d(10.0)			1.41 d(6.6)
		4.93 d(17.5)			

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Table 4-2-19 (continued)

H	4-2-62	4-2-63	4-2-64	4-2-65	4-2-66
12	1.55 s	1.68 s	1.37 s	1.38 s	1.34 s
13	1.55 s	1.68 s	1.37 s	1.38 s	1.62 s
14	4.69 d(6.4)	6.47 d(9.6)	2.97 t(6.8)	2.89 t(6.6)	6.48 d(9.6)
15	5.53 t(6.4)	5.82 d(9.6)	1.95 t(6.8)	1.88 t(6.6)	5.83 d(9.6)
17	1.79 s	1.46 s	1.41 s	1.36 s	1.46 s
18	1.79 s	1.46 s	1.41 s	1.36 s	1.46 s
2′	8.09, 8.07 m	7.71 d(2.1)	8.14 d(8.9)	8.05 br s	7.67 d(2.1)
3′	7.49~7.53 m	7.80 s(OH)	7.02 d(8.9)		8.09 s(OH)
4′	7.49~7.53 m		8.84 br s(OH)		
5′	7.49~7.53 m		7.02 d(8.9)	6.88 d(8.7)	
6′	8.09, 8.07 m	7.51 d(2.1)	8.14 d(8.9)	8.01 br d(8.7)	7.52 d(2.1)

Table 4-2-20: ^{1}H NMR spectroscopic data of flavonol-type flavonols **4-2-67**~**4-2-70**.

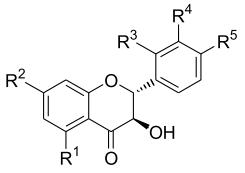
H	4-2-67	4-2-68	4-2-69(CD_3COCD_3)	4-2-69($CDCl_3$)	4-2-70
3	3.66 s(OMe)				
5	12.73 br s(OH)		13.19 br s(OH)	13.05 br s(OH)	12.62 br s(OH)
6	6.24 d(2.0)				
8	6.36 d(2.0)				
9	3.05 dd(18.0, 8.0) 2.93 d(18.0)	3.28 d(7.2)	3.46 or 3.66 br d(6.8)	3.44 or 3.56 br d(6.7)	3.37 d(6.8)
10	1.85 d(8.0)	5.17 t(7.2)	5.27 m	5.26 m	5.16 m
12	5.76 d(10.0)	1.75 s			1.90 m, 2.38 m
13	5.81 m	1.62 s			
14	1.99 d(18.0) 1.85 dd(18.0, 6.0)	6.81 d(10.0)	3.46 or 3.66 br d(6.8)	3.44 or 3.56 br d(6.7)	1.90 m, 2.38 m
15		5.48 d(10.0)	5.27 m	5.26 m	5.27 m
16	0.97 s				
17	0.79 s	1.62 m, 1.76 m			
18	1.36 s	1.38 s			
19		2.05 m	6.25 d(9.5)	6.28 d(9.5)	7.00 d(10.1)
20		5.03 t(7.1)	5.50 br d(9.5)	5.43 m	5.77 d(10.1)
22		1.51 s			
23		1.60 s			
2′		7.72 d(2.1)	6.47 d(2.2)	6.43 d(2.3)	7.90 d(2.1)
5′	6.76 d(8.5)	6.90 d(8.5)	7.73 d(8.5)	7.65 d(8.6)	7.05 d(8.5)
6′	6.95 d(8.5)	6.58 dd(8.5, 2.1)	6.67 dd(8.5, 2.2)	6.55 dd(8.6, 2.3)	7.80 dd(8.5, 2.1)
Me			1.72 s, 1.72 s 1.63 s, 1.81 s 1.88 s, 1.98 s	1.75 s, 1.75 s 1.70 s, 1.84 s 1.87 s, 1.98 s	1.49 s, 1.49 s 1.67 s, 1.70 s 1.83 s

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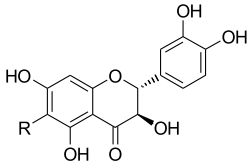
4.2.2 Flavanonol-type flavonols

Table 4-2-21: Cos, MFs, and TSs of flavanonol-type flavonols **4-2-71**~**4-2-82**.

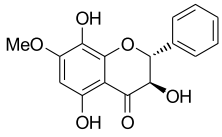
No.	Compounds	MFs	Test solvents	References
4-2-71	erycibenin D	$C_{16}H_{14}O_6$	CD_3COCD_3	[126]
4-2-72	(2*R*,3*R*)-(+)-4′,5,7-trimethoxydihydroflavonol	$C_{18}H_{18}O_6$	CD_3COCD_3	[127]
4-2-73	(2*R*,3*R*)-(+)-4′,7-di-*O*-methyldihydroquercetin	$C_{17}H_{16}O_7$	CD_3COCD_3	[127]
4-2-74	(2*R*,3*R*)-(+)-4′,7-di-*O*-methyldihydrokaempferol	$C_{17}H_{16}O_6$	CD_3COCD_3	[127]
4-2-75	(2*R*,3*R*)-(+)-4′-*O*-methyldihydroquercetin	$C_{16}H_{14}O_7$	CD_3COCD_3	[127]
4-2-76	(2*R*,3*R*)-4′,7-dihydroxy-2′,5-dimethoxydihydroflavonol	$C_{17}H_{16}O_7$	DMSO-d_6	[93]
4-2-77	6-(3″-oxobutyl)taxifolin	$C_{19}H_{18}O_8$	–	[128]
4-2-78	taxifolin	$C_{15}H_{12}O_7$	–	[128]
4-2-79	(2*R*,3*R*)-7-methoxy-3,5,8-trihydroxyflavanone	$C_{16}H_{14}O_6$	DMSO-d_6	[129]
4-2-80	diosalol	$C_{16}H_{14}O_8$	$CDCl_3$	[130]
			$CDCl_3$-CD_3OD	[130]
			DMSO-d_6	[130]
4-2-81	(2*R*,3*S*)-4′-*O*-methyl-2,3-dihydromyricetin	$C_{16}H_{14}O_8$	CD_3OD	[131]
4-2-82	(2*R*,3*S*)-(+)-3,5′-dihydroxy-4′,7-dimethoxydihydroflavonol	$C_{17}H_{16}O_7$	CD_3OD	[127]
			CD_3COCD_3	[127]
			DMSO-d_6	[127]



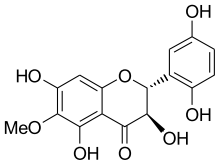
	R^1	R^2	R^3	R^4	R^5
4-2-71	H	OH	H	OMe	OH
4-2-72	OMe	OMe	H	H	OMe
4-2-73	OH	OMe	H	OH	OMe
4-2-74	OH	OMe	H	H	OMe
4-2-75	OH	OH	H	OH	OMe
4-2-76	OMe	OH	OMe	H	OH



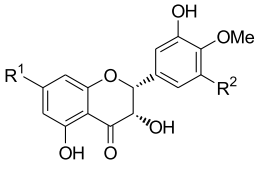
4-2-77 R = $CH_2CH_2COCH_3$
4-2-78 R = H



4-2-79



4-2-80



	R^1	R^2
4-2-81	OH	OH
4-2-82	OMe	H

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Table 4-2-22: ^{1}H NMR spectroscopic data of flavanonol-type flavonols **4-2-71**~**4-2-74**.

H	4-2-71	4-2-72	4-2-73	4-2-74
2	5.05 d(11.9)	5.01 d(11.9)	5.10 d(11.6)	5.16 d(11.6)
3	4.61 d(11.9)	4.43 dd(11.9, 3.6)	4.69 dd(11.6, 4.3)	4.70 d(11.6, 3.0)
		4.29 d(3.6, OH)	4.77 d(4.3, OH)	4.75 d(3.6, OH)
5	7.73 d(8.6)		11.69 s(OH)	11.67 s(OH)
6	6.63 dd(8.6, 2.2)	6.15 d(2.3)	6.06 d(2.3)	6.06 d(2.3)
7			3.87 s(OMe)	3.84 s(OMe)
8	6.41 d(2.2)	6.25 d(2.3)	6.09 d(2.3)	6.09 d(2.3)
2′	7.24 d(1.9)	7.52 d(8.8)	7.09 d(1.9)	7.52 d-like(8.7)
3′	3.89 s(OMe)	7.00 d(8.8)	7.72 s(OH)	7.00 d-like(8.7)
4′			3.88 s(OMe)	3.86 s(OMe)
5′	6.88 d(8.3)	7.00 d(8.8)	6.99 d(8.3)	7.00 d-like(8.7)
6′	7.05 dd(8.3, 1.9)	7.52 d(8.8)	7.03 dd(8.3, 1.9)	7.52 d-like(8.7)
OMe		3.87 s, 3.84 s, 3.82 s		

Note: t-like denotes a signal similar to doublet, and the same below.

Table 4-2-23: ^{1}H NMR spectroscopic data of flavanonol-type flavonols **4-2-75**~**4-2-78**.

H	4-2-75	4-2-76	4-2-77	4-2-78
2	5.07 d(11.5)	5.25 d(11.1)	5.00 d(11.4)	5.03 d(11.4)
3	4.64 br d(11.5)	4.36 d(11.1)	4.58 d(11.4)	4.63 d(11.4)
	4.70 br s(OH)			
5	11.71 s(OH)	3.74 s(OMe)	12.01 s(OH)	11.69 s(OH)
6	5.96 d(2.3)	6.06 d(2.1)		5.94 d(0.8)
7		10.55 (OH)		
8	6.00 d(2.3)	5.88 d(2.1)	5.99 s	5.98 d(0.8)
2′	7.09 d(2.0)	3.71 s(OMe)	7.05 d(1.9)	7.06 d(1.9)
3′	7.70 s(OH)	6.42 d(2.1)		
4′	3.88 s(OMe)	9.62 (OH)		
5′	6.98 d(8.3)	6.38 dd(8.1, 2.1)	6.82 d(8.1)	6.82 d(8.1)
6′	7.03 dd(8.3, 2.0)	7.21 d(8.1)	6.88 dd(8.1, 1.9)	6.89 dd(8.1, 1.9)
1″			2.27 t(4.8)	
2″			2.62 t(4.8)	
4″			2.12 s	

Table 4-2-24: ^{1}H NMR spectroscopic data of flavanonol-type flavonols **4-2-79**~**4-2-81**.

H	4-2-79	4-2-80($CDCl_3$)	4-2-80(DMSO-d_6)	4-2-80($CDCl_3$-CD_3OD)	4-2-81
2	5.17 d(11.1)	5.29 d(11.7)	5.38 d(10.3)	5.29 d(11.7)	5.26 d(2.1)
3	4.62 d(11.1)	4.48 d(11.7)	4.61 d(10.3)	4.48 d(11.7)	4.20 d(2.1)

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Table 4-2-24 (continued)

H	4-2-79	4-2-80($CDCl_3$)	4-2-80(DMSO-d_6)	4-2-80($CDCl_3$-CD_3OD)	4-2-81
5	11.59 s(OH)	11.89 s(OH)	11.89 s(OH)		
6	6.26 s	3.64 s(OMe)	3.65 s(OMe)	3.64 s(OMe)	5.92 br s
7	3.84 s(OMe)	9.02 s(OH)	9.02 s(OH)		
8		5.83 s	5.95 s	5.83 s	5.97 br s
2′	7.41~7.43 m				6.56 br s
3′	7.54~7.56 m	6.52 d(8.7)	6.57~6.77 m	6.52 d(8.7)	
4′	7.41~7.43 m	6.46 dd(8.8, 2.4)	6.57~6.77 m	6.46 dd(8.8, 2.4)	3.80 br s(OMe)
5′	7.54~7.56 m				
6′	7.41~7.43 m	6.67 d(2.5)	6.57~6.77 m	6.67 d(2.5)	6.56 br s

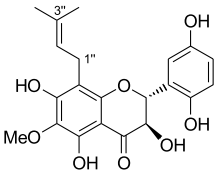
Table 4-2-25: ^{1}H NMR spectroscopic data of flavanonol-type flavonol **4-2-82**.

H	4-2-82(DMSO-d_6)	4-2-82(CD_3OD)	4-2-82(CD_3COCD_3)
2	6.03 d (2.2)	5.75 d (5.0)	6.10 d (3.2)
3	4.80 d (2.2)	5.03 d (5.0)	5.02 d (3.2)
5	11.47 s (OH)		11.65 s (OH)
6	6.16 d (2.3)	6.03 d (2.3)	6.00 d (2.1)
7	3.80 s (OMe)		
8	6.29 d (2.3)	6.13 d (2.3)	6.14 d (2.1)
2′	6.77 d (2.0)	6.83 d (2.3)	6.84 d (2.1)
3′	9.28 s (OH)		7.71 s (OH)
4′	3.91 s (OMe)		
5′	6.95 d (8.3)	6.87 d (8.3)	6.89 d (8.3)
6′	6.67 dd(8.3, 2.0)	6.79 dd(8.3, 2.3)	6.77 dd(8.3, 2.1)
OMe		3.82 s, 3.84 s	3.80 s, 3.88 s

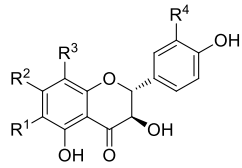
Table 4-2-26: Cos, MFs, and TSs of flavanonol-type flavonols **4-2-83**~**4-2-89**.

No.	Compounds	MFs	Test solvents	References
4-2-83	paraibanol	$C_{21}H_{22}O_8$	$CDCl_3$	[130]
			$CDCl_3$-CD_3OD	[130]
			DMSO-d_6	[130]
4-2-84	scariosin	$C_{22}H_{24}O_7$	DMSO-d_6	[132]
4-2-85	2*R*,3*R*-shuterin	$C_{20}H_{20}O_6$	CD_3COCD_3	[133]
4-2-86	6,8-diprenylaromadendrin	$C_{25}H_{28}O_6$	$CDCl_3$	[134]
4-2-87	bonanniol A	$C_{25}H_{28}O_6$	$CDCl_3$	[135]
4-2-88	bonanniol B	$C_{26}H_{30}O_6$	$CDCl_3$	[135]
4-2-89	alnifoliol	$C_{25}H_{28}O_7$	CD_3OD	[136]

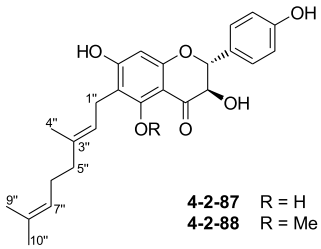
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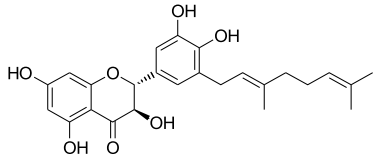
4-2-83



	R^1	R^2	R^3	R^4
4-2-84	H	OMe	Prenyl	OMe
4-2-85	Prenyl	OH	H	H
4-2-86	Prenyl	OH	Prenyl	H



4-2-87 R = H
4-2-88 R = Me



4-2-89

Table 4-2-27: ^{1}H NMR spectroscopic data of flavanonol-type flavonols **4-2-83**~**4-2-85**.

H	4-2-83($CDCl_3$)	4-2-83($CDCl_3$-CD_3OD)	4-2-83(DMSO-d_6)	4-2-84	4-2-85
2	5.33 d(11.8)	5.33 d(11.8)	5.38 d(10.1)	5.05 d(11)	4.97 d(11.5)
3	4.47 d(11.8)	4.47 d(12.4)	4.47 d(10.2)	4.48 d(11)	4.53 d(11.5)
			8.96 s(OH)	5.78 d(6.0, OH)	
5	11.94 s(OH)		11.94 s(OH)	12.08 br s(OH)	
6	3.74 s(OMe)	3.74 s(OMe)	3.69 s(OMe)	6.06 s	
7	10.25 s(OH)		10.25 s(OH)	3.90 s(OMe)	
8					5.99 s
2′				7.23 d(2.5)	7.40 d(8.5)
3′	6.65 d(8.5)	6.65 d(8.5)	6.57~6.71 m	3.82 s(OMe)	6.87 d(8.5)
4′	6.62 dd(8.8, 2.8)	6.62 dd(8.5)	6.57~6.71 m	9.12 br s(OH)	
5′				6.88 d(8.5)	6.87 d(8.5)
6′	6.90 d(2.6)	6.9 d(2.6)	6.57~6.71 m	7.05 dd(8.5, 2.5)	7.40 d(8.5)
1″	3.10 d(7.3)	3.1 t(7.3)	3.05 d(7.0)	3.10 d(8.0)	3.25 br d(7.3)
2″	5.04 t	5.04 t(7.2)	4.59 t(6.9)	5.10 m	5.26 br t(7.3)
4″, 5″	1.51 s, 1.49 s	1.51 s, 1.49 s	1.56 s, 1.50 s	1.55 m, 1.55 m	1.75 s, 1.61 s

Table 4-2-28: ^{1}H NMR spectroscopic data of flavanonol-type flavonols **4-2-86**~**4-2-89**.

H	4-2-86	4-2-87	4-2-88	4-2-89
2	4.97 d(12.0)	5.02 d(12)	4.97 d(12)	4.88 d(11)
3	4.53 d(12.0)	4.56 d(12)	4.32 d(12)	4.47 d(11)
5	11.49 s(OH)	11.60 s(OH)	3.70 s(OMe)	

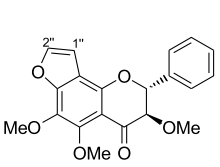
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Table 4-2-28 (continued)

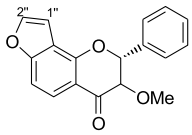
H	4-2-86	4-2-87	4-2-88	4-2-89
6				5.87 d(2.5)
7	6.51 s(OH)			
8		6.00 s	6.17 s	5.91 d(2.5)
2′	7.39 d(8.0)	7.42 d (8)	7.32 d (8)	6.81 d(2)
3′	6.83 d(8.0)	6.84 d (8)	6.77 d (8)	
5′	6.83 d(8.0)	6.84 d (8)	6.77 d (8)	
6′	7.39 d(8.0)	7.42 d (8)	7.32 d (8)	6.74 d(2)
1″	3.36 d(6.5)	3.38 br d	3.17 br d	3.31 d(7.5)
2″	5.24 t(6.5)	5.10 m	5.07 m	5.34 t(7.5)
4″	1.76 s	1.82 br s	1.72 br s	1.70 s
5″	1.83 s			2.02 t(8)
6″	3.26 d(7.0)			2.09 q(7.5)
7″	5.18 t(7.0)	5.10 m	5.07 m	5.10 t
9″, 10″	1.71 s, 1.67 s	1.62 s, 1.56 s	1.61 s, 1.55 s	1.61 s, 1.56 s

Table 4-2-29: Cos, MFs, and TSs of flavanonol-type flavonols **4-2-90**~**4-2-96**.

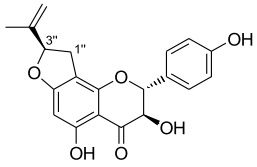
No.	Compounds	MFs	Test solvents	References
4-2-90	(2*R*,3*R*)-3,5,6-trimethoxy-[2″,3″:7,8]-furanoflavanonol	$C_{20}H_{18}O_6$	$CDCl_3$	[137]
4-2-91	3-methoxy-(2″,3″:7,8)-furanoflavanone	$C_{18}H_{14}O_4$	$CDCl_3$	[138]
4-2-92	phellodensin-A	$C_{20}H_{18}O_6$	CD_3COCD_3	[139]
4-2-93	phellodensin-C	$C_{20}H_{20}O_7$	CD_3COCD_3	[139]
4-2-94	2*R*,3*R*-shuterol	$C_{20}H_{18}O_6$	CD_3COCD_3	[133]
4-2-95	2*R*,3*R*-shuterone A	$C_{20}H_{18}O_7$	CD_3COCD_3	[133]
4-2-96	2*S*,3*R*-shuterone B	$C_{20}H_{18}O_7$	CD_3COCD_3	[133]



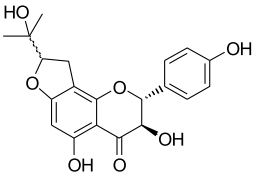
4-2-90



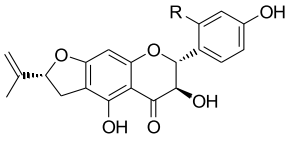
4-2-91



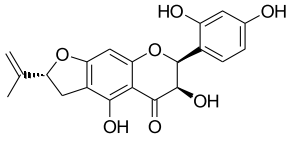
4-2-92



4-2-93



4-2-94 R = H
4-2-95 R = OH



4-2-96

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Table 4-2-30: ^{1}H NMR spectroscopic data of flavanonol-type flavonols **4-2-90**~**4-2-93**.

H	4-2-90	4-2-91	4-2-92	4-2-93
2	5.44 d(9.6)	5.50 d(10)	5.00 d(12.0)	5.12 d(11.4)
3	4.09 d(9.6)	4.20 d(10)	4.57 dd(12.0, 4.0)	4.66 dd(11.4, 3.8)
	3.44 s(OMe)	3.42 s(OMe)	4.76 d(4.0, OH)	4.72 d(3.8, OH)
5		7.88 d(9)	11.64 br s(OH)	11.96 br s(OH)
6		7.23 dd(9, 1)	6.02 s	5.92 s
2′, 6′	7.45 m	7.54 dd(8, 2)	7.42 d(8.4)	7.43 d(8.2)
3′, 5′	7.45 m	7.4~7.5 m	6.88 d(8.4)	6.89 d(8.2)
4′	7.45 m	7.4~7.5 m	8.76 br s(OH)	8.57 br s(OH)
1″	6.87 d(2.2)	6.93 dd(2, 1)	2.75 dd(14.0, 5.8)	2.80~3.10 m
			2.82 dd(14.0, 5.8)	
2″	7.58 d(2.2)	7.62 d(2)	4.28 br t(5.8)	4.75 dd(9.2, 8.2)
3″				3.76 br s(OH)
4″			4.65 br s, 4.71 br s	1.11 s
5″			1.60 s	1.22 s
OMe	3.97 s, 4.07 s			

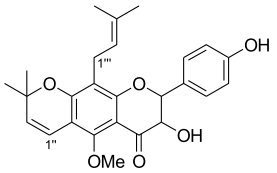
Table 4-2-31: ^{1}H NMR spectroscopic data of flavanonol-type flavonols **4-2-94**~**4-2-96**.

H	4-2-94	4-2-95	4-2-96
2	5.08 d(11.6)	5.50 d(11.7)	5.66 d(2.0)
3	4.64 d(11.6)	4.87 d(11.7)	4.24 d(2.0)
8	5.96 s	5.95 s	6.03 s
2′	7.42 d(8.4)		
3′	6.89 d(8.4)	6.46 d	6.46 d
5′	6.89 d(8.4)	6.43 dd(8.8, 2.4)	6.40 dd(8.8, 2.4)
6′	7.42 d(8.4)	7.33 d(8.8)	7.39 d(8.8)
1″	2.86 dd(15.4, 7.6)	2.87 dd(15.1, 7.8)	2.87 dd(15.1, 7.8)
	3.31 dd(15.4, 9.5)	3.31 dd(15.1, 9.8)	3.32 dd(15.1, 9.8)
2″	5.39 br t(8.3)	5.40 br t(8.3)	5.40 br t(8.3)
4″	4.93 br s, 5.08 br s	4.93 br s, 5.08 br s	4.93 br s, 5.09 br s
5″	1.76 s	1.76 s	1.77 s

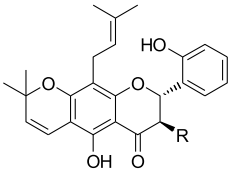
Table 4-2-32: Cos, MFs, and TSs of flavanonol-type flavonols **4-2-97**~**4-2-102**.

No.	Compounds	MFs	Test solvents	References
4-2-97	5-methyl lupinifolinol	$C_{26}H_{28}O_6$	$CDCl_3$	[140]
4-2-98	5,2′-dihydroxy-3-methoxy-6,7-(2″,2″-dimethylchromene)-8-(3‴,3‴-dimethylallyl)-flavanone	$C_{26}H_{28}O_6$	$CDCl_3$	[141]
4-2-99	2′,3,5-trihydroxy-6,7-(2″,2″-dimethylchromene)-8-(3‴,3‴-dimethylallyl)-flavanone	$C_{25}H_{26}O_6$	$CDCl_3$	[141]
	jayacanol	$C_{25}H_{26}O_6$	$CDCl_3$	[142]
4-2-100	kanzonol Z	$C_{25}H_{26}O_5$	$CDCl_3$	[143]
			CD_3COCD_3	[143]
4-2-101	sophoranodichromane A	$C_{25}H_{28}O_6$	$CDCl_3$	[123]
			CD_3COCD_3	[123]
4-2-102	flavenochromane A	$C_{25}H_{28}O_7$	CD_3COCD_3	[121]

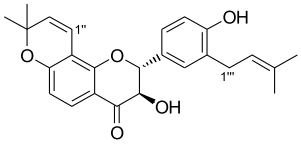
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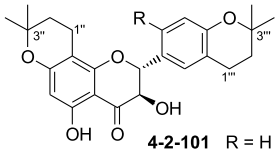
4-2-97



4-2-98 R = OMe
4-2-99 R = OH



4-2-100



4-2-101 R = H
4-2-102 R = OH

Table 4-2-33: ^{1}H NMR spectroscopic data of flavanonol-type flavonols **4-2-97**~**4-2-99** and **4-2-102**.

H	4-2-97	4-2-98	4-2-99	4-2-102
2	4.95 d(12)	5.43 d(11)	5.39 d(11)	5.44 d(11.6)
3	4.42 br d(12)	4.15 d(11)	4.53 d(11)	4.87 d(11.6)
	4.1 br s(OH)	3.60 s(OMe)	4.18 s(OH)	4.64 t(3.8, OH)
5	3.85 s(OMe)	11.95 s(OH)	11.29 s(OH)	12.09 d(2.4, OH)
6				5.82 s
2′	7.4 d(9)	6.73 s(OH)	6.86 s(OH)	8.31 s(OH)
3′	6.85 d(9)	7.00 dd(8, 1)	7.02 d(7, 5)	6.32 s
4′		7.31 td(8, 1)	7.30 t(7, 5)	
5′	6.85 d(9)	7.03 td(8, 1)	7.05 t(7, 5)	
6′	7.40 d(9)	7.52 dd(8, 1)	7.57 d(7, 5)	7.19 s
1″	6.65 d(9)	6.65 d(10)	6.64 d(10)	2.60 t(6.8)
2″	5.65 d(9)	5.54 d(10)	5.55 d(10)	1.83 t(6.8)
4″, 5″	1.45 s, 1.45 s	1.45 s, 1.47 s	1.46 s, 1.47 s	1.34 s, 1.34 s
1‴	3.25 d(7)	3.23 dd(10, 6)	3.23 dd(10, 7)	2.72 t(6.7)
2‴	5.15 t(7)	5.12 t(6)	5.12 t(7)	1.80 t(6.7)
4‴, 5‴	1.6 s, 1.6 s	1.66 s, 1.67 s	1.66 s, 1.66 s	1.31 s, 1.31 s

Table 4-2-34: ^{1}H NMR spectroscopic data of flavanonol-type flavonols **4-2-100** and **4-2-101**.

H	4-2-100(CD_3COCD_3)	4-2-100($CDCl_3$)	4-2-101(CD_3COCD_3)	4-2-101($CDCl_3$)
2	5.08 d(12)	5.01 d(12)	5.09 d(11.4)	4.98 d(12.0)
3	4.59 dd(12, 3)	4.54 dd(12, 2)	4.64 m	4.53 dd(12.0, 1.8)
	4.39 d(3, OH)	3.72 d(2, OH)	4.64 br s(OH)	3.53 d(1.8, OH)
5	7.64 d(8.5)	7.72 d(9)	11.39 s(OH)	10.95 s(OH)
6	6.52 br d(8.5)	6.54 dd(9, 1)	5.87 s	6.00 s
2′	7.35 d(2)	7.30 d(2)	7.32 m	7.25 d(3.0)
4′	8.42 br s(OH)			
5′	6.89 d(8)	6.87 d(8)	6.77 d(9.0)	6.85 d(8.1)
6′	7.28 dd(8, 2)	7.33 dd(8, 2)	7.32 m	7.28 dd(8.1, 3.0)

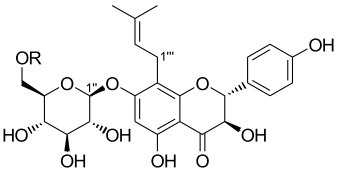
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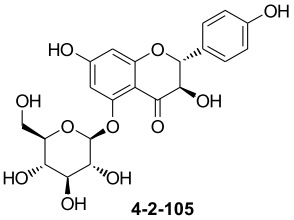
Table 4-2-34 (continued)

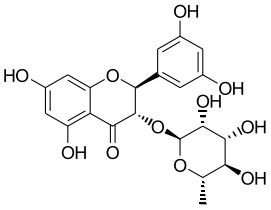
H	4-2-100(CD_3COCD_3)	4-2-100($CDCl_3$)	4-2-101(CD_3COCD_3)	4-2-101($CDCl_3$)
1″	6.52 br d(10)	6.58 dd(10, 1)	2.52 m	2.55 m
2″	5.71 d(10)	5.56 d(10)	1.78 m	1.74 m
4″, 5″	1.42 s, 1.44 s	1.45 s, 1.47 s	1.33 s, 1.31 s	1.35 s, 1.32 s
1‴	3.36 br d(7)	3.41 br d(7)	2.83 t(6.7)	2.83 t(6.7)
2‴	5.39 br t(7)	5.36 m d(7)	1.85 t(6.7)	1.83 t(6.7)
4‴, 5‴	1.70 s, 1.71 s	1.78 br s, 1.79 br s	1.33 s, 1.33 s	1.36 s, 1.36 s

Table 4-2-35: Cos, MFs, and TSs of flavanonol-type flavonols **4-2-103**~**4-2-107**.

No.	Compounds	MFs	Test solvents	References
4-2-103	phellamurin	$C_{26}H_{30}O_{11}$	CD_3OD	[144]
4-2-104	6‴-*O*-acetyl phellamurin	$C_{28}H_{32}O_{12}$	CD_3COCD_3	[145]
4-2-105	helicioside A	$C_{21}H_{22}O_{11}$	DMSO-d_6	[146]
4-2-106	neosmitilbin	$C_{21}H_{22}O_{11}$	CD_3OD	[147]
4-2-107	(2*R*,3*R*)-6-methylaromadendrin-3-*O*-*β*-D-glucopyranoside	$C_{22}H_{24}O_{11}$	CD_3OD	[148]







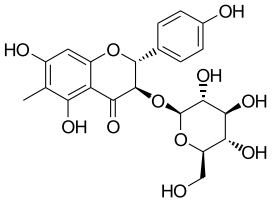


Table 4-2-36: ^{1}H NMR spectroscopic data of flavanonol-type flavonols **4-2-103**~**4-2-107**.

H	4-2-103	4-2-104	4-2-105	4-2-106	4-2-107
2	4.99 d(11.5)	5.09 d(12.0)	4.99 d(11)	4.98 d(11.4)	5.23 d(10.1)
3	4.58 d(11.5)	4.64 dd(12.0, 4.4) 4.71 d(4.4)	4.34 d(11)	4.62 d(11.4)	4.96 d(10.1)
5		11.64 br s(OH)			
6	6.28 s	6.36 s	6.36 d(2)	5.88 d(2.0)	1.94 s(Me)
8			6.04 d(2)	5.91 d(2.0)	5.91 s

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Table 4-2-36 (continued)

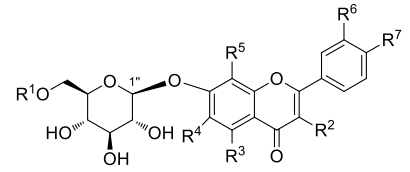
H	4-2-103	4-2-104	4-2-105	4-2-106	4-2-107
2′	7.35 d(8.5)	7.43 d(8.8)	7.31 d(9)	6.97 s	7.35 d(8.6)
3′	6.82 d(8.5)	6.91 d(8.8)	6.79 d(9)		6.80 d(8.6)
4′		8.51 s(OH)		6.80 s	
5′	6.82 d(8.5)	6.91 d(8.8)	6.79 d(9)		6.80 d(8.6)
6′	7.35 d(8.5)	7.43 d(8.8)	7.31 d(9)	6.80 s	7.35 d(8.6)
1″	5.01 d(8.0)	5.08 d(7.6)	4.80 d(7)	5.15 d(1.5)	3.78 d(7.7)
2″	3.26 m	3.55~3.58 m	3.20~3.37 m	4.00 dd(3.3, 1.5)	2.90~3.80 m
3″	3.46 m	3.55~3.58 m	3.20~3.37 m	3.38 dd(9.6, 3.3)	2.90~3.80 m
4″	3.64 m	3.43 m	3.20~3.37 m	3.19 t(9.6)	2.90~3.80 m
5″	3.48 m	3.84 m	3.20~3.37 m	2.29 m	2.90~3.80 m
6″	3.88 dd(11.5, 1.9)	4.21 dd(11.6, 7.2)	3.54 dd(12, 6)	0.90 d(6.3)	2.90~3.80 m
	3.79 dd(11.5, 6.0)	4.44 m	3.77 dd(12, 2)		
1‴	3.38 br d(7.0)	3.13 dd(14.4, 7.6)			
		3.31 m			
2‴	5.22 br t(7.0)	5.16 m			
4‴, 5‴	1.64 s, 1.78 s	1.58 s, 1.61 s			
OAc		1.93 s			
OH		4.51 m, 4.60 m			

4.2.3 Flavonol glycoside-type flavonols

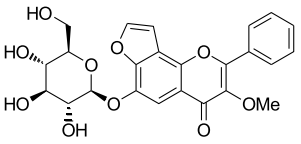
Table 4-2-37: Cos, MFs, and TSs of flavonol glycoside-type flavonols **4-2-108**~**4-2-120**.

No.	Compounds	MFs	Test solvents	References
4-2-108	gossypitrin	$C_{21}H_{20}O_{13}$	DMSO-d_6	[149]
4-2-109	pongamoside C	$C_{24}H_{22}O_{10}$	DMSO-d_6	[150]
4-2-110	pongamoside D	$C_{23}H_{22}O_{11}$	DMSO-d_6	[150]
4-2-111	6-hydroxykaempferol-7-*O*-(6″-*O*-acetyl-*β*-D-glucopyranoside)	$C_{23}H_{22}O_{13}$	DMSO-d_6	[151]
4-2-112	6‴-*O*-acetyl amurensin	$C_{28}H_{30}O_{12}$	CD_3COCD_3	[145]
4-2-113	quercetagetin-7-*O*-(6-*O*-caffeoyl-*β*-D-glucopyranoside)	$C_{30}H_{26}O_{16}$	CD_3OD	[152]
4-2-114	quercetagetin-7-*O*-(6-*O*-*p*-coumaroyl-*β*-D-glucopyranoside)	$C_{30}H_{26}O_{15}$	CD_3OD	[152]
4-2-115	quercetagetin-7-*O*-(6-*O*-galloyl-*β*-D-glucopyranoside)	$C_{28}H_{24}O_{17}$	CD_3OD	[152]
4-2-116	7-*O*-*α*-D-glucopyranosyl-3,5-dihydroxy-3′-(4″-acetoxyl-3″-methylbutyl)-6,4′-dimethoxyflavone	$C_{30}H_{36}O_{14}$	CD_3OD	[114]
4-2-117	7-*O*-*α*-D-glucopyranosyl-3,4′-dihydroxy-3′-(4″-acetoxyl-3″-methylbutyl)-5,6-dimethoxyflavone	$C_{30}H_{36}O_{14}$	CD_3OD	[114]
4-2-118	kaempferol 7-*O*-(2-*E*-*p*-coumaroyl-*α*-L-rha-mno-side)	$C_{30}H_{26}O_{12}$	CD_3COCD_3	[153]
4-2-119	kaempferol 7-*O*-(2,3-di-*E*-*p*-coumaroyl-*α*-L-rha-mnoside)	$C_{39}H_{32}O_{14}$	CD_3COCD_3	[153]
4-2-120	2-hydroxy-4-*O*-L-(3,5,7-trihydroxy-4-oxo-4*H*-chromen-2-yl)phenylarabinofuranoside	$C_{20}H_{18}O_{11}$	CD_3OD	[154]

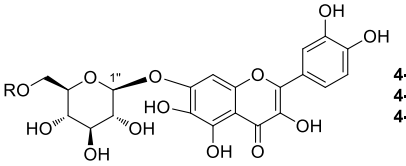
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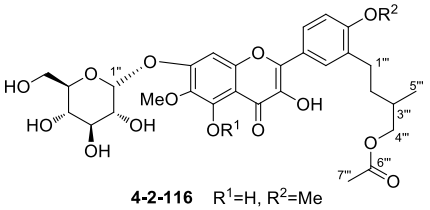
	R^1	R^2	R^3	R^4	R^5	R^6	R^7
4-2-108	H	OH	OH	H	OH	OH	OH
4-2-110	H	OMe	H	H	H	OCH_2O	
4-2-111	Ac	OH	OH	OH	H	H	OH
4-2-112	Ac	OH	OH	H	Prenyl	H	OH



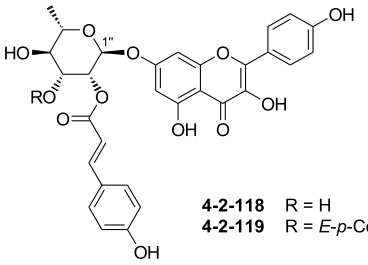
4-2-109



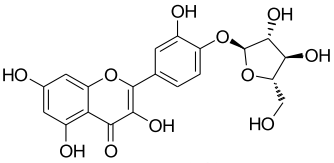
4-2-113 R = Caff
4-2-114 R = Coum
4-2-115 R = Gal



4-2-116 R^1=H, R^2=Me
4-2-117 R^1=Me, R^2=H



4-2-118 R = H
4-2-119 R = *E*-*p*-Coum



4-2-120

Table 4-2-38: ^{1}H NMR spectroscopic data of flavonol glycoside-type flavonols **4-2-108**~**4-2-111**.

H	4-2-108	4-2-109	4-2-110	4-2-111
3		3.85 s(OMe)	3.79 s(OMe)	
5		7.62 s	7.98 d(9.0)	
6	6.61 s		7.12 d(9.0, 2.4)	
8			7.33 dd(2.4)	6.89 s
2′	7.75 d(2.3)	8.14 m	7.57 d(1.5)	8.04 d(8.9)
3′		7.60 m		6.92 d(8.9)
4′		7.60 m		
5′	6.89 d(8.6)	7.60 m	7.11 d(8.4)	6.92 d(8.9)
6′	7.62 dd(8.6, 2.3)	8.14 m	7.65 dd(1.5, 8.4)	8.04 d(8.9)

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Table 4-2-38 (continued)

H	4-2-108	4-2-109	4-2-110	4-2-111
A		8.24 d(2.1)		
B		7.52 d(2.1)		
1″	4.91 d(7.6)	5.27 d(6.9)	5.06 d(7.2)	5.03 d(7.4)
2″	3.34 m	3.30~3.43 m	3.27~3.52 m	3.39 m
3″	3.41 m	3.30~3.43 m	3.27~3.52 m	3.38 m
4″	3.17 m	3.30~3.43 m	3.27~3.52 m	3.20 m
5″	3.29 m	3.27 m	3.19 m	3.76 m
6″	3.72 dd(5.0, 11.0)	3.69 dd(3.6, 11.7)	3.70 dd(4.5, 10.2)	4.06 dd(7.6, 11.9)
	3.47 m	3.53 dd(5.7, 11.7)	3.27~3.52 m	4.39 dd(1.4, 11.9)
OH		5.45 d(3.6)	5.43 d(3.6)	
		5.17 br s	5.13 d(4.8)	
		5.06 d(5.1)	5.07 d(5.1)	
		4.56 d(5.7)	4.60 d(5.4)	
OAc				2.00 s
OCH_2O			6.15 s	

Table 4-2-39: ^{1}H NMR spectroscopic data of flavonol glycoside-type flavonols **4-2-112**~**4-2-115**.

H	4-2-112	4-2-113	4-2-114	4-2-115
3	8.07 br (OH)			
5	12.14 s(OH)	6.73 s	6.79 s	6.82 s
6	6.67 s			
2′	8.18 d(8.8)	7.69 d(2.0)	7.74 d(2.0)	7.73 d(2.0)
3′	7.03 d(8.8)			
4′	9.05 br s(OH)			
5′	7.03 d(8.8)	6.81 d(8.5)	6.84 d(8.5)	6.80 d(8.5)
6′	8.18 d(8.8)	7.56 dd(2.0, 8.5)	7.64 dd(2.0, 8.5)	7.43 dd(2.0, 8.5)
1″	5.14 d(7.6)	5.06 d(7.5)	5.06 d(7.5)	5.10 d(7.5)
2″	3.52~3.74 m	3.63 dd(7.5, 9.0)	3.61 m	3.61 m
3″	3.52~3.74 m	3.59 t(9.0)	3.57 m	3.59 m
4″	3.45 m	3.47 dd(9.0, 9.5)	3.43 m	3.57 m
5″	3.86 td(8.6, 2.0)	3.84 ddd(2.5, 7.5, 9.5)	3.88 m	3.85 m
6″	4.21 m	4.64 dd(2.5, 12.0)	4.62 br d(11.5)	4.68 dd(2.0, 12.0)
	4.46 d(9.6)	4.32 dd(7.5, 12.0)	4.32 dd(7.5, 11.5)	4.45 dd(5.0, 12.0)
1‴	3.52~3.74 m			
2‴	5.28 br t(6.8)	6.72 d(2.0)	7.03 d(8.5)	7.03 s
3‴			6.53 d(8.5)	
4‴	1.65 s			
5‴	1.82 s	6.50 d(8.5)	6.53 d(8.5)	
6‴		6.54 dd(2.0, 8.5)	7.03 d(8.5)	7.03 s
7‴		7.41 d(16.0)	7.47 d(16.0)	
8‴		6.15 d(16.0)	6.20 d(16.0)	
OAc	2.04 s			
OH	4.51 d(4.4), 4.55 br s			
	4.65 br s			

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Table 4-2-40: ^{1}H NMR spectroscopic data of flavonol glycoside-type flavonols **4-2-116**~**4-2-120**.

H	4-2-116	4-2-117	4-2-118	4-2-119	4-2-120
5		3.81 s(OMe)	13.06 br s(OH)	12.55 br s(OH)	
6	3.77 s(OMe)	3.76 s(OMe)	6.36 d(1.2)	6.31 d(1.2)	6.22 d(2.0)
8	6.44 s	6.45 s	6.51 d(1.2)	6.52 d(1.2)	6.41 d(2.0)
2′	7.86 d(1.9)	7.87 d(1.9)	7.86 d(8.8)	7.98 d(8.6)	7.52 d(2.2)
3′			7.03 d(8.8)	7.10 d(8.6)	
4′	3.84 s(OMe)				
5′	6.87 d(8.5)	6.89 d(8.5)	7.03 d(8.8)	7.10 d(8.6)	6.92 d(8.5)
6′	7.78 dd(8.5, 1.9)	7.78 dd(8.5, 1.9)	7.86 d(8.8)	7.98 d(8.6)	7.52 dd(8.5, 2.2)
1″	5.30 d(3.7)	5.30 d(3.7)	5.65 d(1.2)	5.61 d(1.3)	5.48 s
2″	3.98 dd(9.5, 3.7)	3.99 dd(9.5, 3.7)	5.58 dd(3.3, 1.2)	5.92 dd(3.2, 1.3)	4.35 dd(1.1, 3.0)
3″	3.85 t(9.5)	3.86 t(9.5)	3.95 dd(9.3, 3.3)	5.40 dd(9.7, 3.2)	3.92 dd(6.0, 3.0)
4″	3.55 t(9.5)	3.56 t(9.5)	3.43 dd(9.4, 9.3)	3.78 dd(9.7, 9.5)	3.89 m
5″	3.68 m	3.68 m	3.35 dd(9.4, 6.1)	3.58 dd(9.5, 6.1)	3.51 m
6″	3.66 dd(11.2, 4.5)	3.64 dd(11.4, 4.8)	0.96 d(6.1)	1.10 d(6.1)	
	3.76 dd(11.2, 5.1)	3.75 dd(11.4, 5.4)			
1‴	2.65 t(7.2)	2.66 t(7.2)			
2‴	1.42 m	1.44 m	7.52 d(8.5)	7.58 d(8.6), 7.48 d(8.5)	
3‴	1.66 m	1.66 m	6.87 d(8.5)	6.92 d(8.6), 6.86 d(8.5)	
4‴	3.48 d(6.5)	3.49 d(6.5)			
5‴	0.99 d(6.7)	0.99 d(6.6)	6.87 d(8.5)	6.92 d(8.6), 6.86 d(8.5)	
6‴			7.52 d(8.5)	7.58 d(8.6), 7.48 d(8.5)	
7‴	1.89 s	1.90 s	7.63 d(15.6)	7.68 d(17.1), 7.64 d(16.3)	
8‴			6.34 d(15.6)	6.32 d(17.1), 6.43 d(16.3)	

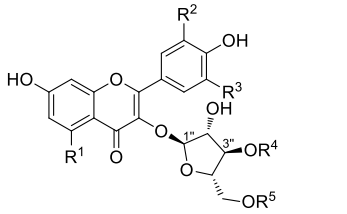
Table 4-2-41: Cos, MFs, and TSs of flavonol glycoside-type flavonols **4-2-121**~**4-2-136**.

No.	Compounds	MFs	Test solvents	References
4-2-121	quercetin 3-*O*-*α*-L-(5″-*O*-acetyl)arabinofuranoside	$C_{22}H_{20}O_{12}$	DMSO-d_6	[155]
4-2-122	myricetin-3-*O*-*α*-L-3″-acetylarabinofuranoside	$C_{22}H_{20}O_{13}$	CD_3COCD_3	[156]
4-2-123	myricetin-3-*O*-*α*-L-3″,5″-diacetylarabinofuranoside	$C_{24}H_{22}O_{14}$	CD_3COCD_3	[156]
4-2-124	5-galloylquercetin-3-*O*-*α*-L-arabinofuranoside	$C_{27}H_{22}O_{14}$	CD_3OD	[156]
4-2-125	kaempferol-3-*O*-*α*-L-5″-acetyl-arabinofuranoside	$C_{22}H_{20}O_{11}$	DMSO-d_6	[157]
4-2-126	kaempferol-3-*O*-*α*-L-3″-acetyl-arabinofuranoside	$C_{22}H_{20}O_{11}$	DMSO-d_6	[157]
4-2-127	quercetin-3-*O*-*α*-L-3″,5″-diacetyl-arabinofuranoside	$C_{24}H_{22}O_{13}$	DMSO-d_6	[157]
4-2-128	kaemoferol-3-*O*-(2,3-di-*O*-acetyl-*α*-L-rhamnopyranoside)	$C_{25}H_{24}O_{12}$	CD_3OD	[158]

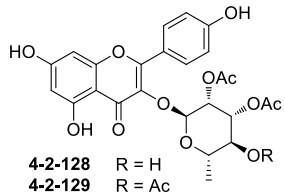
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Table 4-2-41 (continued)

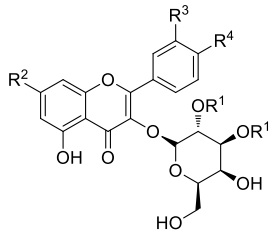
No.	Compounds	MFs	Test solvents	References
4-2-129	kaemoferol-3-*O*-(2,3,4-tri-*O*-acetyl-*α*-L-rhamnopyranoside)	$C_{27}H_{26}O_{13}$	$CDCl_3$	[158]
4-2-130	polygalin A	$C_{23}H_{24}O_{11}$	DMSO-d_6	[159]
4-2-131	quercetin 3-*O*-(2″,3″-digalloyl)-*β*-D-galactopyranoside	$C_{35}H_{28}O_{20}$	DMSO-d_6	[160]
4-2-132	2-(3,4-dihydroxyphenyl)-5,7-dihydroxy-4-oxo-4*H*-chro-men-3-yl-4,6-bis-*O*-*β*-D-(3,4,5-trihydroxybenzoyl)gluc-opyranoside	$C_{35}H_{28}O_{20}$	CD_3OD	[154]
4-2-133	5,7-dihydroxy-2-(4-hydroxyphenyl)-4-oxo-4*H*-chromen-3-yl-5-*O*-*α*-L-(3,4,5-trihydroxybenzoyl)arabinofuranoside	$C_{27}H_{22}O_{14}$	CD_3COCD_3	[154]
4-2-134	myricetin 3-*O*-(3″-acetyl)-*α*-L-arabinopyranoside	$C_{22}H_{20}O_{13}$	CD_3OD	[161]
4-2-135	myricetin 3-*O*-(4″-acetyl)-*α*-L-arabinopyranoside	$C_{22}H_{20}O_{13}$	CD_3OD	[161]
4-2-136	hetranthin B	$C_{25}H_{28}O_{13}$	CD_3OD	[162]



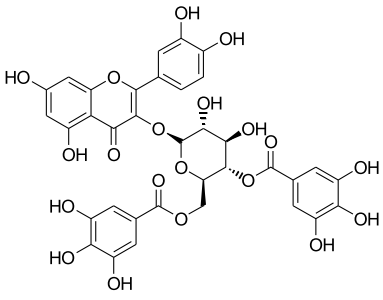
	R^1	R^2	R^3	R^4	R^5
4-2-121	OH	OH	H	H	Ac
4-2-122	OH	OH	OH	Ac	H
4-2-123	OH	OH	OH	Ac	Ac
4-2-124	Gal	OH	H	H	H
4-2-125	OH	H	H	H	Ac
4-2-126	OH	H	H	Ac	H
4-2-127	OH	OH	H	Ac	Ac



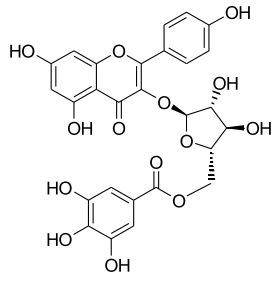
4-2-128 R = H
4-2-129 R = Ac



	R^1	R^2	R^3	R^4
4-2-130	H	OMe	H	OMe
4-2-131	Gal	OH	OH	OH

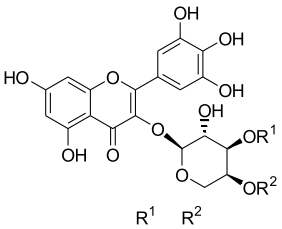


4-2-132

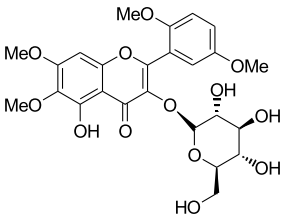


4-2-133

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	R^1	R^2
4-2-134	Ac	H
4-2-135	H	Ac



4-2-136

Table 4-2-42: ^{1}H NMR spectroscopic data of flavonol glycoside-type flavonols **4-2-121**~**4-2-124**.

H	4-2-121	4-2-122	4-2-123	4-2-124
6	6.17 s	6.22 d(2.1)	6.20 d(1.7)	6.20 d(2.1)
8	6.38 s	6.43 d(2.1)	6.39 d(1.7)	6.39 d(2.1)
2′	7.44 s	7.20 s	7.12 s	7.46 dd(8.3, 2.1)
5′	6.85 d(8.4)			6.88 d(8.3)
6′	7.46 d(8.4)	7.20 s	7.12 s	7.50 d(2.1)
1″	5.46 s	5.74 s	5.71 s	5.49 s
2″	3.62 br s	4.41 d(1.3)	4.45 d(1.6)	3.94 d(1.6)
3″	3.62 br s	4.85 dd(1.6, 4.2)	4.75 dd(1.6, 4.8)	4.37 dd(1.6, 2.8)
4″	4.15 br s	3.94 q(3.4, 7.4)	3.85 m	3.95 m
5″	3.72 dd(10.7, 6.3)	3.58 d(3.8)	3.93 dd(18.0, 4.0)	4.11 dd(14.0, 3.2)
	4.05 d(10.7)		4.14 dd(11.2, 4.0)	
2‴, 6‴				6.99 s
OAc	1.89 s	2.05 s(3″-OAc)	2.05 s(3″-OAc)	
			1.98 s(5″-OAc)	

Table 4-2-43: ^{1}H NMR spectroscopic data of flavonol glycoside-type flavonols **4-2-125**~**4-2-128**.

H	4-2-125	4-2-126	4-2-127	4-2-128
6	6.15 br s	6.09 br s	6.18 br s	6.28 d(2.2)
8	6.38 br s	6.31 br s	6.37 br s	6.10 d(2.2)
2′	8.05 d(8.8)	7.92 d(8.7)	7.39 br s	7.71 d(8.8)
3′	6.88 d(8.8)	6.89 d(8.7)		6.85 d(8.8)
5′	6.88 d(8.8)	6.89 d(8.7)	6.84 d(8.7)	6.85 d(8.8)
6′	8.05 d(8.8)	7.92 d(8.7)	7.38 d(8.7)	7.71 d(8.8)
1″	5.51 br s	5.67 br s	5.58 br s	5.40 d(1.7)
2″	4.15 br s	4.25 br s	4.32 br s	5.51 dd(3.0,1.7)
3″	3.61 m	4.71 d(3.3)	4.66 d(4.0)	4.98 dd(10.0, 3.0)
4″	3.61 m	3.57 m	3.74 m	4.33 dd(10.0, 9.0)
5″	3.78 dd(9.6, 6.6)	3.32 m	3.89 dd(11.7, 6.7)	3.21 m
	4.02 dd(9.6, 2.6)		4.11 dd(11.7, 3.3)	
6″				0.88 d(6.0)
OAc	1.90 s	2.10 s	1.92 s	1.99 s(2″-OAc)
			2.09 s	1.93 s(3″-OAc)

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Table 4-2-44: ^{1}H NMR spectroscopic data of flavonol glycoside-type flavonols **4-2-129**~**4-2-132**.

H	4-2-129	4-2-130	4-2-131	4-2-132
6	6.37 br s	6.39 d(2.0)	6.19 d(1.9)	6.15 d(2.3)
8	6.26 br s	6.75 d(2.0)	6.38 d(1.9)	6.30 d(2.3)
2′	7.80 d(8.4)	8.21 d(9.0)	7.50 d(2.5)	7.58 d(1.5)
3′	7.00 d(8.4)	7.01 d(9.0)		
5′	7.00 d(8.4)	7.01 d(9.0)	6.84 d(8.7)	6.73 d(9.3)
6′	7.80 d(8.4)	8.21 d(9.0)	7.69 dd(8.7, 2.5)	7.60 dd(9.0,1.5)
1″	5.56 d(1.7)	5.46 d(8.0)	5.93 d(7.9)	5.35 d(7.8)
2″	5.58 dd(3.0, 1.7)	3.68 m	5.63 dd(7.8, 10.2)	3.86 (ov)
3″	5.31 dd(10.0, 3.0)	3.47 m	5.14 dd(3.1, 10.2)	3.86 (ov)
4″	4.95 dd(10.0, 9.0)	3.57 m	4.06 dd(3.1, 5.3)	5.17 t(9.8)
5″	3.50 m	3.37 m	3.37 m	3.70 t(9.8)
6″	0.93 d(6.0)	3.40, 3.33 m	3.68, 3.50 m	4.20 m
Gal			6.96, 6.93 s	7.07 s, 6.92 s
OMe		3.87 s, 3.88 s		
OAc	2.12 s(2″-OAc)			
	2.01 s(3″-OAc)			
	2.00 s(4″-OAc)			

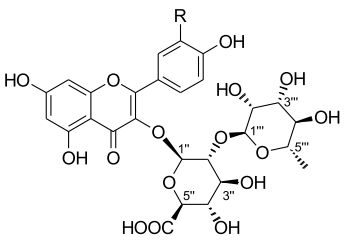
Table 4-2-45: ^{1}H NMR spectroscopic data of flavonol glycoside-type flavonols **4-2-133**~**4-2-136**.

H	4-2-133	4-2-134	4-2-135	4-2-136
5				12.71 s(OH)
6	6.27 d(2.0)	6.24 d(1.8)	6.22 d(2.0)	3.90 s(OMe)
7				3.92 s(OMe)
8	6.50 d(2.0)	6.42 d(1.8)	6.42 d(2.0)	6.51 s
2′	8.04 d(8.7)	7.27 s	7.34 s	3.95 s(OMe)
3′	7.03 d(8.7, ov)			7.32 d(8.5)
4′				6.98 dd(8.5, 2.2)
5′	7.03 d(8.7, ov)			3.96 s(OMe)
6′	8.04 d(8.7)	7.27 s	7.34 s	7.50 d(2.2)
1″	5.62 d(0.9)	5.30 d(6.8)	5.20 d(6.8)	5.01 d(7.5)
2″	4.05 m	4.13 dd(8.5, 6.8)	3.95 dd(8.5, 6.8)	3.97 dd(9.5, 3.7)
3″	4.03 m	4.90 dd(8.5, 3.0)	3.82 dd(8.5, 3.0)	3.85 t(9.5)
4″	4.42 m	4.05 m	5.02 m	3.54 t(9.5)
5″	4.26 dd(11.8, 4.1)	3.90 dd(12.0, 2.0)	3.90 dd(12.0, 2.0)	3.67 m
		3.55 dd(12.0, 3.0)	3.50 dd(12.0, 3.0)	
6″				3.65 dd(11.2, 4.5)
				3.75 dd(11.2, 5.1)
Gal	7.06 s			
Oac		2.11 s	2.18 s	

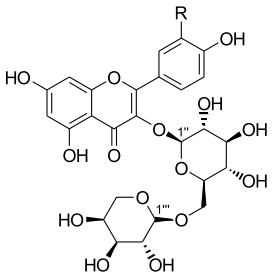
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Table 4-2-46: Cos, MFs, and TSs of flavonol glycoside-type flavonols **4-2-137**~**4-2-154**.

No.	Compounds	MFs	Test solvents	References
4-2-137	kaempferol-3-*O*-(2″-*α*-rhamnopyranosyl)-*β*-glucurono-pyranoside	$C_{27}H_{28}O_{16}$	CD_3OD	[163]
4-2-138	quercetin-3-*O*-(2″-*α*-rhamnopyranosyl)-*β*-glucurono-pyranoside	$C_{27}H_{28}O_{17}$	CD_3OD	[163]
4-2-139	kaempferol-3-*O*-*α*-arabinopyranosyl(1‴ → 6″)-*β*-gluco-pyranoside	$C_{26}H_{28}O_{15}$	DMSO-d_6	[164]
4-2-140	quercetin-3-*O*-*α*-arabinopyranosyl(1‴ → 6″)-*β*-gluco-pyranoside	$C_{26}H_{28}O_{16}$	DMSO-d_6	[164]
4-2-141	kaempferol-3-*O*-*β*-sophoroside	$C_{27}H_{30}O_{16}$	CD_3OD	[149]
4-2-142	kaempferol-3-*O*-*α*-L-arabinopyranosyl(1→2) *α*-L-rhamnopyranoside	$C_{26}H_{28}O_{14}$	DMSO-d_6 CD_3OD	[165] [165]
4-2-143	quercetin-3-*O*-*α*-L-arabinopyranosyl(1→2) *α*-L-rhamnopyranoside	$C_{26}H_{28}O_{15}$	DMSO-d_6 CD_3OD	[165] [165]
4-2-144	polygalin B	$C_{28}H_{32}O_{15}$	DMSO-d_6	[159]
4-2-145	polygalin C	$C_{28}H_{32}O_{16}$	DMSO-d_6	[159]
4-2-146	kaempferol-3-*O*-*β*-D-glucopyranoside-7-*O*-*α*-L-arabin-ofuranoside	$C_{26}H_{28}O_{15}$	DMSO-d_6	[166]
4-2-147	quercetin-3-*O*-[2‴-*O*-acetyl-*β*-D-glucopyranosyl-(1→6)-*β*-D-glucopyranoside]	$C_{29}H_{32}O_{18}$	CD_3OD	[167]
4-2-148	quercetin-3-*O*-[2‴,6‴-*O*-diacetyl-*β*-D-glucopyranosyl-(1→6)-*β*-D-glucopyranoside]	$C_{31}H_{34}O_{19}$	CD_3OD	[167]
4-2-149	Isorhamnetin-3-*O*-[2‴-*O*-acetyl-*β*-D-glucopyranosyl-(1→6)-*β*-D-glucopyranoside]	$C_{30}H_{34}O_{18}$	CD_3OD	[167]
4-2-150	quercetin-3-*O*-[2‴-*O*-acetyl-*α*-L-arabinopyranosyl-(1→6)-*β*-D-glucopyranoside]	$C_{28}H_{30}O_{17}$	CD_3OD	[167]
4-2-151	heteronoside	$C_{36}H_{38}O_{20}$	DMSO-d_6 C_5D_5N	[168] [168]
4-2-152	quercetin-3-*O*-*α*-L-rhamnopyranosyl(1→6)-(3-*O*-*trans*-*p*-coumaroyl)-*β*-D-galactopyranosdie	$C_{36}H_{36}O_{18}$	CD_3OD	[169]
4-2-153	isorhamnetin-3-*O*-(5-*O*-*trans*-feruloyl-*β*-D-apiofurano-syl)-(1→2)-*β*-D-glucopyranoside	$C_{37}H_{38}O_{19}$	DMSO-d_6	[170]
4-2-154	isorhamnetin-3-*O*-(6″-*O*-*E*-feruloyl)neohesperidoside	$C_{38}H_{40}O_{19}$	CD_3OD	[171]

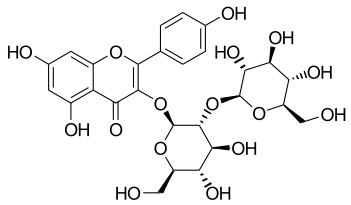


4-2-137 R = H
4-2-138 R = OH

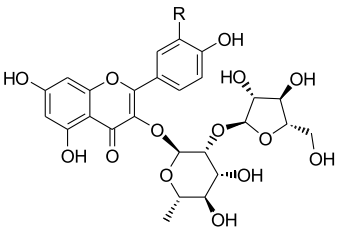


4-2-139 R = H
4-2-140 R = OH

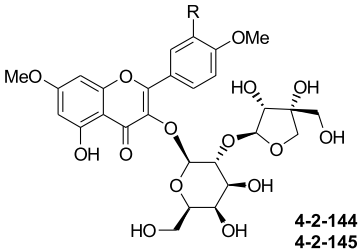
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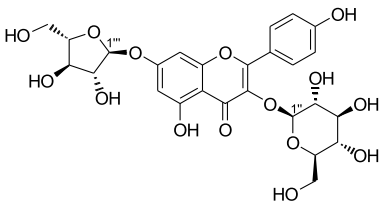
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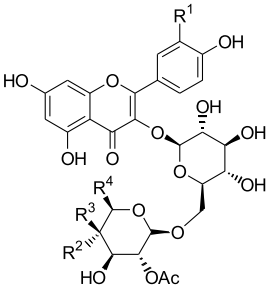
4-2-142 R = H
4-2-143 R = OH



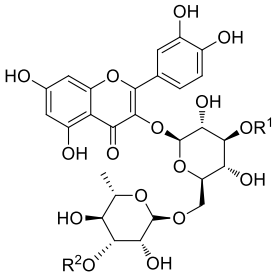
4-2-144 R = H
4-2-145 R = OH



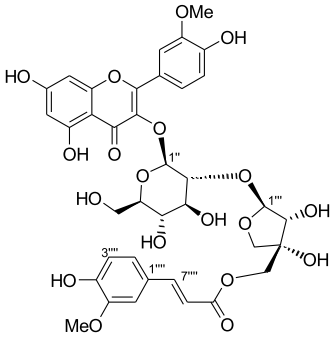
4-2-146



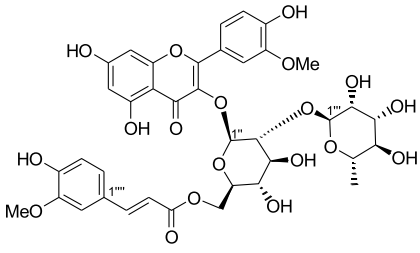
	R^1	R^2	R^3	R^4
4-2-147	OH	OH	H	CH_2OH
4-2-148	OH	OH	H	CH_2OAc
4-2-149	OMe	OH	H	CH_2OH
4-2-150	OH	H	OH	H



	R^1	R^2
4-2-151	H	Hdmb
4-2-152	*trans*-*p*-Coum	H



4-2-153



4-2-154

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Table 4-2-47: ^{1}H NMR spectroscopic data of flavonol glycoside-type flavonols **4-2-137**~**4-2-140**.

H	4-2-137	4-2-138	4-2-139	4-2-140
5			12.53 br s(OH)	12.59 br s(OH)
6	6.09 d(2.0)	6.11 d(2.0)	6.14 d(1.9)	6.17 d(1.9)
8	6.26 d(2.0)	6.27 d(2.0)	6.34 d(1.9)	6.37 d(1.9)
2′	8.01 d(9.0)	7.68 d(2.0)	8.01 d(8.8)	7.57 d(2.0)
3′	6.86 d(9.0)		6.89 d(8.8)	
5′	6.86 d(9.0)	6.85 d(8.4)	6.89 d(8.9)	6.85 d(9.1)
6′	8.01 d(9.0)	7.47 dd(8.4, 2.0)	8.01 d(8.8)	7.57 dd(9.0, 2.1)
1″	5.77 d(7.2)	5.83 d(7.3)	5.33 d(7.3)	5.36 d(7.2)
2″	3.66 dd(8.1, 7.2)	3.70 m	3.21 m	3.26 m
3″	3.59 m	3.59 dd(7.4, 7.2)	3.23 m	3.25 m
4″	3.57 m	3.61 m	3.10 m	3.10 m
5″	3.61 d(10.1)	3.63 d(7.8)	3.29 m	3.30 m
6″			3.78 dd(11.8, 1.7)	3.78 dd(11.9, 1.6)
			3.44 m	3.45 m
1‴	5.23 d(1.1)	5.21 d(1.5)	3.99 d(6.4)	3.98 d(6.6)
2‴	4.01 dd(3.5, 1.1)	4.01 dd(3.3, 1.5)	3.21 m	3.18 dd(8.3, 6.5)
3‴	3.77 dd(9.5, 3.3)	3.76 dd(9.5, 3.3)	3.05 dd(8.3, 3.5)	3.00 dd(8.3, 3.5)
4‴	3.33 dd(9.5, 9.5)	3.31 t(9.5)	3.45 m	3.43 m
5‴	3.99 dq(9.5, 7.2)	3.90 dq(9.5, 6.2)	3.51 dd(11.9, 3.6)	3.49 dd(12.0, 3.5)
			2.99 dd(11.9, 1.8)	2.95 dd(11.9, 1.6)
6‴	0.95 d(7.2)	0.91 d(6.2)		

Table 4-2-48: ^{1}H NMR spectroscopic data of flavonol glycoside-type flavonols **4-2-141** and **4-2-144**~**4-2-146**.

H	4-2-141	4-2-144	4-2-145	4-2-146
5				12.62 s(OH)
6	6.24 d(2.1)	6.37 d(2.0)	6.37 d(2.0)	6.43 d(3.5)
8	6.44 d(2.1)	6.74 d(2.0)	6.71 d(2.0)	6.77 d(3.5)
2′	8.08 d(9.0)	8.25 d(9.0)	7.57 d(2.0)	8.09 d(8.7)
3′	6.95 d(9.0)	7.07 d(9.0)		6.90 d(8.7)
4′				10.25 br s(OH)
5′	6.95 d(9.0)	7.07 d(9.0)	6.99 d(9.0)	6.90 d(8.7)
6′	8.08 d(9.0)	8.25 d(9.0)	7.91 dd(9.0, 2.0)	8.09 d(8.7)
1″	5.49 d(7.5)	5.64 d(7.0)	5.62 d(8.0)	5.49 d(7.4)
2″	3.78 dd(8.8)	3.78 t-like	3.77 m	3.20 m, 5.39 br s(OH)
3″	3.45~3.34 m	3.59 m	3.58 m	3.22 m, 5.10 br s(OH)
4″	3.40 m	3.66 m	3.65 m	3.09 br s, 4.99 br s(OH)
5″	3.24 ddd(9.6, 2.2)	3.36 m	3.34 m	3.09 br s
6″	3.73 dd	3.41 m	3.43 m	3.33 m, 3.58 m
	3.53 dd(5.4)	3.29 m	3.27 m	4.31 t(5.2, OH)
1‴	4.79 d(7.4)	5.33 s	5.32 d(1.0)	5.61 s
2‴	3.34~3.45 m	3.83 m	3.80 m	4.14 br s, 5.74 br s(OH)
3‴	3.64 dd(8.9, 8.9)			3.83 br s, 5.39 br s(OH)
4‴	3.34~3.45 m	3.44 m	3.45 d(6.0)	3.90 m
		3.39 m	3.40 d(6.0)	

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Table 4-2-48 (continued)

H	4-2-141	4-2-144	4-2-145	4-2-146
5‴	3.33 m	3.85 d(9.0)	3.84 d(9.0)	3.48 m, 3.58 m
		3.50 d(10.0)	3.50 d(9.0)	4.86 br s(OH)
6‴	3.83 dd(12.0, 2.6)			
	3.70 dd(5.2)			
OMe		3.87 s, 3.86 s	3.88 s, 3.87 s	

Table 4-2-49: ^{1}H NMR spectroscopic data of flavonol glycoside-type flavonols **4-2-142** and **4-2-143**.

H	4-2-142(CD_3OD)	4-2-142(DMSO-d_6)	4-2-143(CD_3OD)	4-2-143(DMSO-d_6)
6	6.20 d(1.8)	6.14 s	6.19 d(2.0)	6.16 br s
8	6.38 d(1.8)	6.34 s	6.37 d(2.0)	6.37 br s
2′	7.78 d(8.7)	7.72 d(8.1)	7.36 d(2.1)	7.33 br s
3′	6.94 d(8.7)	6.90 d(8.2)		
5′	6.94 d(8.7)	6.90 d(8.2)	6.93 d(8.3)	6.88 d(8.4)
6′	7.78 d(8.7)	7.72 d(8.1)	7.29 dd(2.1, 8.3)	7.26 br d(8.4)
1″	5.47 d(1.3)	5.34 s	5.37 d(0.9)	5.30 br s
2″	4.20 m	(ov)	4.19 m	4.02 m
3″	3.82 dd(3.4, 9.6)	(ov)	3.89 dd(3.7, 9.7)	(ov)
4″	3.32 dd(9.6, 9.6)	3.13 dd(9.3, 9.3)	3.35 dd(9.7, 9.7)	(ov)
5″	3.73 m	(ov)	3.87 dq(9.7, 6.2)	(ov)
6″	0.98 d(6.2)	0.84 d(5.0)	1.10d(6.2)	0.90 d(6.1)
1‴	4.25 d(7.1)	4.10	4.20 d(7.1)	4.09 d(6.4)
2‴	3.55 dd(7.3, 9.5)	3.39 dd(7.7, 8.1)	3.54 dd(7.1, 9.2)	(ov)
3‴	3.47 dd(3.2, 9.1)	3.31 m	3.47 dd(3.2, 9.2)	(ov)
4‴	3.73 m	3.57 br s	3.72 m	(ov)
5‴	3.68 m	3.48 dd(11.8)	3.65 dd(12.4, 2.2)	(ov)
	3.42 br d(12.6)	3.24 br d(11.8)	3.37 br d(12.4)	

Table 4-2-50: ^{1}H NMR spectroscopic data of flavonol glycoside-type flavonols **4-2-147** and **4-2-148**.

H	4-2-147	4-2-148	H	4-2-147	4-2-148
6	6.15 d(1.8)	6.16 d(2.1)	5″	3.51 m	3.52 m
8	6.38 d(1.8)	6.39 d(2.1)	6″	3.68 m	3.64 m
2′	8.01 d(2.4)	8.07 d(2.1)	1‴	4.15 d(8.1)	4.16 d(8.1)
5′	6.84 d(9.0)	6.85 d(8.5)	2‴	4.40 dd(8.1, 9.0)	4.37 dd(8.1, 8.4)
6′	7.65 dd(9.0, 2.4)	7.68 dd(2.1, 8.5)	3‴	3.04 dd(9.0, 9.3)	2.98 dd(8.4, 9.3)
1″	5.06 d(7.8)	5.08 d(7.8)	4‴	3.20 dd(9.3, 9.6)	3.15 dd(9.3, 9.3)
2″	3.80 dd(7.8, 8.4)	3.82 dd(7.8, 7.8)	5‴	2.84 m	2.84 m
3″	3.54 dd(8.4, 7.5)	3.55 dd(7.8, 7.5)	6‴	3.69 m	4.20 dd(2.1, 12.3)
				3.57 m	4.03 dd(5.5, 12.3)
4″	3.72 dd(7.5, 7.2)	3.70 dd(7.5, 7.8)	OAc	1.61 s	1.59 s, 1.98 s

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Table 4-2-51: ^{1}H NMR spectroscopic data of flavonol glycoside-type flavonols **4-2-149**~**4-2-151**.

H	4-2-149	4-2-150	4-2-151(DMSO-d_6)	4-2-151(C_5D_5N)
5			12.61 s(OH)	
6	6.15 d(2.0)	6.15 d(2.1)	6.20 s	6.73 s
8	6.38 d(2.0)	6.38 d(2.1)	6.42 s	6.72 s
2′	8.16 d(1.8)	8.09 d(2.1)	7.56 br s	8.52 d(2.1)
5′	6.87 d(8.7)	6.84 d(9.0)	6.85 d(8.1)	7.34 d(8.4)
6′	7.63 dd(1.8, 8.7)	7.69 dd(2.1, 9.0)	7.69 br d(8.1)	8.02 dd(8.4, 2.1)
1″	5.25 d(7.8)	5.01 d(7.8)	5.38 d(7.2)	6.01 d(7.8)
2″	3.80 dd(7.8, 8.1)	3.83 dd(7.8, 7.8)	3.32~3.78 m	4.79 m
3″	3.54 dd(8.1, 9.4)	3.55 dd(7.8, 7.5)	3.32~3.78 m	4.24 dd(9.6, 3.0)
4″	3.70 dd(9.4, 7.2)	3.69 dd(7.5, 7.2)	3.32~3.78 m	4.52 br s
5″	3.50 m	3.53 m	3.32~3.78 m	4.13 br t(6.0)
6″	3.68 m	3.64 m	3.32~3.78 m	3.99 m, 4.46 m
1‴	4.22 d(7.8)	4.01 d(7.8)	4.55 br s	5.28 br s
2‴	4.40 dd(7.8, 9.3)	4.63 dd(7.8, 9.3)	3.32~3.78 m	4.79 br s
3‴	3.06 dd(9.3, 9.3)	2.94 dd(9.3, 9.3)	3.32~3.78 m	5.99 m
4‴	3.19 dd(9.3, 9.6)	3.52 m	3.32~3.78 m	4.58 m
5‴	2.67 m	3.00 br d(12.3)	3.32~3.78 m	4.41 m
		3.70 m		
6‴	3.64 dd(11.7, 2.4)		1.17 d(4.8)	1.57 d(6.0)
	3.48 m			
2⁗, 6⁗			7.29 s	7.72 s
OMe	3.92 s		3.83 s, 3.83 s	3.72 s, 3.72 s
OAc	1.64 s	1.56 s		

Table 4-2-52: ^{1}H NMR spectroscopic data of flavonol glycoside-type flavonols **4-2-152**~**4-2-154**.

H	4-2-152	4-2-153	4-2-154
6	6.22 d(2.0)	6.12 d(2.0)	6.03 d(1.8)
8	6.42 d(2.0)	6.19 d(2.0)	6.20 d(2.1)
2′	7.86 d(2.0)	7.90 d(1.5)	7.87 d(2.0)
3′		3.82 s(OMe)	
5′	6.89 d(8.5)	6.86 d(8.5)	6.88 d(8.5)
6′	7.62 dd(8.5, 2.0)	7.36 dd(8.5, 1.5)	7.50 dd(8.5, 2.0)
1″	5.26 d(8.0)	5.70 d(8.0)	5.80 d(7.3)
2″	4.13 dd(10.0, 8.0)	3.53 m	3.68 dd(8.3, 6.3)
3″	4.93 dd(10.0, 3.5)	3.46 m	3.63 t(9.1)
4″	4.08 br d(3.5)	3.09 m	3.30~3.36 m
5″	3.79 br t(6.0)	3.10 m	3.57~3.50 m
6″	3.40 dd(9.0, 5.5)	3.54 t(9.5)	4.36 dd(11.9, 6.1)
	3.76 dd(9.0, 6.0)	3.32 m	4.29 dd(12.0, 2.8)
1‴	4.55 d(1.5)	5.36 br s	5.20 d(1.1)

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Table 4-2-52 (continued)

H	4-2-152	4-2-153	4-2-154
2‴	3.61 dd(3.5, 1.5)	3.68 br s	4.01 dd(3.0, 1.6)
3‴	3.51 dd(9.5, 3.5)		3.77 dd(9.6, 3.4)
4‴	3.30 m	3.92 d(9.5), 3.50 d(9.5)	3.30~3.36 m
5‴	3.52 dq(9.5, 6.0)	4.13 d(11.0), 4.26 d(11.0)	4.03 m
6‴	1.19 d(6.0)		0.90 d(6.0)
2⁗	7.49 d(8.5)	7.10 d(1.5)	6.99 d(1.7)
3⁗	6.82 d(8.5)	3.79 s(OMe)	
5⁗	6.82 d(8.5)	6.76 d(8.0)	6.87 d(8.2)
6⁗	7.49 d(8.5)	6.89 dd(8.0, 1.5)	6.85 dd(8.1, 1.7)
7⁗	7.72 d(16.0)	7.16 d(16.0)	7.33 d(15.9)
8⁗	6.46 d(16.0)	6.14 d(16.0)	6.05 d(15.7)
OMe			3.98 s, 3.88 s

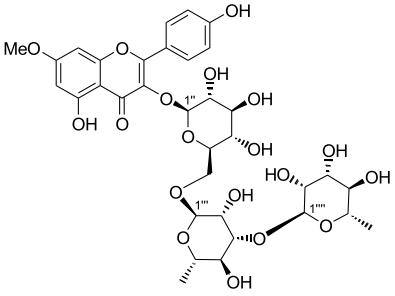
Table 4-2-53: Cos, MFs, and TSs of flavonol glycoside-type flavonols **4-2-155**~**4-2-172**.

No.	Compounds	MFs	Test solvents	References
4-2-155	5,4′-dihydroxy-7-methoxyflavone-3-*O*-[*α*-L-rhamnopy-ranosyl(1 → 3)-*O*-*α*-L-rhamnopyranosyl(1→6)-*O*-*β*-D-glucopyranoside]	$C_{34}H_{42}O_{19}$	CD_3OD	[172]
4-2-156	kaempferol 3-*O*-*β*-(2″-*O*-*α*-L-rhamnopyranosyl-3″-*O*-*β*-glucopyranosyl)-*β*-glucuronopyranoside	$C_{33}H_{38}O_{21}$	DMSO-d_6	[163]
4-2-157	quercetin 3-*O*-*α*-L-rhamnopyranosyl(1 → 6)-[(4-*O*-*trans*-*p*-coumaroyl)-*α*-L-rhamnopyranosyl-(1→2)]-(4-*O*-*trans*-*p*-coumaroyl)-*β*-D-galactopyranoside	$C_{51}H_{52}O_{24}$	CD_3OD	[169]
4-2-158	kaempferol 3-*O*-*α*-L-rhamnopyranosyl(1 → 6)-[(4-*O*-*trans*-*p*-coumaroyl)-*α*-L-rhamnopyranosyl-(1→2)]-(4-*O*-*trans*-*p*-coumaroyl)-*β*-D-galactopyranoside	$C_{51}H_{52}O_{23}$	CD_3OD	[169]
4-2-159	quercetin 3-*O*-*α*-L-rhamnopyranosyl(1 → 6)-[(4-*O*-*trans*-*p*-coumaroyl)-*α*-L-rhamnopyranosyl-(1→2)]-(3-*O*-*trans*-*p*-coumaroyl)-*β*-D-galactopyranoside	$C_{51}H_{52}O_{24}$	CD_3OD	[169]
4-2-160	quercetin 3-*O*-*α*-L-rhamnopyranosyl(1 → 6)-[(4-*O*-*trans*-caffeoyl)-*α*-L-rhamnopyranosyl-(1→2)]-(3-*O*-*trans*-*p*-coumaroyl)-*β*-D-galactopyranoside	$C_{51}H_{52}O_{25}$	CD_3OD	[169]
4-2-161	kaempferol 3-O-*α*-arabinopyranosyl(1‴ → 6″)-*β*-gluco-pyranoside 7-*O*-*β*-glucopyranoside	$C_{32}H_{38}O_{20}$	DMSO-d_6	[164]
4-2-162	quercetin 3-*O*-*α*-arabinopyranosyl(1‴ → 6″)-*β*-gluco-pyranoside 7-*O*-*β*-glucopyranoside	$C_{32}H_{38}O_{21}$	DMSO-d_6	[164]

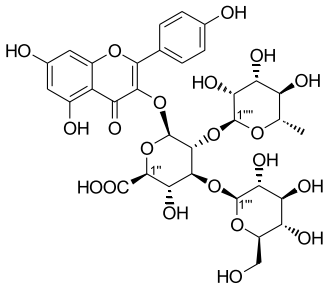
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Table 4-2-53 (continued)

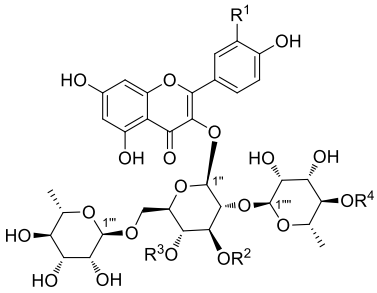
No.	Compounds	MFs	Test solvents	References
4-2-163	myricetin 3-*O*-*α*-rhamnosyl(1‴ → 2″)-*α*-rhamnoside-3′-*O*-*α*-rhamnoside	$C_{33}H_{40}O_{20}$	$CDCl_3$-DMSO-d_6	[173]
4-2-164	5′-*O*-methylmyricetin 3-*O*-*α*-rhamnosyl(1‴ → 2″)-*α*-rh-amnoside-3′-*O*-*β*-galactoside	$C_{34}H_{42}O_{21}$	DMSO-d_6	[173]
4-2-165	myricetin 3-*O*-*β*-glucosyl-(1‴ → 2″)-glucoside-4′-*O*-*β*-glucoside	$C_{33}H_{40}O_{23}$	DMSO-d_6	[173]
4-2-166	kaempferol 3-*O*-*β*-[(6-malonyl)sophoroside]-7-*O*-*β*-[(6-malonyl)glucoside]	$C_{39}H_{44}O_{27}$	DMSO-d_6 CD_3OD	[149] [149]
4-2-167	moricandin	$C_{33}H_{40}O_{21}$	DMSO-d_6	[174]
4-2-168	myriophylloside B	$C_{41}H_{44}O_{22}$	DMSO-d_6	[175]
4-2-169	myriophylloside C	$C_{41}H_{44}O_{23}$	DMSO-d_6	[175]
4-2-170	myriophylloside D	$C_{41}H_{44}O_{21}$	DMSO-d_6	[175]
4-2-171	myriophylloside E	$C_{42}H_{46}O_{23}$	DMSO-d_6	[175]
4-2-172	myriophylloside F	$C_{42}H_{46}O_{23}$	DMSO-d_6	[175]



4-2-155

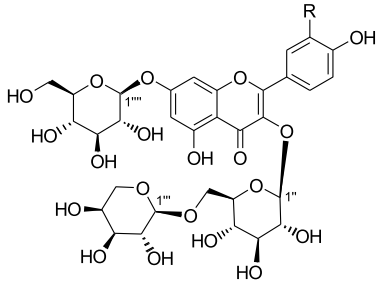


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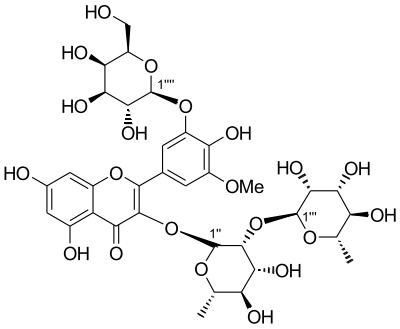


	R^1	R^2	R^3	R^4
4-2-157	OH	H	*trans*-Coum	*trans*-Coum
4-2-158	H	H	*trans*-Coum	*trans*-Coum
4-2-159	OH	*trans*-Coum	H	*trans*-Coum
4-2-160	OH	*trans*-Coum	H	*trans*-Caff

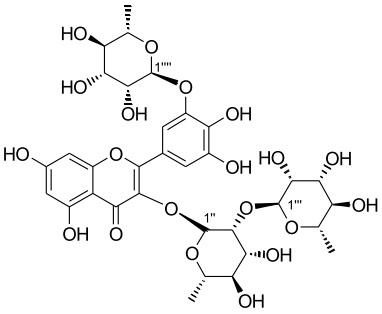
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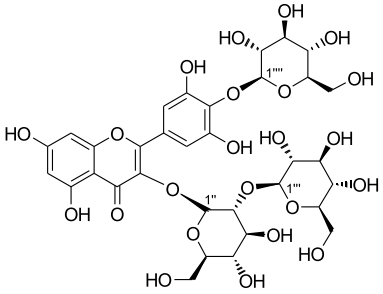
4-2-161 R = H
4-2-162 R = OH



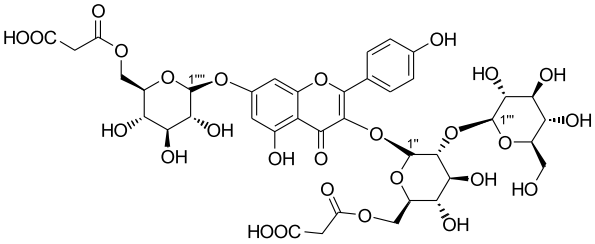
4-2-164



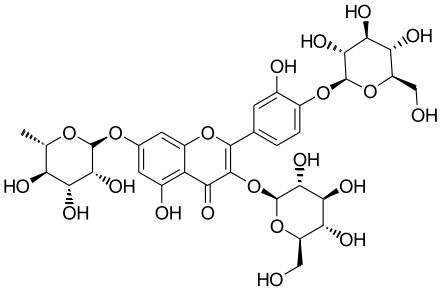
4-2-163



4-2-165

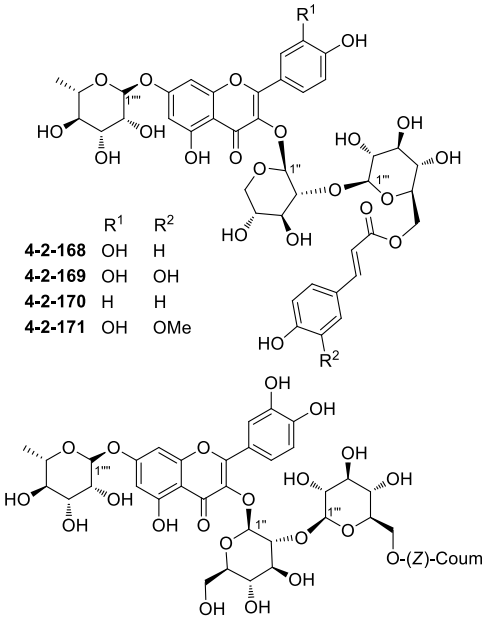


4-2-166



4-2-167

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4-2-172

Table 4-2-54: ^{1}H NMR spectroscopic data of flavonol glycoside-type flavonols **4-2-155**, **4-2-156**, **4-2-161**, and **4-2-162**.

H	4-2-155	4-2-156	4-2-161	4-2-162
5			12.56 br s(OH)	12.63 br s(OH)
6	6.36 d(1.8)	5.89 d(2.0)	6.44 br s	6.43 (2.0)
7	3.90 br s(OMe)			
8	6.61 d(1.8)	6.07 d(2.0)	6.76 br s	6.73 d(2.0)
2′	8.13 d(9.0)	7.96 d(9.0)	8.04 d(8.8)	7.60 d(2.0)
3′	6.90 d(9.0)	6.77 d(9.0)	6.88 d(8.8)	
5′	6.90 d(9.0)	6.77 d(9.0)	6.88 d(8.8)	6.84 d(8.3)
6′	8.13 d(9.0)	7.96 d(9.0)	8.04 d(8.8)	7.58 d(8.3, 2.0)
1″	5.09 d(7.8)	5.63 d(7.1)	5.35 d(7.3)	5.38 d(7.3)
2″	3.80 m	3.64 dd(8.0, 7.1)	3.23 m	3.28 m
3″	3.66 m	3.72 dd(9.0, 8.0)	3.23 m	3.23 m
4″	3.72 m	3.42 dd(10.0, 9.0)	3.11 m	3.11 m
5″	3.56 m	3.31 d(10.0)	3.30 m	3.30 m
6″	3.73 m		3.78 dd(11.8, 1.6)	3.79 dd(11.8, 1.5)
	3.42 m		3.43 m	3.45 m
1‴	4.52 d(1.2)	5.14 d(1.0)	3.99 d(6.4)	3.98 d(6.6)
2‴	3.68 m	3.81 dd(4.3, 1.0)	3.21 m	3.18 m
3‴	3.59 dd(9.2, 3.0)	3.45 dd(10.0, 4.3)	3.05 dd(8.2, 3.3)	3.03 dd(8.3, 3.4)

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Table 4-2-54 (continued)

H	4-2-155	4-2-156	4-2-161	4-2-162
4‴	3.41 m	3.12 t(10.0)	3.47 m	3.46 m
5‴	3.55 m	3.74 dq(10.0, 6.1)	3.51 dd(11.9, 3.7)	3.50 m
			2.99 br d(11.9)	2.96 br d(11.9)
6‴	1.18 d(6.0)	0.77 d(6.1)		
1⁗	4.94 d(1.2)	4.45 d(7.7)	5.06 d(7.3)	5.06 d(7.3)
2⁗	3.78 m	3.08 dd(9.0, 7.7)	3.28 m	3.27 m
3⁗	3.93 m	3.22 t(9.0)	3.30 m	3.30 m
4⁗	3.34 m	3.14 t(9.0)	3.18 m	3.18 m
5⁗	3.67 m	3.16 m	3.44 m	3.44 m
6⁗	1.13 d(6.0)	3.50 dd(11.7, 5.0)	3.71 m	3.71 br d(11.6)
		3.72 br d(11.7)	3.48 m	3.48 m

Table 4-2-55: ^{1}H NMR spectroscopic data of flavonol glycoside-type flavonols **4-2-157**~**4-2-160**.

H	4-2-157	4-2-158	4-2-159	4-2-160
6	6.24 d(2.0)	6.24 d(2.0)	6.22 d(1.5)	6.24 d(2.0)
8	6.40 d(2.0)	6.42 d(2.0)	6.39 d(1.5)	6.40 d(2.0)
2′	7.71 d(2.0)	8.12 d(9.0)	7.79 d(2.0)	7.77 d(2.0)
3′		6.93 d(9.0)		
5′	6.90 d(8.5)	6.93 d(9.0)	6.88 d(8.5)	6.88 d(8.5)
6′	7.69 dd(8.5, 2.0)	8.12 d(9.0)	7.59 dd(8.5, 2.0)	7.59 dd(8.5, 2.0)
1″	5.60 d(7.0)	5.62 d(7.0)	5.80 d(7.5)	5.80 d(7.5)
2″	4.02 dd(9.5, 7.0)	3.96 dd(9.5, 7.0)	4.31 dd(10.0, 7.5)	4.30 dd(10.0, 7.5)
3″	3.99 dd(9.5, 3.5)	3.99 dd(9.5, 3.0)	5.14 dd(10.0, 3.0)	5.12 dd(10.0, 3.5)
4″	5.36 br d(3.5)	5.35 dd(3.0, 0.5)	4.14 br d(3.0)	4.13 br d(3.5)
5″	3.86 br t(6.5)	3.87 br t(6.5)	3.87 br t(6.5)	3.85 br t(6.5)
6″	3.22 dd(10.5, 6.5)	3.22 dd(10.5, 6.5)	3.46 dd(10.0, 6.5)	3.46 dd(10.0, 6.5)
	3.49 dd(10.5, 6.0)	3.49 dd(10.5, 6.0)	3.77 dd(10.0, 6.5)	3.76 dd(10.0, 6.5)
1‴	4.46 d(1.5)	4.46 d(1.5)	4.56 d(1.5)	4.56 d(1.5)
2‴	3.60 dd(3.5, 1.5)	3.59 dd(3.5, 1.5)	3.65 dd(3.5, 1.5)	3.64 dd(3.5, 1.5)
3‴	3.52 dd(9.5, 3.5)	3.51 dd(9.5, 3.5)	3.53 dd(9.5, 3.5)	3.53 dd(9.5, 3.5)
4‴	3.23 t(9.5)	3.23 t(9.5)	3.29 t(9.5)	3.29 t(9.5)
5‴	3.38 dq(9.5, 6.0)	3.37 dq(9.5, 6.0)	3.54 dq(9.5, 6.5)	3.54 dq(9.5, 6.5)
6‴	1.05 d(6.0)	1.05 d(6.0)	1.19 d(6.5)	1.19 d(6.5)
1⁗	5.24 d(1.5)	5.24 d(1.5)	5.12 d(1.5)	5.10 d(1.5)
2⁗	4.07 dd(3.5, 1.5)	4.06 dd(3.5, 1.5)	3.89 dd(3.5, 1.5)	3.87 dd(3.5, 1.5)
3⁗	4.17 dd(9.5, 3.5)	4.16 dd(9.5, 3.5)	4.10 dd(10.0, 3.5)	4.07 dd(10.0, 3.5)
4⁗	5.03 t(9.5)	5.02 t(9.5)	4.97 t(10.0)	4.97 t(10.0)
5⁗	4.52 dq(9.5, 6.0)	4.49 dq(9.5, 6.5)	4.40 dq(10.0, 6.5)	4.37 dq(10.0, 6.5)
6⁗	0.96 d(6.0)	0.94 d(6.5)	0.88 d(6.5)	0.87 d(6.5)

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Table 4-2-55 (continued)

H	4-2-157	4-2-158	4-2-159	4-2-160
2″- or 3″-OR				
2, 6	7.54 d(8.5)	7.52 d(8.5)	7.51 d(8.5)	7.52 d(8.5)
3, 5	6.86 d(8.5)	6.86 d(8.5)	6.82 d(8.5)	6.82 d(8.5)
7	7.67 d(16.0)	7.66 d(16.0)	7.74 d(16.0)	7.74 d(16.0)
8	6.46 d(16.0)	6.38 d(16.0)	6.47 d(16.0)	6.47 d(16.0)
4‴″-OR				
2	7.34 d(8.5)	7.34 d(8.5)	7.28 d(8.5)	7.00 d(1.5)
3	6.76 d(8.5)	6.76 d(8.5)	6.75 d(8.5)	
5	6.76 d(8.5)	6.76 d(8.5)	6.75 d(8.5)	6.72 d(8.5)
6	7.34 d(8.5)	7.34 d(8.5)	7.28 d(8.5)	6.74 dd(8.5, 1.5)
7	7.50 d(16.0)	7.50 d(16.0)	7.44 d(16.0)	7.40 d(16.0)
8	6.27 d(16.0)	6.27 d(16.0)	6.21 d(16.0)	6.17 d(16.0)

Table 4-2-56: ^{1}H NMR spectroscopic data of flavonol glycoside-type flavonols **4-2-163**~**4-2-165** and **4-2-167**.

H	4-2-163	4-2-164	4-2-165	4-2-167
5	12.50 s(OH)	12.60 s(OH)	12.57 s(OH)	
6	6.26 d(2.2)	6.30 d(2.4)	6.20 d(2.1)	6.44 s
7	10.50 s(OH)	10.50 s(OH)	10.45 s(OH)	
8	6.42 d(2.2)	6.50 d(2.2)	6.36 d(2.1)	6.85 s
2′	7.26 d(1.9)	7.50 s	7.28 s	7.68 br s
3′			8.20~9.30 br s(OH)	
4′	8.50 br s(OH)			
5′	8.50 br s(OH)	3.65 s(OMe)	8.20~9.30 br s(OH)	7.20 d(8.7)
6′	7.26 d(1.9)	7.50 s	7.28 s	7.65 d(8.6)
1″	5.20 d(1.2)	5.40 d(1.2)	5.36 d(7.5)	5.51 d(7.5)
2″	3.90 m	4.30 m	3.46 m	3.20 m
3″	3.75 m	3.73 m	3.40 m	3.20 m
4″	3.45 m	3.50 m	3.36 m	3.08~3.83 (ov)
5″	3.65 m	3.41 m	3.28 m	3.15 m
6″	1.10 d(5.9)	1.40 d(6.3)	3.75 m, 3.59 m	3.31~3.71 (ov)
1‴	4.30 d(1.1)	4.60 d(1.0)	4.63 d(7.4)	5.55 br s
2‴	3.77 m	3.90 m	3.55 m	3.08~3.83 (ov)
3‴	3.60 m	3.62 m	3.47 m	3.08~3.83 (ov)
4‴	3.40 m	3.32 m	3.38 m	3.31 m
5‴	3.54 m	3.55 m	3.26 m	3.08~3.83 (ov)
6‴	1.05 d(6.1)	1.16 d(6.2)	3.69 m, 3.57 m	1.11 d(6.0)
1⁗	5.05 d(1.1)	5.10 d(7.7)	5.16 d(7.2)	4.87 d(6.9)
2⁗	3.85 m	3.96 m	3.49 m	3.41 m
3⁗	3.71 m	3.35 m		3.41 m
4⁗	3.30 m	3.20 m	3.32 m	3.08~3.83 (ov)
5⁗	3.56 m	3.80 m	3.24 m	3.41 m
6⁗	0.93 d(6.0)	3.45 m, 3.56 m	3.54 m, 3.67 m	3.31~3.71 (ov)

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Table 4-2-57: ^{1}H NMR spectroscopic data of flavonol glycoside-type flavonol **4-2-166**.

H	4-2-166(DMSO-d_6)	4-2-166 (CD_3OD)	H	4-2-166(DMSO-d_6)	4-2-166 (CD_3OD)
5	12.65 s(OH)		1‴	4.62 d(7.8)	4.76 d(6.9)
6	6.46 d(2.1)	6.50 d(2.1)	2‴	3.09 m	3.40 m
8	6.78 d(2.1)	6.75 d(2.1)	3‴	3.14~3.23	3.53 m
2′, 6′	8.04 d(8.8)	8.03 d(8.8)	4‴	3.14~3.23	3.38~3.42
3′, 5′	6.92 d(8.8)	6.91 d(8.8)	5‴	3.50	3.33
1″	5.61 d(6.3)	5.37 d(7.8)	6‴	3.52 dd	3.69 dd(5.2, 12.1)
				3.50 m	3.82 dd(12.1, 2.0)
2″	3.50 m	3.77 dd(7.8, 7.8)	1⁗	5.11 d(7.3)	5.05 d(7.4)
3″	3.31	3.63 dd(8.8, 7.7)	2⁗	3.31 dd	3.51 m
4″	3.14~3.23	3.38~3.42	3⁗	3.14~3.23	3.40 m
5″	3.34 m	3.39	4⁗	3.14~3.23	3.38~3.42
6″	3.92 dd(5.6, 10.6)	4.09 dd(5.2, 11.8)	5⁗	3.75 m	3.79 m
	4.20 d(10.6)	4.25 dd(11.8, 1.8)			
CH_2COOH	3.01 dd(15.9)		6⁗	4.13 dd(10.8, 4.8)	4.29 dd(6.8, 11.8)
	3.06 dd(15.9)			4.40 d(10.8)	4.54 dd(11.8, 1.8)
	3.37 d(15.9)				
	3.41 d(15.9)				

Table 4-2-58: ^{1}H NMR spectroscopic data of flavonol glycoside-type flavonols **4-2-168**~**4-2-172**.

H	4-2-168	4-2-169	4-2-170	4-2-171	4-2-172
6	6.34 d(2)	6.34 br s	6.39 br s	6.36 d(2)	6.34 br s
8	6.54 d(2)	6.60 br s	6.63 br s	6.56 d(2)	6.54 br s
2′	7.54 d(2)	7.54 d(2)	8.06 d(9)	7.52 d(2)	7.57 d(2)
3′			6.92 d(9)		
5′	6.89 d(8.5)	6.87 d(8.5)	6.92 d(9)	6.89 d(8.5)	6.87 d(8.5)
6′	7.64 dd(8.5, 2)	7.61 dd(8.5, 2)	8.06 d(9)	7.63 dd(8.5, 2)	7.64 dd(8.5, 2)
1″	5.51 d(6)	5.54 d(6)	5.56 d(6)	5.51 d(5.5)	5.67 d(6.5)
1‴	4.62 d(7)	4.61 d(7)	4.64 d(7)	4.63 d(7.5)	4.65 d(8)
1⁗	5.48 br s	5.48 br s	5.50 br s	5.48 br s	5.48 br s
6⁗	1.11 d(6)	1.11 d(6)	1.11 d(6)	1.12 d(6)	1.11 d(6)
6‴-OR					
2	7.23 d(8.5)	6.83 d(1.5)	7.24 d(9)	7.03 d(2)	7.23 d(8.5)
3	6.67 d(8.5)		6.66 d(9)		6.70 d(8.5)
5	6.67 d(8.5)	6.63 d(9)	6.66 d(9)	6.66 d(8.5)	7.24 d(8.5)
6	7.23 d(8.5)	6.70 dd(9, 1.5)	7.24 d(9)	6.85 dd(8.5, 2)	6.70 d(8.5)
7	7.33 d(15.5)	7.27 d(15.5)	7.36 d(15.5)	7.34 d(15.5)	7.33 d(16)
8	6.07 d(15.5)	6.01 d(15.5)	6.10 d(15.5)	6.21 d(15.5)	6.03 d(16)
OMe				3.77 s	

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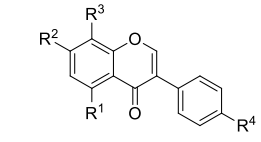
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4.3 Isoflavones

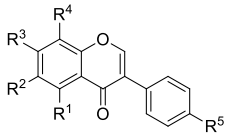
4.3.1 Isoflavone-type isoflavones

Table 4-3-1: Cos, MFs, and TSs of isoflavone-type isoflavones **4-3-1**~**4-3-19**.

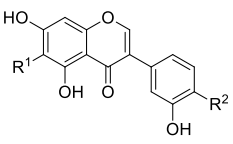
No.	Compounds	MFs	Test solvents	References
4-3-1	4′,8-dihydroxyl-7-methoxylisoflavone	$C_{16}H_{12}O_5$	$CDCl_3$	[176]
4-3-2	7,4′-dihydroxy-8-methoxy-isoflavone	$C_{16}H_{12}O_5$	DMSO-d_6	[177]
4-3-3	7,4′-dimethoxy-5-hydroxyisoflavone	$C_{17}H_{14}O_5$	$CDCl_3$	[178]
4-3-4	biochanin A	$C_{16}H_{12}O_5$	CD_3COCD_3	[178]
4-3-5	prunetin	$C_{16}H_{12}O_5$	CD_3COCD_3	[178]
4-3-6	isonigricin	$C_{17}H_{12}O_6$	DMSO-d_6	[179]
4-3-7	isoirisolidone	$C_{17}H_{14}O_6$	$CDCl_3$	[179]
4-3-8	irisolidone	$C_{17}H_{14}O_6$	CD_3COCD_3	[180]
4-3-9	irilin D	$C_{16}H_{12}O_7$	DMSO-d_6	[181]
4-3-10	5,6,7,3′-tetrahydroxy-4′-methoxyisoflavone	$C_{16}H_{12}O_7$	CD_3COCD_3	[182]
4-3-11	7,4′-dihydroxy-3′,5′-dimethoxyisoflavone	$C_{17}H_{14}O_6$	DMSO-d_6	[183]
4-3-12	caragin	$C_{17}H_{14}O_6$	$CDCl_3$	[184]
4-3-13	vavain	$C_{18}H_{16}O_7$	$CDCl_3$	[185]
4-3-14	5′-formylpratensein	$C_{17}H_{12}O_7$	CD_3COCD_3	[186]
4-3-15	6-hydroxy-7,2′,4′,5′-tetramethoxyisoflavone	$C_{19}H_{18}O_7$	$CDCl_3$ or DMSO-d_6	[187]
4-3-16	7-demethylrobustigenin	$C_{18}H_{16}O_7$	CD_3COCD_3	[186]
4-3-17	olibergin A	$C_{17}H_{14}O_7$	CD_3COCD_3	[188]
4-3-18	2′,7-dihydroxy-4′,5′-dimethoxyisoflavone	$C_{17}H_{14}O_6$	DMSO-d_6	[189]
4-3-19	4′,5,7-trihydroxy-6,8-dimethylisoflavone	$C_{17}H_{14}O_5$	DMSO-d_6	[190]



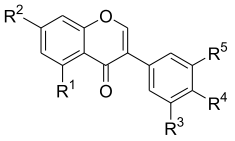
	R^1	R^2	R^3	R^4
4-3-1	H	OMe	OH	OH
4-3-2	H	OH	OMe	OH
4-3-3	OH	OMe	H	OMe
4-3-4	OH	OH	H	OMe
4-3-5	OH	OMe	H	OH



	R^1	R^2	R^3	R^4	R^5
4-3-6	H	OCH_2O		OMe	OH
4-3-7	OH	OH	OMe	H	OMe
4-3-8	OH	OMe	OH	H	OMe

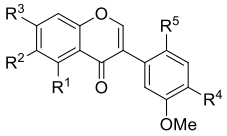


	R^1	R^2
4-3-9	OMe	OH
4-3-10	OH	OMe

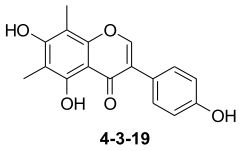


	R^1	R^2	R^3	R^4	R^5
4-3-11	H	OH	OMe	OH	OMe
4-3-12	H	OMe	OH	OMe	OH
4-3-13	OH	OMe	OMe	OMe	OH
4-3-14	OH	OH	OH	OMe	CHO

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	R^1	R^2	R^3	R^4	R^5
4-3-15	H	OH	OMe	OMe	OMe
4-3-16	OH	H	OH	OMe	OMe
4-3-17	OH	H	OH	OH	OMe
4-3-18	H	H	OH	OMe	OH



4-3-19

Table 4-3-2: ^{1}H NMR spectroscopic data of isoflavone-type isoflavones **4-3-1**~**4-3-5**.

H	4-3-1	4-3-2	4-3-3	4-3-4	4-3-5
2	8.13 s	8.28 s	7.8 s	8.2 s	8.22 s
5	7.62 d(9.0)	7.63 d(9.0)	12.8 s(OH)	13.12 s(OH)	13.12 s(OH)
6	6.96 d(9.0)	6.93 d(9.0)	6.3 s	6.32 d(2.5)	6.36 d(2.5)
7	3.84 s(OMe)			9.8 s(OH)	3.92 s(OMe)
8		3.84 s(OMe)	6.3 s	6.44 d(2.5)	6.54 d(2.5)
2′	7.45 d(8.0)	7.36 d(8.5)	7.4 d(8)	7.4 d(8)	7.46 d(8)
3′	6.97 d(8.0)	6.79 d(8.5)	6.9 d(8)	6.84 d(8)	6.9 d(8)
4′				3.84 s(OMe)	8.8 s(OH)
5′	6.97 d(8.0)	6.79 d(8.5)	6.9 d(8)	6.84 d(8)	6.9 d(8)
6′	7.45 d(8.0)	7.36 d(8.5)	7.4 d(8)	7.4 d(8)	7.46 d(8)
OMe			3.85 s, 3.8 s		

Table 4-3-3: ^{1}H NMR spectroscopic data of isoflavone-type isoflavones **4-3-6**~**4-3-10**.

H	4-3-6	4-3-7	4-3-8	4-3-9	4-3-10
2	8.20 s	7.88 s	8.22 s	8.27 s	8.14 s
5	7.02 s		13.22 s(OH)	12.59 s(OH)	13.25 s(OH)
6				3.76 s(OMe)	
7			9.20 br s(OH)		
8	3.92 s(OMe)	6.53 s	6.51 s	6.30 s	6.48 s
2′	7.36 d(8.4)	7.46 dd(8.7, 2.0)	7.55 d(9)	6.62 d(2.2)	7.14 d(2)
3′	6.81 d(8.4)	6.99 dd(8.7, 2.0)	7.00 d(9)		
4′					3.87 s(OMe)
5′	6.81 d(8.4)	6.99 dd(8.7, 2.0)	7.00 d(9)	6.64 d(8.3)	6.87 d(8)
6′	7.36 d(8.4)	7.46 dd(8.7, 2.0)	7.55 d(9)	6.80 d(8.3)	6.94 dd(8, 2)
OMe		3.85 s, 4.04 s	3.84 s, 3.88 s		
OCH_2O	6.12 s				

Table 4-3-4: ^{1}H NMR spectroscopic data of isoflavone-type isoflavones **4-3-11**~**4-3-15**.

H	4-3-11	4-3-12	4-3-13	4-3-14	4-3-15
2	8.32 s	7.90 s	7.88 s	8.32 s	8.08 s
5	7.97 d(8.7)	7.47 d(8.6)	12.82 s(OH)	12.88 s(OH)	7.25 s
6	6.94 dd(8.7, 1.4)	6.94 dd(8.6, 2.9)	6.39 d(2.0)	6.31 d(2.1)	
7		3.82 s(OMe)	3.88 s(OMe)		3.78 s(OMe)

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Table 4-3-4 (continued)

H	4-3-11	4-3-12	4-3-13	4-3-14	4-3-15
8	6.87 d(1.4)	6.96 d(2.9)	6.41 d(2.0)	6.45 d(2.1)	6.50 s
2′	6.87 s	7.63 s	6.70 d(2.5)	7.48 d(2.3)	3.87 s(OMe)
3′	3.78 s(OMe)		5.83 s(OH)	10.38 s(CHO)	6.81 s
4′		4.00 s(OMe)	3.93 s(OMe)		3.80 s(OMe)
5′	3.78 s(OMe)		3.91 s(OMe)		3.89 s(OMe)
6′	6.87 s	7.63 s	6.74 d(2.0)	7.52 d(2.3)	6.98 s
OH				9.84 br, 8.90 br	

Table 4-3-5: ^{1}H NMR spectroscopic data of isoflavone-type isoflavones **4-3-16**~**4-3-19**.

H	4-3-16	4-3-17	4-3-18	4-3-19
2	8.07 s	8.03 s	8.22 s	8.35 s
5	13.04 s(OH)	13.03 s(OH)	7.94 d(8.7)	13.13 (OH)
6	6.29 d(2.1)	6.26 d(2.2)	6.92 dd(8.7, 2.1)	
7	9.69 br (OH)		8.99 s(OH)	
8	6.42 d(2.1)	6.40 d(2.2)	6.87 d(2.1)	
2′		3.70 s(OMe)	10.80 br s(OH)	7.36 d(8)
3′	6.81 s	6.62 s	6.52 s	6.80 d(8)
4′			3.72 s(OMe)	
5′		3.79 s(OMe)	3.66 s(OMe)	6.80 d(8)
6′	6.98 s	6.96 s	6.81 s	7.36 d(8)
OMe	3.89 s, 3.80 s, 3.78 s			
Me				2.17, 2.04

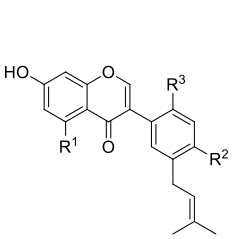
Table 4-3-6: Cos, MFs, and TSs of isoflavone-type isoflavones **4-3-20**~**4-3-42**.

No.	Compounds	MFs	Test solvents	References
4-3-20	vogelin F	$C_{21}H_{20}O_6$	$CDCl_3$	[191]
4-3-21	3′-(3-methylbut-2-enyl)biochanin A	$C_{21}H_{20}O_5$	CD_3COCD_3	[186]
4-3-22	5-deoxy-3′-prenylbiochanin A	$C_{21}H_{20}O_4$	CD_3COCD_3	[192]
4-3-23	glycyrrhisoflavone	$C_{20}H_{18}O_6$	CD_3COCD_3	[193]
4-3-24	5,7,3′,4′-tetrahydroxy-2′-(3,3-dimethylallyl)isoflavone	$C_{20}H_{18}O_6$	CD_3COCD_3	[193]
4-3-25	fremontin	$C_{20}H_{18}O_6$	CD_3COCD_3	[193]
4-3-26	ebenosin	$C_{21}H_{20}O_4$	CD_3OD	[194]
4-3-27	5,7,4′,2″-tetrahydroxy-6-[3″-methyl-3″-butenyl]-iso-flavone	$C_{20}H_{18}O_6$	CD_3OD	[195]
4-3-28	5,7-dihydroxy-6-(2″-hydroxy-3″-methylbut-3″-enyl)-4′-methoxylisoflavone	$C_{21}H_{20}O_6$	$CDCl_3$	[196]
4-3-29	vogelin E	$C_{20}H_{18}O_6$	CD_3OD	[191]
4-3-30	pongamone A	$C_{22}H_{22}O_5$	$CDCl_3$	[197]
4-3-31	brandisianin A	$C_{24}H_{26}O_7$	$CDCl_3$	[198]
4-3-32	olibergin B	$C_{26}H_{28}O_5$	$CDCl_3$	[188]

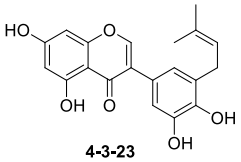
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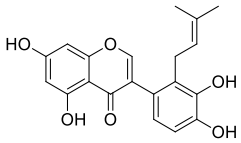
No.	Compounds	MFs	Test solvents	References
4-3-33	corylinin	$C_{25}H_{26}O_4$	DMSO-d_6	[199]
4-3-34	vogelin C	$C_{25}H_{26}O_6$	CD_3OD	[200]
4-3-35	derrisisoflavone A	$C_{26}H_{28}O_5$	$CDCl_3$-CD_3OD	[201]
4-3-36	derrisisoflavone D	$C_{26}H_{28}O_6$	CD_3OD	[201]
4-3-37	derrisisoflavone E	$C_{26}H_{28}O_6$	CD_3OD	[201]
4-3-38	5,7,4′-trihydroxy-6,8-diprenylisoflavone	$C_{25}H_{26}O_5$	$CDCl_3$	[201]
4-3-39	erysenegalensein E	$C_{25}H_{26}O_6$	CD_3OD	[201]
4-3-40	derrisisoflavone B	$C_{25}H_{26}O_6$	CD_3OD	[201]
4-3-41	lupalbigettirt	$C_{25}H_{26}O_5$	$CDCl_3$-CD_3OD	[201]
4-3-42	lupinisol A	$C_{25}H_{26}O_6$	CD_3OD	[201]



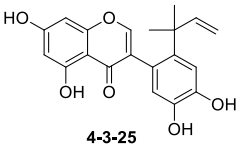
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4-3-20	OH	OH	OMe
4-3-21	OH	OMe	H
4-3-22	H	OMe	H



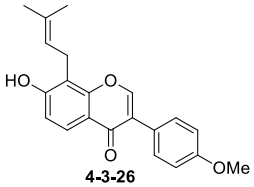
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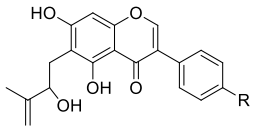
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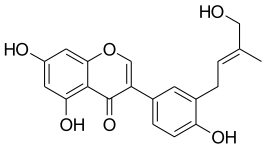
4-3-25



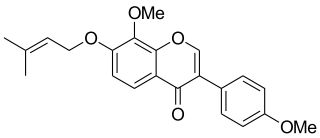
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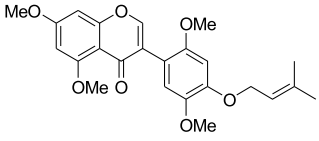
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4-3-28 R = OMe



4-3-29

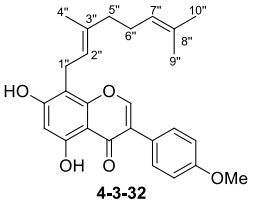


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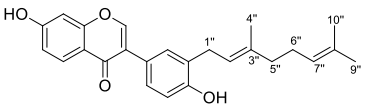


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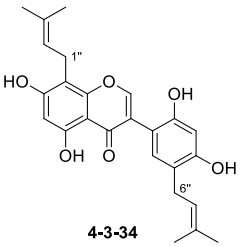
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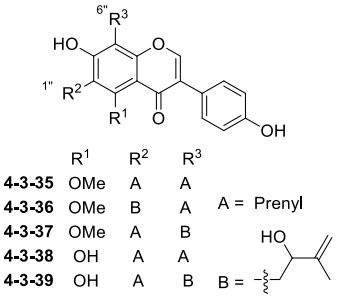
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4-3-33



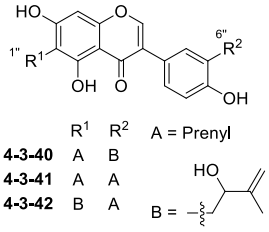
4-3-34



	R^1	R^2	R^3
4-3-35	OMe	A	A
4-3-36	OMe	B	A
4-3-37	OMe	A	B
4-3-38	OH	A	A
4-3-39	OH	A	B

A = Prenyl

B =



	R^1	R^2
4-3-40	A	B
4-3-41	A	A
4-3-42	B	A

A = Prenyl

B =

Table 4-3-7: ^{1}H NMR spectroscopic data of isoflavone-type isoflavones **4-3-20**~**4-3-24**.

H	4-3-20	4-3-21	4-3-22	4-3-23	4-3-24
2	7.90 s	8.14 s	8.14 s	8.09 s	7.89 s
5		13.04 s(OH)	8.06 d(8.7)	13.07 br s(OH)	13.00 s(OH)
6	6.21 d(1.9)	6.29 d(2.1)	6.98 dd(8.7, 2.1)	6.28 br s	6.29 d(1.3)
7		9.69 br(OH)			
8	6.34 d(1.9)	6.41 d(2.1)	6.90 d(2.1)	6.40 br s	6.43 d(1.3)
2′	3.70 s(OMe)	7.38 d(2.3)	7.40 d(2.1)	7.02 d(1.2)	
3′	6.50 s				
4′		3.87 s(OMe)	3.88 s(OMe)		
5′		6.98 d(8.4)	6.99 d(8.4)		6.76 d(8.0)
6′	6.88 s	7.39 dd(8.4, 2.3)	7.43 dd(8.4, 2.1)	6.84 d(1.2)	6.56 d(8.0)
1″	3.25 d(7.2)	3.33 d(7.3)	3.34 d(7.5)	3.37 d(7.3)	3.30 d(6.0)
2″	5.35 m	5.32 t(7.3)	5.31 m	5.37 m	5.08 m
4″	1.66 s	1.72 s	1.70 s	1.73 s	1.43 s
5″	1.71 s	1.70 s	1.73 s	1.70 s	1.52 s

Table 4-3-8: ^{1}H NMR spectroscopic data of isoflavone-type isoflavones **4-3-25**~**4-3-29**.

H	4-3-25	4-3-26	4-3-27	4-3-28	4-3-29
2	7.79 s	8.22 s	8.15 s	7.83 s	8.00 s
5	13.01 s(OH)	7.90 d(8.8)		13.25 s(OH)	
6	6.27 d(1.9)	6.92 d(8.8)			6.20 d(1.9)

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Table 4-3-8 (continued)

H	4-3-25	4-3-26	4-3-27	4-3-28	4-3-29
8	6.39 d(1.9)		6.51 s	6.46 s	6.32 d(1.9)
2′	6.56 s	7.46 d(8.8)	7.45 d(8.5)	7.44 d(8.7)	7.24 d(1.9)
3′		6.96 d(8.8)	6.91 d(8.5)	6.97 d(8.7)	
4′		3.83 s(OMe)		3.84 s(OMe)	
5′	7.02 s	6.96 d(8.8)	6.91 d(8.5)	6.97 d(8.7)	6.80 d(8.3)
6′		7.46 d(8.8)	7.45 d(8.5)	7.44 d(8.7)	7.19 dd(8.3, 1.9)
1″		3.56 d(7.0)	3.06 dd(14.0, 3.5)	3.17 dd(14.9, 7.8)	3.42 d(7.3)
			2.93 dd(14.0, 7.5)	2.92 dd(14.9, 7.8)	
2″	6.01 dd(10.6, 17.6)	5.25 t(7.0)	4.43 dd(7.5, 3.5)	4.41 d(7.8)	5.40 t(7.3)
3″	4.77 dd(17.6, 1.2)				
	4.64 dd(10.6, 1.2)				
4″	1.29 s	1.85 s	4.93 br s, 4.75 br s	4.99 s, 4.88 s	3.95 s
5″	1.33 s	1.69 s	1.83 br s	1.86 s	1.80 s

Table 4-3-9: ^{1}H NMR spectroscopic data of isoflavone-type isoflavones **4-3-30**~**4-3-34**.

H	4-3-30	4-3-31	4-3-32	4-3-33	4-3-34
2	8.02 s	7.79 s	7.93 s	8.22 s	8.06 s
5	8.03 d(9.0)	3.90 s(OMe)	12.85 s(OH)	7.95 d(8.8)	
6	7.07 d(9.0)	6.38 d(2.1)	6.34	6.93 dd(8.8, 2.3)	6.28 s
7		3.94 s(OMe)	6.05 br(OH)		
8	4.00 or 3.87 s(OMe)	6.47 d(2.1)		6.84 d(2.3)	
2′	7.52 d(8.5)	3.74 s(OMe)	7.47 d(8.8)	7.23 d(2.2)	
3′	7.00 d(8.5)	6.62 s	6.99 d(8.8)		6.41 s
4′	4.00 or 3.87 s(OMe)		3.85 s(OMe)		
5′	7.00 d(8.5)	3.84 s(OMe)	6.99 d(8.8)	6.82 d(8.2)	
6′	7.52 d(8.5)	6.95 s	7.47 d(8.8)	7.18 dd(8.2, 2.2)	6.88 s
1″	4.75 d(7.5)	4.64 d(6.6)	3.51 d(7.0)	3.25 d(7.3)	3.41 d(7.3)
2″	5.55 t(7.5)	5.54 t(6.6)	5.26 m	5.32 m	5.21 m
4″	1.81 s	1.80 s	1.84	1.56 s	1.70 s
5″	1.84 s	1.78 s	2.08 m	1.98 m	1.79 s
6″			2.11 m	2.05 m	3.21 d(7.3)
7″			5.05 m	5.06 m	5.30 m
9″			1.60	1.68 s	1.66 s
10″			1.68	1.53 s	1.70 s

Table 4-3-10: ^{1}H NMR spectroscopic data of isoflavone-type isoflavones **4-3-35**~**4-3-38**.

H	4-3-35	4-3-36	4-3-37	4-3-38
2	7.77 s	7.98 s	8.01 s	7.82 s
5	3.71 s(OMe)	3.67 s(OMe)	3.72 s(OMe)	13.04 s(OH)

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Table 4-3-10 (continued)

H	4-3-35	4-3-36	4-3-37	4-3-38
7				6.28 s(OH)
2′, 6′	7.24 d(8.7)	7.23 d(8.5)	7.29 d(8.3)	7.29 d(8.6)
3′, 5′	6.77 d(8.7)	6.73 d(8.5)	6.78 d(8.3)	6.78 d(8.6)
1″	3.40 d(7.0)	3.10 d(14.5) 2.71 dd(14.5, 8.6)	3.39 d(6.9)	3.39 d(5.4)
2″	5.10 t-like(7.0)	4.19 t(8.6)	5.14 t(6.9)	5.19 t-like(5.4)
4″	1.74 s	1.74 s	1.75 s	1.77 s
5″	1.65 s	4.91 s, 4.74 s	1.61 s	1.69 s
6″	3.43 d(7.0)	3.43 d(7.0)	3.18 dd(14.6, 2.6) 2.98 dd(14.6, 8.3)	3.41 d(5.4)
7″	5.13 t-like(7.0)	5.10 t(7.0)	4.31 dd(8.3, 2.6)	5.15 t-like(5.4)
9″	1.74 s	1.72 s	1.80 s	1.76 s
10″	1.63 s	1.56 s	4.91 s, 4.77 s	1.67 s

Table 4-3-11: ^{1}H NMR spectroscopic data of isoflavone-type isoflavones **4-3-39**~**4-3-42**.

H	4-3-39	4-3-40	4-3-41	4-3-42
2	8.08 s	7.95 s	7.70 s	7.97 s
8		6.32 s	6.27 s	6.36 s
2′	7.36 d(8.7)	7.20 d(2.2)	7.09 d(2.2)	7.19 d(2.2)
3′	6.83 d(8.7)			
5′	6.83 d(8.7)	6.78 d(8.3)	6.76 d(8.2)	6.79 d(8.0)
6′	7.36 d(8.7)	7.18 dd(8.3, 2.2)	7.11 dd(8.2, 2.2)	7.15 dd(8.0, 2.2)
1″	3.35 d(7.0)	3.26 d(7.3)	3.30 d(7.0)	3.01 dd(13.5, 5.9) 2.88 dd(13.5, 7.2)
2″	5.22 t-like(7.0)	5.18 t(7.3)	5.18 t-like(7.0)	4.40 dd(7.2, 5.9)
4″	1.77 s	1.73 s	1.72 s	4.47 s, 4.70 s
5″	1.64 s	1.61 s	1.62 s	1.81 s
6″	2.94 dd(14.8, 8.3)	2.89 dd(13.8, 4.5) 2.75 dd(13.8, 8.2)	3.29 d(7.0)	3.31 d(7.3)
7″	3.14 dd(14.8, 2.9) 4.31 dd(8.3, 2.9)	4.34 dd(8.2, 4.5)	5.27 t-like(7.0)	5.33 t-like(7.3)
9″	4.94 s, 4.80 s	4.86 s, 4.73 s	1.66 s	1.72 s
10″	1.82 s	1.76 s	1.67 s	1.72 s

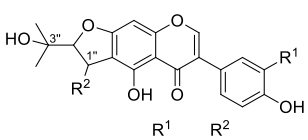
Table 4-3-12: Cos, MFs, and TSs of isoflavone-type isoflavones **4-3-43**~**4-3-51**.

No.	Compounds	MFs	Test solvents	References
4-3-43	5,4′-dihydroxy-2″-(1-hydroxy-1-methylethyl)-3″-meth-oxyfurano[4″,5″:6,7]isoflavone	$C_{21}H_{20}O_7$	CD_3OD	[195]
4-3-44	lupinisoflavone G	$C_{25}H_{26}O_6$	CD_3COCD_3	[201]

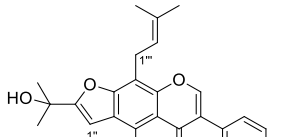
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Table 4-3-12 (continued)

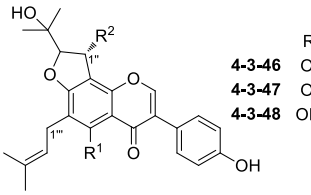
No.	Compounds	MFs	Test solvents	References
4-3-45	5,4′-dihydroxy-8-(3″-methylbut-2″-enyl)-2‴-(4‴-hydroxy-4‴-methylethyl)-furano-[4‴,5‴:6,7]isoflavone	$C_{25}H_{24}O_6$	$CDCl_3$	[196]
4-3-46	5,4′-dihydroxy-6-(3″-methylbut-2″-enyl)-2‴-(4‴-hydroxy-4‴-methylethyl)-3‴-methoxydihydrofurano-[4‴,5‴:7,8]isoflavone	$C_{26}H_{28}O_7$	CD_3COCD_3	[196]
4-3-47	euchrenone b_{10}	$C_{25}H_{26}O_6$	$CDCl_3$	[202]
4-3-48	derrisisoflavone C	$C_{26}H_{28}O_6$	CD_3OD	[201]
4-3-49	vogelin H	$C_{25}H_{26}O_6$	CD_3OD	[203]
4-3-50	5,4′-dihydroxy-8-(3,3-dimethylally)-2″-methoxyisopropy-lfurano[4,5:6,7]isoflavone	$C_{26}H_{26}O_6$	CD_3COCD_3	[204]
4-3-51	sarcolobone	$C_{23}H_{22}O_6$	$CDCl_3$	[205]



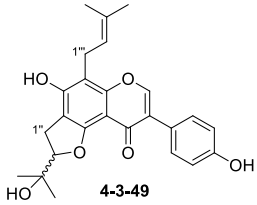
	R^1	R^2
4-3-43	H	OMe
4-3-44	Prenyl	H



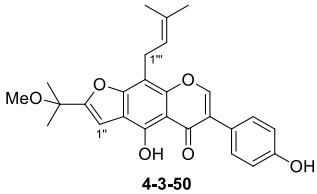
4-3-45



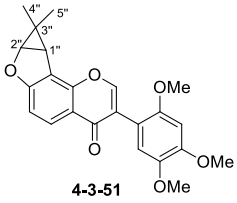
	R^1	R^2
4-3-46	OH	OMe
4-3-47	OH	H
4-3-48	OMe	H



4-3-49



4-3-50



4-3-51

Table 4-3-13: ^{1}H NMR spectroscopic data of isoflavone-type isoflavones **4-3-43**~**4-3-46**.

H	4-3-43	4-3-44	4-3-45	4-3-46
2	8.09 s	8.12 s	8.01 s	8.37 s
5			13.40 s(OH)	13.87 s(OH)

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Table 4-3-13 (continued)

H	4-3-43	4-3-44	4-3-45	4-3-46
8	6.41 s	6.35 s		
2′	7.37 d(8.7)	7.33 d(2.1)	7.44 d(7.3)	7.63 d(8.5)
3′	6.84 d(8.7)		6.91 d(7.3)	7.06 d(8.5)
5′	6.84 d(8.7)	6.88 d(8.2)	6.91 d(7.3)	7.06 d(8.5)
6′	7.37 d(8.7)	7.26 dd(8.2, 2.1)	7.44 d(7.3)	7.63 d(8.5)
1″	5.15 d(2.6)	3.18 dd(15.6, 7.7)	6.81 s	5.46 d(2.1)
	3.52 s(OMe)	3.12 dd(15.6, 9.4)		3.61 s(OMe)
2″	4.45 d(2.6)	4.82 dd(9.4, 7.7)		4.71 d(2.1)
3″				4.12 s(OH)
4″	1.16 s	1.23 s	1.70 s	1.51 s
5″	1.26 s	1.27 s	1.26 s	1.28 s
1‴		3.35 d(7.3)	3.69 d(7.1)	3.52 dd(14.2, 7.2)
				3.45 dd(14.2, 7.2)
2‴		5.36 t-like(7.3)	5.33 t(7.1)	5.43 t(7.2)
4‴		1.72 s	1.70 s	1.93 s
5‴		1.72 s	1.87 s	1.81 s

Table 4-3-14: ^{1}H NMR spectroscopic data of isoflavone-type isoflavones **4-3-47**~**4-3-51**.

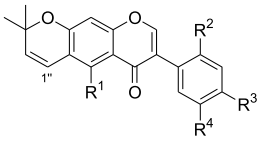
H	4-3-47	4-3-48	4-3-49	4-3-50①	4-3-51
2	7.89 s	8.00 s	7.75 s	8.38 s	7.96 s
5	12.94 s(OH)	3.78 s(OMe)		13.36 s(OH)	8.09 d(8.7)
6					6.90 d(8.7)
2′	7.39 d(9)	7.31 d(8.7)	7.28 d(8.5)	7.50 d(8.6)	
3′	6.85 d(9)	6.82 d(8.7)	6.83 d(8.5)	6.93 d(8.6)	6.63 s
4′				8.71 s(OH)	
5′	6.85 d(9)	6.82 d(8.7)	6.83 d(8.5)	6.93 d(8.6)	
6′	7.39 d(9)	7.31 d(8.7)	7.28 d(8.5)	7.50 d(8.6)	6.95 s
1″	3.12 dd(16, 8)	3.34 d(8.5)	3.20 br d(8.1)	6.91 s	2.74 d(5.6)
	3.22 dd(16, 9)				
2″	4.78 dd(9, 8)	4.83 t(8.5)	4.74 d(8.3)		4.62 d(5.6)
4″	1.25 s	1.27 s	1.30 s	1.63 s	1.20 s
5″	1.34 s	1.26 s	1.20 s	1.63 s	0.79 s
1‴	3.37 br d(7)	3.37 d(7.0)	3.29 d(7.3)	3.72 d(7.5)	
2‴	5.20 br t(7)	5.21 t(7.0)	5.23 m	5.38 tt(7.5, 1.3)	
4‴	1.68 br s	1.78 s	1.73 s	1.89 s	
5‴	1.79 br s	1.67 s	1.64 s	1.67 s	
OMe				3.11 s(OMe)	3.93 s, 3.86 s, 3.79 s

① Typographic errors exist in the Table of the literature. The assignments were done based on the results and discussion.

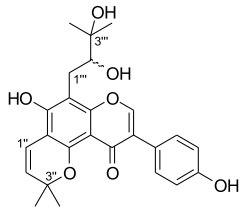
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Table 4-3-15: Cos, MFs, and TSs of isoflavone-type isoflavones **4-3-52**~**4-3-67**.

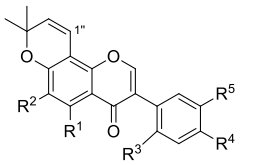
No.	Compounds	MFs	Test solvents	References
4-3-52	alpinumisoflavone 4′-methyl ether	$C_{21}H_{18}O_5$	$CDCl_3$	[202]
4-3-53	indicanine C	$C_{21}H_{18}O_5$	$CDCl_3$	[206]
4-3-54	indicanine E	$C_{22}H_{20}O_6$	CD_3COCD_3	[207]
4-3-55	2′,4′,5′-trimethoxy-2″,2″-dimethylpyrano[5″,6″:6,7]isoflavone	$C_{23}H_{22}O_6$	$CDCl_3$	[208]
4-3-56	vogelin I	$C_{25}H_{26}O_7$	$CDCl_3$	[203]
4-3-57	jamaicin	$C_{22}H_{18}O_6$	$CDCl_3$	[208]
4-3-58	derrone 4′-methyl ether	$C_{21}H_{18}O_5$	$CDCl_3$	[202]
4-3-59	griffonianone B	$C_{22}H_{18}O_7$	$CDCl_3$	[209]
4-3-60	scandinone	$C_{26}H_{26}O_5$	$CDCl_3$	[201]
4-3-61	4′,5″-dihydroxy-6″-methoxy-4″,4″-dimethyl-4″,5″-dihydro-6″*H*-pyrano[2″,3″:7,8]-isoflavone	$C_{21}H_{20}O_6$	CD_3OD	[210]
4-3-62	ulexone B	$C_{25}H_{22}O_5$	$CDCl_3$	[211]
4-3-63	ulexone D	$C_{25}H_{22}O_6$	$CDCl_3$	[211]
4-3-64	dihydroisoderrondiol	$C_{20}H_{18}O_7$	CD_3OD	[212]
4-3-65	derrisisoflavone F	$C_{25}H_{26}O_6$	CD_3OD	[201]
4-3-66	ulexone A	$C_{25}H_{24}O_5$	$CDCl_3$	[211]
4-3-67	ulexone C	$C_{25}H_{24}O_6$	$CDCl_3$	[211]



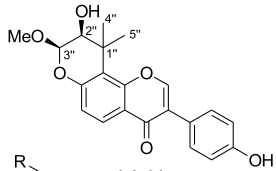
	R^1	R^2	R^3	R^4
4-3-52	OH	H	OMe	H
4-3-53	OMe	H	OH	H
4-3-54	OMe	OH	OMe	H
4-3-55	H	OMe	OMe	OMe



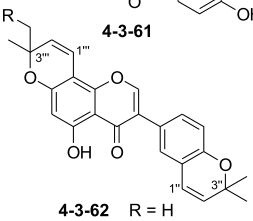
4-3-56



	R^1	R^2	R^3	R^4	R^5
4-3-57	H	H	OMe	OCH_2O	
4-3-58	OH	H	H	OMe	H
4-3-59	OMe	OH	H	OCH_2O	
4-3-60	OMe	Prenyl	H	OH	H

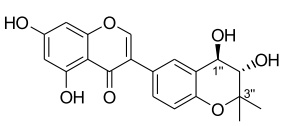


4-3-61

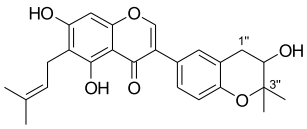


4-3-62 R = H
4-3-63 R = OH

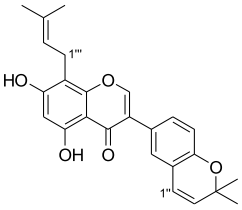
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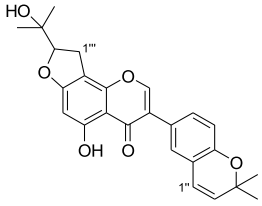
4-3-64



4-3-65



4-3-66



4-3-67

Table 4-3-16: ^{1}H NMR spectroscopic data of isoflavone-type isoflavones **4-3-52**~**4-3-56**.

H	4-3-52	4-3-53	4-3-54	4-3-55	4-3-56
2	7.82 s	7.76 s	7.98 s	7.91 s	8.01 s
5	13.15 s(OH)	3.89 s(OMe)	3.85 s(OMe)	7.88 s	
6					
8	6.32 d(0.7)	6.60 s	6.59 s	6.79 s	
2′	7.45 d(9)	7.26 d(8.7)		3.78 s(OMe)	7.32 d(8.6)
3′	6.97 d(9)	6.82 d(8.7)	6.80 d(2.1)	6.63 s	6.84 d(8.5)
4′	3.84 s(OMe)	7.19 br(OH)	3.84 s(OMe)	3.93 s(OMe)	
5′	6.97 d(9)	6.82 d(8.7)	6.95 dd(6.6, 2.1)	3.86 s(OMe)	6.84 d(8.5)
6′	7.45 d(9)	7.26 d(8.7)	7.40 d(6.6)	6.94 s	7.32 d(8.6)
1″	6.72 dd(10, 0.7)	6.72 d(10)	6.70 d(10.0)	6.45 d(9.9)	6.67 d(10.0)
2″	5.62 d(10)	5.72 d(10)	5.85 d(10.0)	5.74 d(9.9)	5.64 d(10.0)
4″, 5″	1.47 s, 1.47 s	1.47 s, 1.47 s	1.45 s, 1.45 s	1.49 s, 1.49 s	1.46 s, 1.46 s
1‴					2.88 m, 2.85 m
2‴					3.60 m
4‴, 5‴					1.28 s, 1.28 s

Table 4-3-17: ^{1}H NMR spectroscopic data of isoflavone-type isoflavones **4-3-57**~**4-3-61**.

H	4-3-57	4-3-58	4-3-59	4-3-60	4-3-61
2	7.91 s	7.88 s	7.80 s	7.77 s	8.30 s
5	8.05 d(8.6)	12.91 s(OH)	4.01 s(OMe)	3.82 s(OMe)	8.29 d(9.0)
6	6.81 d(8.6)	6.28 d(0.7)			7.12 d(9.0)
2′	3.73 s(OMe)	7.47 d(9)	7.10 d(1.7)	7.24 d(8.4)	7.48 d(8.7)
3′	6.62 s	6.97 d(9)		6.77 d(8.4)	6.95 d(8.7)
4′		3.84 s(OMe)		6.44 br s(OH)	

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Table 4-3-17 (continued)

H	4-3-57	4-3-58	4-3-59	4-3-60	4-3-61
5′		6.97 d(9)	6.88 d(8.0)	6.77 d(8.4)	6.95 d(8.7)
6′	6.83 s	7.47 d(9)	6.97 dd(8.0, 1.7)	7.24 d(8.4)	7.48 d(8.7)
1″	6.85 d(9.8)	6.68 dd(10, 0.7)	6.81 d(10.0)	6.72 d(9.8)	
2″	5.72 d(9.8)	5.57 d(10)	5.74 d(10.0)	5.60 d(9.8)	4.66 d(4.0)
3″					5.49 d(4.0)
4″, 5″	1.50 s, 1.50 s	1.47 s, 1.47 s	1.58 s, 1.58 s	1.44 s, 1.44 s	1.29 s, 1.42 s
1‴				3.34 d(7.0)	
2‴				5.12 t-like(7.0)	
4‴, 5‴				1.76 s, 1.63 s	
OMe					3.63 s
OCH_2O	5.96 s		6.00 s		

Table 4-3-18: ^{1}H NMR spectroscopic data of isoflavone-type isoflavones **4-3-62**~**4-3-65**.

H	4-3-62	4-3-63	4-3-64	4-3-65
2	7.85 s	7.85 s	8.06 s	8.00 s
5	12.89 s(OH)	12.92 s(OH)		
6	6.27 s	6.27 s	6.22 d(1.8)	
8			6.32 d(1.8)	6.35 s
2′	7.22 m	7.21 m	7.61 d(1.8)	7.24 d(2.0)
5′	6.80 br d(7.8)	6.80 br d(8.3)	6.79 d(8.4)	6.78 d(8.4)
6′	7.22 m	7.21 m	7.33 dd(8.3, 1.9)	7.21 dd(8.4, 2.0)
1″	6.34 d(10.1)	6.34 d(9.7)	4.53 d(8.3)	2.75 dd(16.6, 7.4)
				3.04 dd(16.6, 5.2)
2″	5.60 d(9.8)	5.61 d(9.7)	3.54 d(8.3)	3.77 dd(7.4, 5.2)
4″, 5″	1.43 s, 1.43 s	1.43 s, 1.43 s	1.45 s, 1.21 s	1.71 s, 1.69 s
1‴	6.65 d(10)	6.81 d(10)		3.30 d(7.3)
2‴	5.55 d(10)	5.52 d(10.1)		5.21 t-like(7.3)
4‴, 5‴	1.45 s, 1.45 s	3.65 s, 1.40 s		1.76 s, 1.65 s

Table 4-3-19: ^{1}H NMR spectroscopic data of isoflavone-type isoflavones **4-3-66** and **4-3-67**.

H	4-3-66	4-3-67	H	4-3-66	4-3-67
2	7.89 s	7.79 s	1″	6.34 d(9.4)	6.34 d(8.6)
5	12.79 s(OH)	13.03 s(OH)	2″	5.60 d(9.8)	5.61 d(9.8)
6	6.27 s	6.28 s	4″, 5″	1.42 s, 1.42 s	1.43 s, 1.43 s
7	7.92 s(OH)		1‴	3.43 br d(6.7)	3.19 br d(8.8)
2′	7.21 m	7.20 m	2‴	5.22 br t	4.75 br t(8.8)
5′	6.80 br d(8.5)	6.80 br d(7.8)	4‴, 5‴	1.80 s, 1.73 s	1.34 s, 1.22 s
6′	7.21 m	7.20 m			

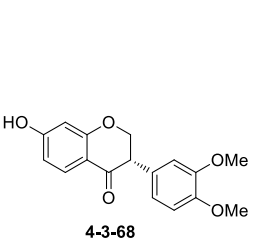
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4.3.2 Isoflavanone-type isoflavones

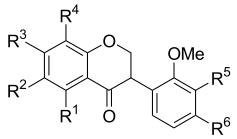
Table 4-3-20: Cos, MFs, and TSs of isoflavanone-type isoflavones **4-3-68**~**4-3-76**.

No.	Compounds	MFs	Test solvents	References
4-3-68	(3*S*)-sativanone①	$C_{17}H_{16}O_5$	DMSO-d_6	[213]
4-3-69	(±)5,7-dihydroxy-2′,3′,4′-trimethoxy-isoflavanone	$C_{18}H_{18}O_7$	CD_3OD	[214]
4-3-70	(±)5,7-dihydroxy-2′-methoxy-3′,4′-methylenedioxy-iso-flavanone	$C_{17}H_{14}O_7$	CD_3OD	[214]
4-3-71	6,8,3′,4′-tetrahydroxy-2′-methoxy-7-methylisoflavanone	$C_{17}H_{16}O_7$	$CDCl_3$	[215]
4-3-72	dalparvin	$C_{17}H_{16}O_6$	CD_3COCD_3	[213]
4-3-73	(*R*)-2,3-dihydro-7-demethylrobustigenin	$C_{18}H_{18}O_7$	CD_3COCD_3	[216]
4-3-74	uncinanone E	$C_{18}H_{18}O_6$	$CDCl_3$	[217]
4-3-75	(3*R*)-4′-methoxy-2′,3,7-trihydroxyisoflavanone	$C_{16}H_{14}O_6$	DMSO-d_6	[189]
4-3-76	(2*R*,3*R*)-isodalparvinol B	$C_{16}H_{14}O_7$	CD_3OD	[213]

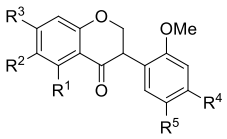
① The structural formula in the literature was uncorrect. It can be judged by the NMR and MS data that there is OMe on C-3′.



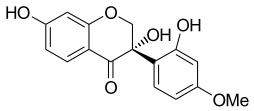
4-3-68



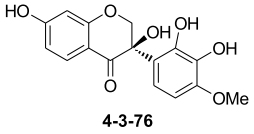
	R^1	R^2	R^3	R^4	R^5	R^6
4-3-69	OH	H	OH	H	OMe	OMe
4-3-70	OH	H	OH	H	OCH_2O	
4-3-71	H	OH	Me	OH	OH	OH



	R^1	R^2	R^3	R^4	R^5
4-3-72	H	H	OH	OMe	OH
4-3-73	OH	H	OH	OMe	OMe
4-3-74	OH	Me	OMe	OH	H



4-3-75



4-3-76

Table 4-3-21: ^{1}H NMR spectroscopic data of isoflavanone-type isoflavones **4-3-68**~**4-3-71**.

H	4-3-68	4-3-69	4-3-70	4-3-71
2	4.51 dd(11, 11) 4.15 dd(11, 5)	4.46 dd(11.2, 11.2) 4.34 dd(10.8, 5.6)	4.51 dd(11.0, 11.0) 4.36 dd(10.8, 5.6)	4.38 m

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Table 4-3-21 (continued)

H	4-3-68	4-3-69	4-3-70	4-3-71
3	4.41 dd(11, 5)	4.17 dd(11.6, 5.6)	4.19 dd(11.2, 5.6)	4.14 dd(11.2, 5.5)
5	7.67 d(9)			5.92 s
6	6.51 dd(9, 2)	5.88 d(2.0)	5.90 d(2.0)	
7	10.5 s(OH)			1.95 s(Me)
8	6.33 d(2)	5.86 d(2.0)	5.88 d(2.0)	
2′		3.80 s(OMe)	3.89 s(OMe)	3.79 s(OMe)
3′	6.57 d(2)	3.78 s(OMe)		
4′		3.81 s(OMe)		
5′	6.47 dd(9, 2)	6.70 d(8.8)	6.52 d(8.0)	6.52 d(8.6)
6′	6.97 d(9)	6.84 d(8.8)	6.66 d(8.0)	6.46 d(8.6)
OMe	3.71 s, 3.74 s			
OCH_2O			5.95 s	

Table 4-3-22: ^{1}H NMR spectroscopic data of isoflavanone-type isoflavones **4-3-72**~**4-3-76**.

H	4-3-72	4-3-73	4-3-74	4-3-75	4-3-76
2	4.54 dd(11, 11)	ax 4.56 dd(11.1, 12.0)	4.45 dd(10.9, 5.5)	ax 4.04 d(12)	4.89 d(12)
	4.13 dd(11, 5)	eq 4.41 dd(11.1, 5.6)	4.55 dd(11.0, 10.9)	eq 4.70 d(12)	4.19 d(12)
3	4.44 dd(11, 5)	4.32 dd(12.0, 5.6)	4.31 dd(11.0, 5.5)		
5	7.77 d(9)	12.35 s(OH)	12.33 s(OH)	7.66 d(8.6)	7.76 d(9)
6	6.57 d(9, 2)	5.97 d(2.0)	2.04 s(Me)	6.52 dd(8.6, 2.1)	6.51 d(9, 2)
7		9.68 s(OH)	3.89 s(OMe)		
8	6.40 d(2)	5.95 d(2.0)	6.05 s	6.30 d(2.1)	6.30 d(2)
2′			3.80 s(OMe)		
3′	6.72 s	6.75 s	6.47 d(2.1)	6.29 d(2.3)	
4′				3.68 s(OMe)	3.88 s(OMe)
5′			6.41 dd(8.1, 2.1)	6.43 dd(8.5, 2.3)	6.47 d(9)
6′	6.62 s	6.86 s	6.97 d(8.1)	7.36 d(8.5)	6.90 d(9)
OMe	3.75 s, 3.85 s	3.84 s, 3.80 s, 3.72 s			
OH				9.60 br, 10.53 br	

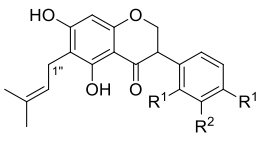
Table 4-3-23: Cos, MFs, and TSs of isoflavanone-type isoflavones **4-3-77**~**4-3-94**.

No.	Compounds	MFs	Test solvents	References
4-3-77	uncinanone A	$C_{20}H_{20}O_6$	$CDCl_3$	[218]
4-3-78	uncinanone D	$C_{23}H_{26}O_7$	CD_3OD	[217]
4-3-79	sophoronol D	$C_{22}H_{24}O_8$	$CDCl_3$	[219]
4-3-80	lysisteisoflavanone	$C_{21}H_{22}O_6$	$CDCl_3$	[220]
4-3-81	5,7,3′,4′-tetrahydroxy-5′-γ,γ-dimethylallylisoflavanone	$C_{20}H_{20}O_6$	CD_3COCD_3	[221]
4-3-82	erypoegin C	$C_{21}H_{22}O_6$	$CDCl_3$	[222]

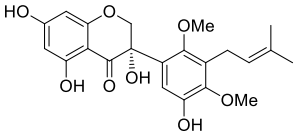
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Table 4-3-23 (continued)

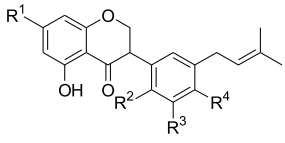
No.	Compounds	MFs	Test solvents	References
4-3-83	erypoegin D	$C_{22}H_{24}O_6$	$CDCl_3$	[222]
4-3-84	dalversinol A	$C_{25}H_{28}O_6$	$CDCl_3$	[223]
4-3-85	tomentosanol A	$C_{26}H_{30}O_6$	CD_3COCD_3	[180]
4-3-86	tomentosanol B	$C_{26}H_{30}O_7$	CD_3COCD_3	[180]
4-3-87	glisoflavanone	$C_{25}H_{28}O_6$	CD_3COCD_3	[224]
4-3-88	5,7,4′-trihydroxy-6,3′-di(γ,γ-dimethylallyl)isoflavanone	$C_{25}H_{28}O_5$	CD_3COCD_3	[221]
4-3-89	sophoronol E	$C_{27}H_{32}O_7$	$CDCl_3$	[219]
4-3-90	sophoronol F	$C_{27}H_{32}O_7$	$CDCl_3$	[219]
4-3-91	5,7,2′,4′-tetrahydroxy-8,3′-di(γ,γ-dimethylallyl)-isoflavanone	$C_{25}H_{28}O_6$	CD_3COCD_3	[221]
4-3-92	eryzerin A	$C_{25}H_{28}O_5$	CD_3COCD_3	[225]
4-3-93	bolusanthin II	$C_{25}H_{28}O_7$	CD_3COCD_3	[226]
4-3-94	eryzerin B	$C_{26}H_{30}O_5$	CD_3COCD_3	[225]



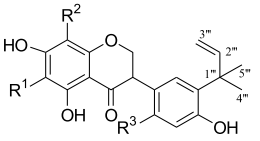
	R^1	R^2
4-3-77	OH	H
4-3-78	OMe	OMe



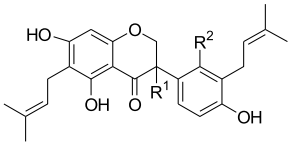
4-3-79



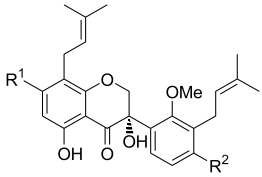
	R^1	R^2	R^3	R^4
4-3-80	OH	OH	H	OMe
4-3-81	OH	H	OH	OH
4-3-82	OH	OMe	H	OH
4-3-83	OMe	OMe	H	OH



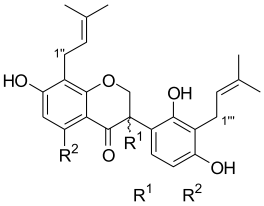
	R^1	R^2	R^3
4-3-84	H	Prenyl	OH
4-3-85	Prenyl	H	OMe



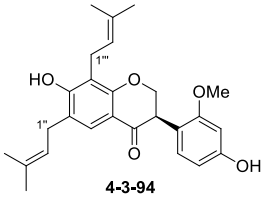
	R^1	R^2
4-3-86	OH	OMe
4-3-87	H	OH
4-3-88	H	H



	R^1	R^2
4-3-89	OH	OMe
4-3-90	OMe	OH



	R^1	R^2
4-3-91	H	OH
4-3-92	H	H
4-3-93	OH	OH



4-3-94

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Table 4-3-24: ^{1}H NMR spectroscopic data of isoflavanone-type isoflavones **4-3-77**~**4-3-81**.

H	4-3-77	4-3-78	4-3-79	4-3-80	4-3-81
2	4.76 dd(12.6, 4.3)	4.40 dd(10.8, 5.4)	4.20 d(12)	4.61 br d(7.6)	4.52 dd(11.4, 6.3)
	4.63 dd(12.6, 4.6)	4.51 dd(10.8, 11.0)	4.78 d(12)	4.76 m	4.53 dd(11.4, 4.7)
3	3.93 t(4.6)	4.23 dd(11.0, 5.5)		3.98 m	3.76 t(6.3)
5	12.02 s(OH)		11.77 s(OH)		12.31 s(OH)
6			6.00 s	5.92 s	5.93 d(2.1)
8	5.94 s	5.97 s	5.91 s	5.92 s	5.94 d(2.1)
2′		3.87 s(OMe)	3.75 s(OMe)		6.67 d(2.0)
3′	6.42 d(2.4)	3.85 s(OMe)		6.43 s	
4′		3.88 s(OMe)	3.70 s(OMe)	3.72 s(OMe)	
5′	6.37 dd(8.2, 2.4)	6.78 d(8.6)			
6′	7.23 d(8.2)	6.91 d(8.6)	6.98 s	7.08 s	6.62 d(2.0)
1″	3.26 d(7.0)	3.25 d(7.1)	3.33 d(5.4)	3.18 d(5.6)	3.30 d(7.2)
2″	5.17 br t(7.0)	5.24 br t(7.3)	5.19 t(5.4)	5.20 t(6)	5.31 t(7.2)
4″, 5″	1.75 s, 1.69 s	1.79 s, 1.70 s	1.73 s, 1.68 s	1.65 s, 1.69 s	1.68 s, 1.68 s
OH	5.00, 6.31, 7.77				

Table 4-3-25: ^{1}H NMR spectroscopic data of isoflavanone-type isoflavones **4-3-82**~**4-3-85**.

H	4-3-82	4-3-83	4-3-84	4-3-85
2	4.40 dd(11.0, 5.9)	4.41 dd(11.2, 5.4)	4.91 dd(12.0, 4.9)	4.36 dd(11, 5)
	4.54 dd(11.7, 11.0)	4.54 t(11.2)	4.72 dd(12.0, 4.9)	4.51 t(11)
3	4.25 dd(11.7, 5.9)	4.25 dd(11.2, 5.4)	4.00 br t(6.0)	4.24 dd(11, 5)
5	12.27 s(OH)	12.27 s(OH)		12.66 s(OH)
6	5.97 d(2.2)	6.08 d(2.0)	6.00 s	
7		3.82 s(OMe)		9.48 br s(OH)
8	5.92 d(2.2)	6.00 d(2.0)		6.01 s
2′	3.73 s(OMe)	3.73 s(OMe)		3.71 s(OMe)
3′	6.42 s	6.42 s	6.46 s	6.52 s
4′				8.07 s(OH)
6′	6.79 s	6.79 s	7.31 s	7.03 s
1″	3.25 d(7.3)	3.25 d(7.3)	3.33 d(7.0)	3.25 br d(7)
2″	5.27 t(7.3)	5.28 t(7.3)	5.19 br t(7.5)	5.25 m
4″, 5″	1.75 s, 1.75 s	1.75 s, 1.75 s	1.75 s, 1.81 s	1.64 s, 1.75 s
2‴			6.16 dd(17.6, 10.3)	6.24 dd(17, 11)
3‴			5.35 d(17.6)	4.92 dd(11, 1)
			5.30 d(10.3)	4.98 dd(17, 1)
4‴, 5‴			1.41 s, 1.39 s	1.42 s, 1.42 s

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Table 4-3-26: ^{1}H NMR spectroscopic data of isoflavanone-type isoflavones **4-3-86** and **4-3-87**.

H	4-3-86	4-3-87	H	4-3-86	4-3-87
2	4.07 d(12)	4.59 dd(11.0, 6.0)	5′	6.67 d(9)	6.40 d(8.5)
	4.75 d(12)	4.67 dd(11.0, 6.0)			
3	5.43 s(OH)	4.08 br t(6.0)	6′	7.29 d(9)	6.96 d(8.5)
5	12.43 s(OH)	12.31 s(OH)	1″, 1‴	3.26 br d(7)	3.21 d(7.5)
				3.33 t like m	3.39 d(7.5)
8	6.00 s	6.02 s	2″, 2‴	5.28 m	5.21 m
2′	3.61 s(OMe)		4″, 5″/4‴, 5‴	1.65 s, 1.66 s	1.61 s, 1.63 s
				1.73 s, 1.75 s	1.73 s, 1.75 s

Table 4-3-27: ^{1}H NMR spectroscopic data of isoflavanone-type isoflavones **4-3-88**~**4-3-91**.

H	4-3-88	4-3-89	4-3-90	4-3-91
2	4.53 dd(11.4, 8.0)	4.26 d(11.7)	4.24 d(11.4)	4.62 dd(11.8, 9.0)
	4.55 dd(11.4, 5.4)	4.89 d(11.7)	4.84 d(11.4)	4.79 dd(11.8, 4.4)
3	3.88 dd(8.0, 5.4)			3.89 dd(9.0, 4.5)
5	12.50 s(OH)	11.75 s(OH)	11.86 s(OH)	11.3 s(OH)
6		6.05 s	6.15 s	5.89 s
7			3.85 s(OMe)	
8	5.97 s			
2′	7.01 d(2.2)	3.86 s(OMe)	3.65 s(OMe)	7.71 s(OH)
4′		3.82 s(OMe)		5.30 s(OH)
5′	6.77 d(8.9)	6.64 d(8.7)	6.58 d(8.7)	6.32 d(8.5)
6′	7.02 dd(8.9, 2.2)	7.20 d(8.7)	7.27 d(8.7)	7.10 d(8.5)
1″	3.50 d(7.1)	3.28 d(6.9)	3.19 d(6.9)	3.32 d(7.1)
2″	5.29 t(7.1)	5.20 t(6.9)	5.10 t(6.9)	5.14 t(7.1)
4″, 5″	1.83 s, 1.77 s	1.74 s, 1.68 s	1.64 s, 1.72 s	1.74 s, 1.67 s
1‴	3.35 d(7.1)	3.33 d(6.0)	3.36 d(6.3)	3.38 d(7.1)
2‴	5.29 t(7.1)	5.20 t(6.0)	5.22 t(6.3)	5.14 t(7.1)
4‴, 5‴	1.83 s, 1.77 s	1.74 s, 1.77 s	1.79 s, 1.85 s	1.74 s, 1.67 s

Table 4-3-28: ^{1}H NMR spectroscopic data of isoflavanone-type isoflavones **4-3-92**~**4-3-94**.

H	4-3-92	4-3-93	4-3-94
2	4.82 dd(11.7, 4.4)	4.84 d(11.5)	4.48 dd(11.0, 5.5)
	4.94 dd(11.7, 4.9)	4.44 d(11.5)	4.53 t(11.0)
3	3.96 dd(4.9, 4.4)		4.14 dd(11.0, 5.5)
5	7.62 d(8.8)	11.77 s(OH)	7.55 s
6	6.63 d(8.8)	6.07 s	
2′-OMe			3.75 s
3′			6.50 d(2.2)
5′	6.40 d(8.3)	6.34 d(8.1)	6.38 dd(8.1, 2.2)

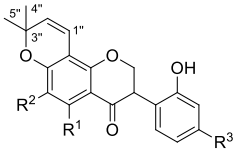
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Table 4-3-28 (continued)

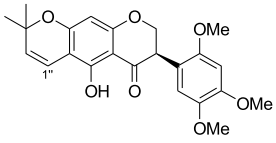
H	4-3-92	4-3-93	4-3-94
6′	7.12 d(8.3)	7.03 d(8.1)	6.91 d(8.1)
1″	3.37 d(7.3)	3.22 d(7.0)	3.35 d(7.3)
2″	5.25 t(7.3)	5.21 m	5.34 t(7.3)
4″, 5″	1.80 s, 1.66 s	1.75 s, 1.63 s	1.71 s, 1.76 s
1‴	3.38 d(7.3)	3.35 d(7.0)	3.40 d(7.3)
2‴	5.25 t(7.3)	5.21 m	5.20 t(7.3)
4‴, 5‴	1.76 s, 1.63 s	1.75 s, 1.63 s	1.75 s, 1.66 s

Table 4-3-29: Cos, MFs, and TSs of isoflavanone-type isoflavones **4-3-95**~**4-3-105**.

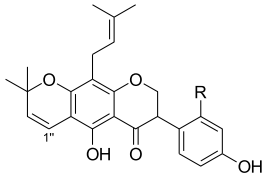
No.	Compounds	MFs	Test solvents	References
4-3-95	glabroisoflavanone A	$C_{20}H_{18}O_5$	CD_3COCD_3	[227]
4-3-96	glabroisoflavanone B	$C_{21}H_{20}O_5$	$CDCl_3$	[227]
4-3-97	5,2′,4′-trihydroxy-6-(γ,γ-dimethylallyl)-2‴,2‴-dimethyl-dihydropyrano[5‴,6‴]isoflavanone	$C_{25}H_{26}O_6$	CD_3OD	[228]
4-3-98	(*R*)-saclenone	$C_{23}H_{24}O_7$	$CDCl_3$	[216]
4-3-99	5,4′-dihydroxy-2′-methoxy-8-(3,3-dimethylally)-2″,2″-dimethylpyrano[5,6:6,7]-isoflavanone	$C_{26}H_{28}O_6$	$CDCl_3$	[204]
4-3-100	2,3-dihydroauriculatin	$C_{25}H_{26}O_6$	CD_3OD	[228]
4-3-101	5,3′-dihydroxy-4′-methoxy-5′-(3-methyl-1,3-butadienyl)-2″,2″-dimethylpyrano[5,6:6,7]isoflavanone	$C_{26}H_{26}O_6$	CD_3COCD_3	[229]
4-3-102	5,3′-dihydroxy-5′-(3-hydroxy-3-methyl-1-butenyl)-4′-methoxy-2″,2″-dimethylpyrano[5,6:6,7]isoflavanone	$C_{26}H_{28}O_7$	CD_3COCD_3	[229]
4-3-103	sophoronol A	$C_{20}H_{18}O_7$	DMSO-d_6	[219]
4-3-104	sophoronol B	$C_{21}H_{20}O_8$	CD_3OD	[219]
4-3-105	sophoronol C	$C_{26}H_{30}O_7$	$CDCl_3$	[219]



	R^1	R^2	R^3
4-3-95	H	H	OH
4-3-96	H	H	OMe
4-3-97	OH	Prenyl	OH



4-3-98



4-3-99 R = OMe
4-3-100 R = OH

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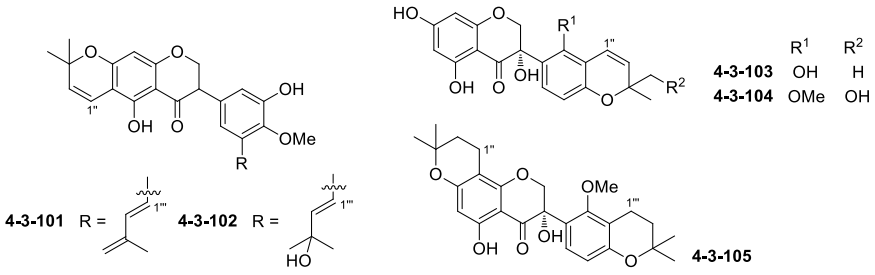


Table 4-3-30: ^{1}H NMR spectroscopic data of isoflavanone-type isoflavones **4-3-95**~**4-3-98**.

H	4-3-95	4-3-96	4-3-97	4-3-98
2	ax 4.72 dd(11.0, 10.3) eq 4.60 dd(11.0, 5.5)	ax 4.95 dd(11.0, 4.2) eq 4.77 dd(11.0, 4.6)	4.56 t(10.8) 4.44 dd(5.6, 10.8)	ax 4.54 dd(11.9, 10.9) eq 4.41 dd(10.9, 5.6)
3	4.16 dd(10.3, 5.5)	3.95 dd(4.6, 4.2)	4.21 dd(5.6, 10.8)	4.27 dd(11.9, 5.6)
5	7.70 d(8.8)	7.73 d(8.8)		12.54 s(OH)
6	6.49 d(8.8)	6.46 d(8.8)		
8				5.93 s
3′	6.43 d(2.3)	6.49 d(2.5)	6.33 d(2.4)	6.57 s
4′		3.72 s(OMe)		
5′	6.32 dd(8.4, 2.3)	6.45 dd(8.4, 2.5)	6.26 dd(8.0, 2.4)	
6′	6.93 d(8.4)	7.34 d(8.4)	6.85 d(8.0)	6.67 s
1″	6.64 d(10.0)	6.65 d(10.0)	6.60 d(10.0)	6.62 d(10.1)
2″	5.75 d(10.0)	5.61 d(10.0)	5.56 d(10.0)	5.50 d(10.1)
4″, 5″	1.44 s, 1.45 s	1.44 s, 1.47 s	1.45 s, 1.42 s	1.45 s, 1.45 s
1‴			3.22 d(7.2)	
2‴			5.17 br t(7.2)	
4‴, 5‴			1.78 s, 1.66 s	
OMe				3.89 s, 3.81 s, 3.78 s
OH	8.23 br s, 8.54 br s	8.40 br s, 8.40 br s		

Table 4-3-31: ^{1}H NMR spectroscopic data of isoflavanone-type isoflavones **4-3-99**~**4-3-103**.

H	4-3-99	4-3-100	4-3-101	4-3-102	4-3-103
2	4.47 m	4.55 t(11.0) 4.44 dd(11.0, 5.5)	4.68 m	4.66 d(6.4)	4.58 d(11.7) 4.06 d(11.7)
3	4.28 dd(11.2, 5.6)	4.20 dd(5.5, 11.0)	4.02 dd(7.3, 5.2)	4.01 t(6.4)	
5	12.45 s(OH)		12.55 br s(OH)	12.57 br s(OH)	11.60 s(OH)
6					5.68 s
8			5.91 s	5.91 s	5.68 s
2′	3.75 s(OMe)		6.81 d(2.0)	6.78 d(2.0)	
3′	6.40 br s	6.33 d(2.5)	8.19 br s(OH)	7.35 br s(OH)	
4′			3.77 s(OMe)	3.73 s(OMe)	
5′	6.34 dd(8.0, 2.0)	6.26 dd(8.0, 2.5)			6.26 d(8.4)
6′	6.92 d(8.0)	6.85 d(8.0)	7.14 d(2.0)	7.04 d(2.0)	7.15 d(8.4)

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Table 4-3-31 (continued)

H	4-3-99	4-3-100	4-3-101	4-3-102	4-3-103
1″	6.64 d(10.0)	6.54 d(9.6)	6.57 d(10.3)	6.57 d(10.3)	6.62 d(10.2)
2″	5.49 d(10.0)	5.55 d(9.6)	5.64 d(10.3)	5.64 d(10.3)	5.62 d(10.2)
4″, 5″	1.45 s, 1.45 s	1.43 s, 1.43 s	1.43 s, 1.44 s	1.44 s, 1.44 s	1.33 s, 1.33 s
1‴	3.20 d(7.2)	3.19 m	6.82 d(16.6)	6.85 d(16.1)	
2‴	5.16 t(7.2)	5.13 br t	6.98 d(16.6)	6.45 d(16.1)	
3‴				8.11 br s(OH)	
4‴	1.76 s	1.75 s	5.09 br s, 5.12 br s	1.35 s	
5‴	1.68 s	1.65 s	1.98 br s	1.35 s	

Table 4-3-32: ^{1}H NMR spectroscopic data of isoflavanone-type isoflavones **4-3-104** and **4-3-105**.

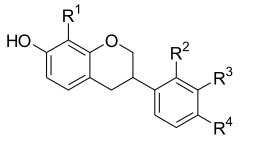
H	4-3-104	4-3-105	H	4-3-104	4-3-105
2	4.06 d(12)	4.84 dd(11.7)	1″	6.63 d(10.2)	2.56 t(6.9)
	4.66 d(12)	4.28 dd(11.7)			
3		3.72 s(OH)	2″	5.76 d(10.2)	1.75 m
5		11.57 s(OH)	4″, 5″	3.62 s, 1.31 s	1.33 s, 1.32 s
6	5.93 s	6.00 s	1‴		2.72 t(6.0)
8	5.89 s		2‴		1.75 m
5′	6.64 d(8.4)	6.58 d(8.4)	4‴, 5‴		1.35 s, 1.33 s
6′	7.40 d(8.4)	7.26 d(8.4)	OMe	3.63 s	3.71 s

4.3.3 Isoflavan-type isoflavones

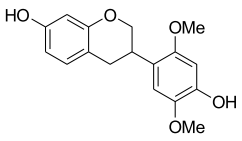
Table 4-3-33: Cos, MFs, and TSs of isoflavan-type isoflavones **4-3-106**~**4-3-119**.

No.	Compounds	MFs	Test solvents	References
4-3-106	7,2′,3′-trihydroxy-4′-methoxyisoflavan	$C_{16}H_{16}O_5$	CD_3CN	[230]
4-3-107	7,2′,4′-trihydroxy-3′-methoxyisoflavan	$C_{16}H_{16}O_5$	CD_3CN	[230]
4-3-108	7,4′-dihydroxy-3′-methoxyisoflavan	$C_{16}H_{16}O_4$	CD_3COCD_3	[231]
4-3-109	7,4′-dihydroxy-2′-methoxyisoflavan	$C_{16}H_{16}O_4$	$CDCl_3$	[231]
4-3-110	7,2′,3′-trihydroxy-8,4′-dimethoxyisoflavan	$C_{17}H_{18}O_6$	CD_3CN	[230]
4-3-111	sphaerosin S3	$C_{18}H_{18}O_6$	CD_3CN	[230]
			$CDCl_3$	[230]
4-3-112	eryvarin T	$C_{17}H_{18}O_5$	CD_3COCD_3	[232]
4-3-113	hildegardiol	$C_{17}H_{16}O_6$	C_6D_6	[233]
4-3-114	4,2′,3′,4′-tetrahydroxy-6,7-methylenedioxyisoflavan	$C_{16}H_{14}O_7$	CD_3COCD_3	[221]
4-3-115	(3*S*)-7-hydroxy-2′,3′,4′,5′,8-pentamethoxyisoflavan	$C_{20}H_{24}O_7$	$CDCl_3$	[234]
4-3-116	(3*S*)-3′,7-dihydroxy-2′,4′,5′,8-tetramethoxyisoflavan	$C_{19}H_{22}O_7$	$CDCl_3$	[234]
4-3-117	colutequinone B	$C_{18}H_{18}O_6$	$CDCl_3$	[235]
			C_6D_6	[235]
4-3-118	millettilone A	$C_{17}H_{16}O_6$	CD_3COCD_3	[236]
4-3-119	laurentiquinone	$C_{18}H_{22}O_7$	$CDCl_3$	[237]

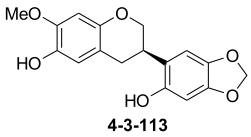
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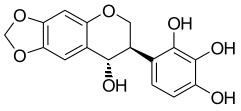
	R^1	R^2	R^3	R^4
4-3-106	H	OH	OH	OMe
4-3-107	H	OH	OMe	OH
4-3-108	H	H	OMe	OH
4-3-109	H	OMe	H	OH
4-3-110	OMe	OH	OH	OMe
4-3-111	CHO	OMe	OH	OMe



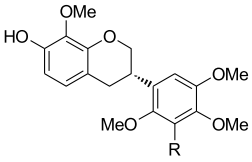
4-3-112



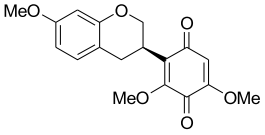
4-3-113



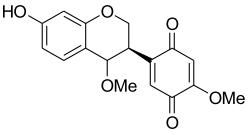
4-3-114



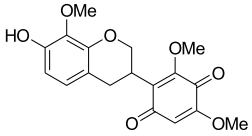
4-3-115 R = OMe
4-3-116 R = OH



4-3-117



4-3-118



4-3-119

Table 4-3-34: ^{1}H NMR spectroscopic data of isoflavan-type isoflavones **4-3-106**~**4-3-109**.

H	4-3-106	4-3-107	4-3-108	4-3-109
2	4.23 ddd(10.6, 3.7, 2.0)	4.24 ddd(10.2, 3.4, 1.9)	ax 3.96 dd(10.4, 10.0)	ax 3.92 m
	3.98 t-like(10.6)	3.98 dd(10.2, 9.5)	eq 4.23 ddd(10.4, 3.4, 2.0)	eq 4.20 br d(10.3)
3	3.42 m	3.42 m	3.46 m	3.42 m
4	2.84 m	2.84 ddd(15.5, 5.0, 1.9)	ax 2.95 dd(15.6, 10.8)	ax 2.87 dd(15.6, 15.5)
	2.93 ddd(16.0, 10.5, 1.0)	2.94 ddd(15.5, 10.7, 1.0)	eq 2.79 ddd(15.6, 5.2, 2.0)	eq 2.76 dd(15.6, 5.0)
5	6.91 br d(8.2)	6.91 br d(8.2)	7.01 d(8.4)	6.80 d(8.2)
6	6.33 dd(8.2, 2.6)	6.34 dd(8.2, 2.5)	6.39 dd(8.4, 2.4)	6.27~6.32 m
8	6.24 d(2.6)	6.24 d(2.5)	6.48 d(2.4)	6.22 br s
2′			6.27 d(2.4)	3.66 s(OMe)
3′		3.80 s(OMe)	3.71 s(OMe)	6.27~6.32 m
4′	3.81 s(OMe)			
5′	6.49 d(8.6)	6.49 d(8.6)	6.86 d(8.4)	6.27~6.32 m
6′	6.60 d(8.6)	6.79 d(8.6)	6.34 dd(8.0, 2.4)	6.87 d(8.4)

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Table 4-3-35: ^{1}H NMR spectroscopic data of isoflavan-type isoflavones **4-3-110**~**4-3-112**.

H	4-3-110	4-3-111(CD_3CN)	4-3-111($CDCl_3$)	4-3-112
2	4.33 ddd(10.6, 3.7, 2.0)	4.37 ddd(10.6, 3.7, 2.0)	4.06 t(10.4)	3.96 t-like(10.3)
	4.03 t (10.6)	4.12 t (10.6)	4.41 ddd(10.4, 3.6, 2.1)	4.17 ddd(10.3, 3.4, 2.0)
3	3.42 m	3.50 m	3.56 m	3.47 m
4	2.84 m	2.85 ddd(15.6, 5.0, 2.2)	2.84 ddd(15.7, 5.4, 2.1)	2.77 ddd(15.6, 5.4, 2.0)
	2.96 ddd(16.0, 10.5, 1.0)	2.93 ddd(15.6, 10.7, 1.0)	2.92 ddd(15.7, 10.4, 1.0)	2.96 dd(15.6, 11.2)
5	6.67 br d(8.4)	7.28 br d(8.6)	7.19 d(8.3)	6.89 d(8.1)
6	6.39 d(8.4)	6.43 dd(8.6, 0.6)	6.46 dd(8.3, 0.6)	6.36 dd(8.1, 2.4)
7		11.73 s(OH)	11.79 s(OH)	
8		10.33 d(0.6, CHO)	10.33 d(0.6, CHO)	6.28 d(2.4)
2′		3.83 s(OMe)	3.93 s(OMe)	3.78 s(OMe)
3′			5.61 s(OH)	6.57 s
4′		3.83 s(OMe)	3.89 s(OMe)	
5′	6.50 d(8.6)	6.65 d(8.6)	6.65 d(8.6)	3.77 s(OMe)
6′	6.61 d(8.6)	6.72 d(8.6)	6.60 d(8.6)	6.85 s
OH				7.54 s, 8.07 br s
OMe	3.81 s, 3.78 s			

Table 4-3-36: ^{1}H NMR spectroscopic data of isoflavan-type isoflavones **4-3-113**~**4-3-116**.

H	4-3-113	4-3-114	4-3-115	4-3-116
2	*α* 3.83 dd(10.2, 9.6)	3.74 dd(11.0, 10.8)	*α* 4.05 dd(10.5, 10.5)	*α* 3.94 dd(10.5, 10.5)
	β 4.21 ddd(10.2, 3.4, 1.8)	4.32 dd(5.0, 10.8)	*β* 4.39 ddd(10.5, 3.5, 1.0)	*β* 4.35 ddd(10.5, 3.0, 1.5)
3	3.48 m	3.52 ddd(5.0, 7.0, 11.0)	3.61 dddd(10.5, 3.5, 5.5, 10.5)	3.54 m
4	*α* 2.61 ddd(16.0, 10.1, 0.7)	5.52 d(7.0)	*α* 2.96 ddd(16.0, 10.5, 1.0)	2.83 m
	β 2.55 ddd(16.0, 5.6, 1.5)		*β* 2.90 ddd(16.0, 5.5, 1.0)	
5	6.74 s	6.74 s	6.72 dd(8.5, 1.0)	6.66 dd(8.5, 1.0)
6	5.09 s(OH)		6.53 dd(8.5)	6.49 d(8.5)
7	3.10 s(OMe)		5.80 br s(OH)	5.75 s(OH)
8	6.43 s	6.45 s	3.92 s(OMe)	3.88 s(OMe)
2′	3.66 br s(OH)		3.83 s(OMe)	3.81 s(OMe)
3′	5.85 s		3.95 s(OMe)	5.75 s(OH)
4′			3.89 s(OMe)	3.90 s(OMe)
5′		6.70 d(8.5)	3.79 s(OMe)	3.93 s(OMe)
6′	6.46 s	7.00 d(8.5)	6.40 s	6.46 s
OCH_2O	5.30 d(1.4), 5.29 d(1.4)	5.93 d(7.8)		

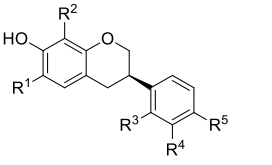
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Table 4-3-37: ^{1}H NMR spectroscopic data of isoflavan-type isoflavones **4-3-117**~**4-3-119**.

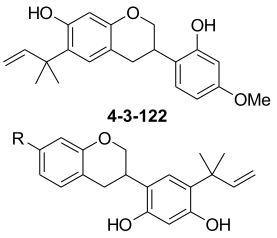
H	4-3-117($CDCl_3$)	4-3-117(C_6D_6)	4-3-118	4-3-119
2	ax 4.14 ddd(10.9, 2.7, 2.7)	ax 4.25 ddd(10.0, 3.0, 0.5)	4.26 d(10.5)	4.20 m
	eq 4.43 ddd(10.9, 10.9, 0.3)	eq 4.59 dd(10.0, 10.5)	4.36 dd(10.5, 3.1)	4.45 m
3	3.60 m	3.85 m	3.48 m	3.60 m
4	ax 2.66 ddd(15.5, 5.3, 2.7)	ax 2.63 ddd(15.0, 5.0, 3.0)	4.20 s	2.63 m
	eq 3.12 ddd(15.5, 13.6, 0.3)	eq 3.21 ddd(15.0, 12.0, <0.25)		
5	6.92 d(8.2)	6.99 d(8.8)	7.10 d(8.3)	6.65 d(8.3)
6	6.46 dd(8.2, 2.3)	6.65 dd(8.8, 2.5)	6.44 dd(8.3, 2.3)	6.50 d(8.3)
7	3.76 s(OMe)		8.59 br s(OH)	5.60 s(OH)
8	6.40 d(2.3)	6.79 d(2.5)	6.30 br s	3.96 s(OMe)
2′				3.91 s(OMe)
3′	5.86 s	5.40 s	6.06 s	
4′	3.80 s(OMe)			3.80 s(OMe)
6′	3.97 s(OMe)		6.39 s	
OMe		2.87 s, 3.41 s, 3.47 s	3.81 s, 3.42 s	

Table 4-3-38: Cos, MFs, and TSs of isoflavan-type isoflavones **4-3-120**~**4-3-129**.

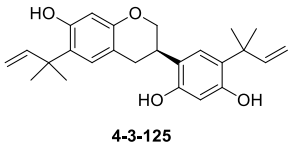
No.	Compounds	MFs	Test solvents	References
4-3-120	3*R*-(–)-manuifolin H	$C_{20}H_{22}O_4$	$CDCl_3$	[238]
4-3-121	(*R*)-8-prenylmucronulatol	$C_{22}H_{26}O_5$	$CDCl_3$	[239]
4-3-122	3*R*-(–)-isomillinol B	$C_{21}H_{24}O_4$	$CDCl_3$	[240]
4-3-123	3*R*-(–)-manuifolin K	$C_{20}H_{22}O_4$	$CDCl_3$	[238]
4-3-124	3*S*-(+)-7-methoxymanuifolin K	$C_{21}H_{24}O_4$	CD_3COCD_3	[241]
4-3-125	3*R*-(–)-manuifolin E	$C_{25}H_{30}O_4$	$CDCl_3$	[242]
4-3-126	3*R*-(–)-manuifolin D	$C_{25}H_{30}O_4$	$CDCl_3$	[242]
4-3-127	3*R*-(–)-manuifolin G	$C_{25}H_{32}O_5$	$CDCl_3$	[238]
4-3-128	eryzerin C	$C_{25}H_{30}O_4$	$CDCl_3$	[225]
4-3-129	manuifolin Q	$C_{27}H_{28}O_6$	CD_3COCD_3	[243]



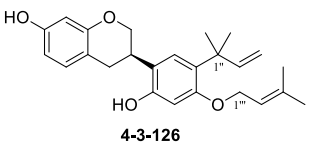
	R^1	R^2	R^3	R^4	R^5
4-3-120	Prenyl	H	OH	H	OH
4-3-121	H	Prenyl	OMe	OH	OMe



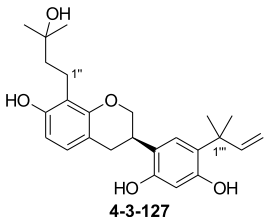
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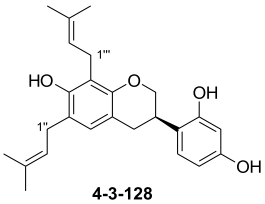
4-3-125



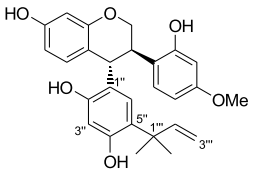
4-3-126



4-3-127



4-3-128



4-3-129

Table 4-3-39: ^{1}H NMR spectroscopic data of isoflavan-type isoflavones **4-3-120**~**4-3-122**.

H	4-3-120	4-3-121	4-3-122
2	ax 3.98 t(10.2)	*α* 4.33 ddd(10.4, 3.6, 2.0)	ax 4.03 t(10, 10)
	eq 4.28 br d(10.2)	*β* 3.97 t(10.4, 10.4)	eq 4.33 dd(10, 3.1)
3	3.46 m	3.53 m	3.35~3.65 m
4	ax 2.96 dd(15.6, 10.4)	*α* 2.89 ddd(15.6, 5.8, 2.0)	ax 3.05 dd(15.7, 10.6)
	eq 2.85 br dd(15.6, 5.2)	*β* 2.93 ddd(15.6, 10.8, 1.0)	eq 2.90 dd(15.7, 5.1)
5	6.77 s	6.81 d(8.2)	6.95 s
6		6.40 d(8.2)	
7		5.15 br s(OH)	
8	6.33 s		6.41 s
2′		3.90 s(OMe)	
3′	6.29 d(2.4)	5.57 s(OH)	6.38 d(3)
4′		3.88 s(OMe)	3.75 s(OMe)
5′	6.37 dd(8.2, 2.4)	6.60 d(8.6)	6.44 dd(9, 3)
6′	6.93 d(8.2)	6.64 d(8.6)	7.04 d(9)
1″	3.26 d(7.1)	3.40 d(7.1)	
2″	5.28 br t(7.1)	5.27 t(7.1, 1.5)	6.20 dd(17.5, 10.6)
3″			5.28 dd(17.5, 1.1)
			5.26 dd(10.6, 1.1)
4″, 5″	1.75 s, 1.76 s	1.81 m, 1.74 m	1.42 s, 1.42 s

Table 4-3-40: ^{1}H NMR spectroscopic data of isoflavan-type isoflavones **4-3-123**~**4-3-125**.

H	4-3-123	4-3-124	4-3-125
2	ax 4.06 t(10.1)	4.31 br d(10.0)	ax 4.04 t(10.1)
	eq 4.32 br d(10.1)	4.04 t(10.0)	eq 4.31 br d(10.1)
3	3.48 m	3.56 m	3.49 m

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Table 4-3-40 (continued)

H	4-3-123	4-3-124	4-3-125
4	ax 3.01 dd(15.6, 10.7) eq 2.88 br dd(15.6, 5.2)	3.01 dd(10.9, 15.6) 2.88 dd(15.2, 4.6)	ax 3.03 dd(15.6, 10.4) eq 2.90 br dd(15.6, 4.2)
5	6.92 d(8.1)	6.95 d(7.9)	6.94 s
6	6.37 dd(8.1, 2.4)	6.42 dd(7.9, 2.4)	
7		3.79 s(OMe)	
8	6.34 d(2.4)	6.37 d(2.4)	6.36 s
3′	6.29 s	6.44 s	6.28 s
4′		5.89 s(OH)	
6′	6.93 s	7.00 s	6.94 s
2″, 2‴	6.14 dd(17.7, 10.6)	6.18 dd(10.5, 17.7)	6.14 dd(17.7, 10.6) 6.16 dd(17.7, 10.6)
3″, 3‴	5.27 d(10.6), 5.32 d(17.7)	5.36 d(17.7), 5.31 d(10.5)	5.27 d(10.6), 5.28 d(10.6) 5.32 d(17.7), 5.33 d(17.7)
4″, 4‴/5″, 5‴	1.34 s, 1.35 s	1.39 s, 1.39 s	1.33 s, 1.34 s, 1.39 s, 1.40 s

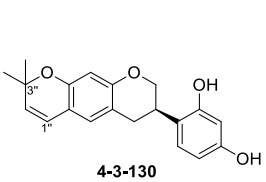
Table 4-3-41: ^{1}H NMR spectroscopic data of isoflavan-type isoflavones **4-3-126**~**4-3-129**.

H	4-3-126	4-3-127	4-3-128	4-3-129
2	ax 4.03 t(10.3) eq 4.29 br d(10.3)	ax 4.05 t(10.1) eq 4.37 br d(10.1)	3.97 t-like(10.2) 4.33 ddd(10.2, 3.4, 2.0)	4.18 dd(10.8, 6.0) 4.24 dd(10.8, 3.8)
3	3.42 m	3.46 m	3.45 m	3.65 m
4	ax 3.00 dd(15.6, 11.0) eq 2.85 br dd(15.6, 5.0)	ax 3.02 dd(15.6, 10.7) eq 2.91 br dd(15.6, 5.2)	2.85 ddd(15.6, 5.4, 2.0) 2.96 dd(15.6, 10.2)	4.56 d(7.0)
5	6.92 d(8.1)	6.81 d(8.1)	6.67 s	6.62 d(8.2)
6	6.36 dd(8.1, 2.5)	6.42 d(8.1)		6.31 dd(8.2, 2.5)
8	6.33 d(2.5)			6.33 d(2.5)
3′	6.32 s	6.28 s	6.27 d(2.4)	6.43 d(2.5)
4′				3.67 s(OMe)
5′			6.36 dd(8.8, 2.4)	6.29 dd(8.5, 2.5)
6′	6.95 s	6.94 s	6.92 d(8.8)	7.17 d(8.5)
1″		2.73 t(7.1)	3.26 d(7.3)	
2″	6.13 dd(17.6, 10.8)	1.75 t(7.1)	5.30 t(7.3)	
3″	4.90 d(10.8) 4.91 d(17.6)			6.41 s
4″, 5″	1.38 s, 1.38 s	1.26 s, 1.26 s	1.74 s, 1.75 s	
6″				6.72 s
1‴	4.44 d(6.4)		3.38 d(7.3)	
2‴	5.46 br t(6.4)	6.14 dd(17.7, 10.9)	5.23 t(7.3)	6.16 dd(17.6, 10.6)
3‴		5.27 d(10.9), 5.33 d(17.7)		4.84 d(10.6), 4.88 d(17.6)
4‴, 5‴	1.70 s, 1.77 s	1.34 s, 1.35 s	1.79 s, 1.71 s	1.30 s, 1.30 s
OH			5.35 s, 5.58 br s	

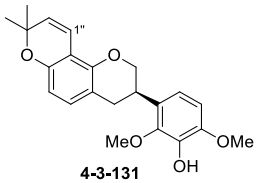
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Table 4-3-42: Cos, MFs, and TSs of isoflavan-type isoflavones **4-3-130**~**4-3-138**.

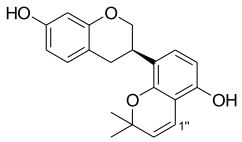
No.	Compounds	MFs	Test solvents	References
4-3-130	eryvarin C	$C_{20}H_{20}O_4$	$CDCl_3$	[244]
4-3-131	glyasperin H	$C_{22}H_{24}O_5$	$CDCl_3$	[239]
4-3-132	erythbidin A	$C_{20}H_{20}O_4$	CD_3COCD_3	[245]
4-3-133	phaseollinisoflavan	$C_{20}H_{20}O_4$	CD_3COCD_3	[245]
4-3-134	2′-methoxyphaseollinisoflavan	$C_{21}H_{22}O_4$	$CDCl_3$	[245]
4-3-135	8,8-dimethyl-3-(3-hydroxy-2,4-dimethoxyphenyl)-3,4:9,10-tetrahydro-2*H*,8*H*-benzo[1,2-*b*:3,4-*b*′] dipyran-10-ol	$C_{22}H_{26}O_6$	$CDCl_3$ CD_3CN	[230] [230]
4-3-136	eryzerin D	$C_{25}H_{28}O_4$	$CDCl_3$	[225]
4-3-137	smiranicin	$C_{19}H_{18}O_5$	$CDCl_3$	[239]
4-3-138	3-[3,4-dihydro-8-(2-propenyl)-2*H*-furo[2,3-*h*]-1-benzopyran-3-yl]-2,6-dimethoxyphenol	$C_{22}H_{22}O_5$	$CDCl_3$ CD_3CN	[230] [230]



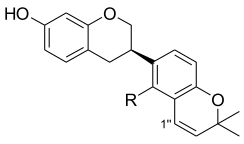
4-3-130



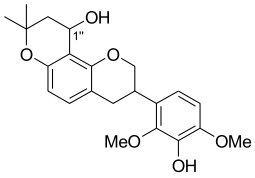
4-3-131



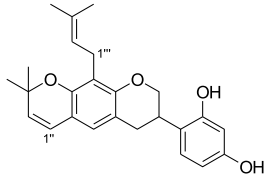
4-3-132



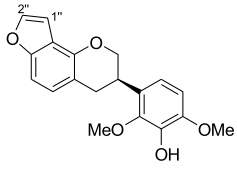
4-3-133 R = OH
4-3-134 R = OMe



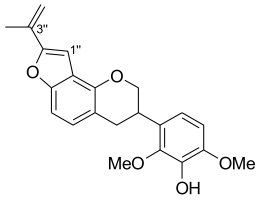
4-3-135



4-3-136



4-3-137



4-3-138

Table 4-3-43: ^{1}H NMR spectroscopic data of isoflavan-type isoflavones **4-3-130**~**4-3-133**.

H	4-3-130	4-3-131	4-3-132	4-3-133
2	4.02 t-like(10.3) 4.31 ddd(10.3, 3.4, 2.0)	*α* 4.35 ddd(10.4, 3.6, 2.0) *β* 3.99 t(10.4, 10.4)	3.97 t-like(10.3) 4.19 ddd(10.3, 3.4, 2.2)	3.95 t-like(10.3) 4.21 ddd(10.3, 3.4, 2.1)

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Table 4-3-43 (continued)

H	4-3-130	4-3-131	4-3-132	4-3-133
3	3.48 m	3.55 m	3.42 m	3.48 m
4	2.86 ddd(15.6, 5.4, 1.5)	*α* 2.87 ddd(15.7, 5.5, 2.0)	2.77 dd(15.4, 5.2)	2.79 dd(15.4, 5.2)
	2.95 dd(15.6, 10.7)	*β* 2.93 ddd(15.7, 11.0, 1.0)	2.94 dd(15.4, 11.0)	2.92 dd(15.4, 11.0)
5	6.69 s	6.83 d(8.2)	6.89 d(8.2)	6.89 d(8.2)
6		6.39 dd(8.2, 0.7)	6.37 dd(8.2, 2.2)	6.37 dd(8.2, 2.2)
7			8.07 s(OH)	8.33 br s(OH)
8	6.32 s		6.29 d(2.2)	6.28 d(2.2)
2′		3.91 s(OMe)		8.09 br s(OH)
3′	6.31 d(2.4)	5.59 s(OH)		
4′		3.90 s(OMe)	8.39 s(OH)	
5′	6.38 dd(8.3, 2.4)	6.62 d(8.6)	6.40 d(8.8)	6.33 d(8.8)
6′	6.95 d(8.3)	6.65 d(8.6)	6.87 d(8.8)	6.92 d(8.8)
1″	6.25 d(9.8)	6.67 dd(9.9, 0.7)	6.70 d(10.3)	6.79 d(10.3)
2″	5.49 d(9.8)	5.58 d(9.9)	5.66 d(10.3)	5.69 d(10.3)
4″, 5″	1.41 s, 1.41 s	1.43 s, 1.45 s	1.42 s, 1.43 s	1.38 s, 1.38 s
OH	4.73 s, 4.90 s			

Table 4-3-44: ^{1}H NMR spectroscopic data of isoflavan-type isoflavones **4-3-134**, **4-3-135**, and **4-3-137**.

H	4-3-134	4-3-135($CDCl_3$)	4-3-135(CD_3CN)	4-3-137
2	3.94 t-like(10.3)	3.97 t(10.4)	4.27 ddd(10.3, 3.6, 2.4)	*α* 4.43 ddd(10.4, 3.6, 2.0)
	4.27 ddd(10.3, 3.7, 1.5)	4.34 ddd(10.4, 3.6, 2.3)	3.97 t(10.3)	*β* 4.10 t(10.4, 10.4)
3	3.51 m	3.53 m	3.42 m	3.64 m
4	2.85 dd(15.4, 5.2)	2.85 ddd(15.5, 5.5, 2.3)	2.83 m	*α* 3.01 ddd(15.8, 5.5, 2.0)
	2.90 dd(15.4, 11.0)	2.95 ddd(15.5, 11.0, 1.0)	2.92 ddd(15.7, 11.0, 1.0)	*β* 3.08 ddd(15.8, 10.8, 0.9)
5	6.93 d(8.2)	6.86 d(8.3)	6.82 br d(8.3)	7.00 d(8.4)
6	6.39 dd(8.2, 2.2)	6.42 d(8.3)	6.29 d(8.3)	7.06 dd(8.4, 1.0)
7	4.94 br s(OH)			
8	6.37 d(2.2)			
2′	3.76 s(OMe)	3.90 s(OMe)		3.91 s(OMe)
3′				5.58 s(OH)
4′		3.89 s(OMe)		3.89 s(OMe)
5′	6.59 d(8.8)	6.65 d(8.6)	6.65 d(8.6)	6.63 d(8.6)
6′	6.87 d(8.8)	6.60 d(8.6)	6.72 d(8.6)	6.65 d(8.6)
1″	6.58 d(10.3)	3.81 t(5.3)	3.72 t(6.6)	6.82 dd(2.2, 1.0)
2″	5.66 d(10.3)	2.69 dd(17.7, 5.3)	2.46 dd(17.0, 6.6)	7.52 d(2.2)
		2.91 dd(17.7, 5.3)	2.81 m	
4″, 5″	1.43 s, 1.43 s	1.32 s, 1.36 s	1.27 s, 1.21 s	
OMe			3.81 s, 3.83 s	

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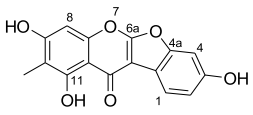
Table 4-3-45: ^{1}H NMR spectroscopic data of isoflavan-type isoflavones **4-3-136** and **4-3-138**.

H	4-3-136	4-3-138($CDCl_3$)	4-3-138(CD_3CN)
2	4.01 t-like(10.3)	4.10 t(10.3)	4.34 ddd(10.6, 3.7, 2.0)
	4.35 ddd(10.3, 2.9, 2.2)	4.42 ddd(10.3, 3.5, 1.9)	4.11 t(10.6)
3	3.47 m	3.63 m	3.54 m
4	2.84 ddd(15.5, 5.1, 2.2)	2.99 ddd(15.6, 5.2, 1.9)	2.97 ddd(15.6, 5.0, 2.0)
	2.95 dd(15.5, 11.0)	3.07 ddd(15.6, 11.0, 0.6)	3.05 ddd(15.6, 10.7, 1.0)
5	6.55 s	6.97 d(8.4)	7.00 br s
6		7.00 dd(8.4, 0.8)	7.00 br s
2′		3.91 s(OMe)	3.83 s(OMe)
3′	6.30 d(2.2)		
4′		3.88 s(OMe)	3.83 s(OMe)
5′	6.36 dd(8.1, 2.2)	6.65 d(8.6)	6.65 d(8.6)
6′	6.93 d(8.1)	6.63 d(8.6)	6.71 d(8.6)
1″	6.23 d(10.3)	6.70 m	6.58 s
2″	5.47 d(10.3)		
4″	1.40 s	5.13 q(1.5), 5.73 m	–
5″	1.40 s	2.11 s	1.57 br s
1‴	3.30 d(7.3)		
2‴	5.24 t(7.3)		
4‴, 5‴	1.78 s, 1.66 s		

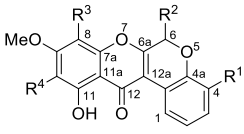
4.3.4 Rotenoids

Table 4-3-46: Cos, MFs, and TSs of rotenoids **4-3-139**~**4-3-151**.

No.	Compounds	MFs	Test solvents	References
4-3-139	boeravinone J	$C_{16}H_{10}O_6$	CD_3OD	[246]
4-3-140	boeravinone I	$C_{18}H_{14}O_7$	CD_3OD	[246]
4-3-141	9-*O*-methyl-4-hydroxyboeravinone B	$C_{18}H_{14}O_7$	C_5D_5N	[247]
			CD_3OD	[247]
4-3-142	boeravinone H	$C_{19}H_{16}O_7$	$CDCl_3$	[248]
4-3-143	boeravinone G	$C_{18}H_{14}O_7$	$CDCl_3$	[248]
4-3-144	9-*O*-methyl-10-hydroxycoccineone B	$C_{17}H_{12}O_7$	CD_3OD	[249]
4-3-145	6-methoxyboeravinone C	$C_{19}H_{18}O_8$	C_5D_5N	[247]
4-3-146	(+)-usararotenoid A	$C_{18}H_{12}O_8$	C_5D_5N	[250]
4-3-147	(+)-usararotenoid B	$C_{19}H_{16}O_8$	C_5D_5N	[250]
4-3-148	coccineone C	$C_{17}H_{14}O_7$	CD_3COCD_3	[251]
4-3-149	coccineone D	$C_{16}H_{12}O_7$	CD_3COCD_3	[251]
4-3-150	coccineone E	$C_{18}H_{16}O_7$	$CDCl_3$	[251]
4-3-151	boerhavone C	$C_{18}H_{16}O_7$	CD_3OD	[251]

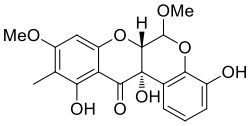


4-3-139

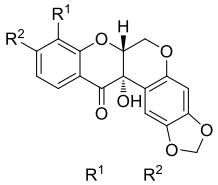


	R^1	R^2	R^3	R^4
4-3-140	H	OH	OH	Me
4-3-141	OH	OH	H	Me
4-3-142	OH	OMe	H	Me
4-3-143	OH	OMe	H	H
4-3-144	H	OH	H	OH

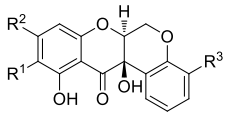
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4-3-145



	R^1	R^2
4-3-146	OCH_2O	
4-3-147	OMe	OMe



	R^1	R^2	R^3
4-3-148	H	OMe	OH
4-3-149	H	OH	OH
4-3-150	OMe	OMe	H
4-3-151	Me	OMe	OH

Table 4-3-47: ^{1}H NMR spectroscopic data of rotenoids **4-3-139**~**4-3-143**.

H	4-3-139	4-3-140	4-3-141(C_5D_5N)	4-3-141(CD_3OD)	4-3-142	4-3-143
1	7.81 d(7.0)	8.75 d(7.5)	8.86 dd(8.1, 1.5)	8.27 dd(8.1, 1.5)	8.39 d(7.5)	8.37 d(7.5)
2	6.93 d(7.0)	7.02 t(7.5)	7.31 t(8.1)	6.94 t(8.1)	7.09 t(7.5)	7.09 t(7.5)
3		7.19 t(7.5)	7.44 dd(8.1, 1.5)	6.85 dd(8.1, 1.5)	6.99 d(7.5)	6.98 d(7.5)
4	7.01 br s	6.97 d(7.5)				
6		6.12 s	6.71 s	6.19 s	5.90 s	5.84 s
					3.61 s(OMe)	3.61 s(OMe)
8	6.48 s		6.89 s	6.55 s	6.46 s	6.45 s
9		3.80 s(OMe)	3.96 s(OMe)	3.91 s(OMe)	3.93 s(OMe)	3.89 s(OMe)
10	2.08 s(Me)	2.01 s(Me)	2.39 s(Me)	2.07 s(Me)	2.14 s(Me)	6.41 s
11					12.80 s(OH)	12.80 s(OH)

Table 4-3-48: ^{1}H NMR spectroscopic data of rotenoids **4-3-144**~**4-3-147**.

H	4-3-144	4-3-145	4-3-146	4-3-147
1	8.87 d(7.8)	8.33 dd(8.1, 1.5)	8.22 s	8.29 s
2	7.08 t(7.8)	7.05 t(8.1)		
3	7.29 t(7.8)	7.28 dd(8.1, 1.5)		
4	7.05 d(7.8)		6.69 s	6.70 s
6	6.06 s	6.06 d(8.2)	α 4.82 dd(11.2, 9.9)	α 4.94 dd(11.2, 9.9)
		3.66 s(OMe)	β 4.54 dd(9.9, 4.6)	β 4.63 dd(9.9, 4.6)
6a		4.90 d(8.2)	4.99 dd(11.2, 4.6)	4.94 dd(11.2, 4.6)
8	6.30 s	6.34 s		
9	3.89 s(OMe)	3.67 s(OMe)		
10		2.11 s(Me)	6.73 d(8.4)	6.79 d(8.4)
11			7.88 d(8.4)	8.05 d(8.4)
OCH_2O			5.93 d, 5.95 d	5.93 d
			6.03 d, 6.18 d	5.95 d
OMe				3.79 s, 3.92 s

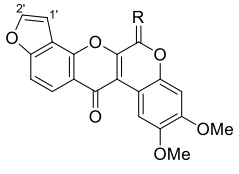
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Table 4-3-49: ^{1}H NMR spectroscopic data of rotenoids **4-3-148**~**4-3-151**.

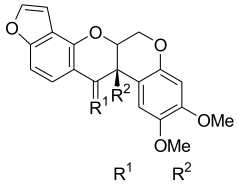
H	4-3-148	4-3-149	4-3-150	4-3-151
1	7.78 dd(7.0, 3.0)	7.8 dd(6.5, 3.0)	8.33 dd(8.0, 1.7)	7.89 dd(8.8, 0.6)
2	6.84~6.87 m	6.84~6.86 m	7.34 qd(8.6, 8.0, 1.7)	6.99 dd(8.8, 8.0)
3	6.84~6.87 m	6.84~6.86 m	7.08 qd(8.6, 8.0, 1.1)	6.98 dd(8.0, 0.6)
4			6.93 dd(8.6, 1.1)	
6	*α* 4.44 dd(5.5, 10)	*α* 4.44 dd(5.5, 10)	*α* 4.51 dd(6, 10)	*α* 4.52 dd(4.6, 9.9)
	β 4.48 t(10, 10)	*β* 4.48 t(10, 10)	*β* 4.54 t(10, 10)	*β* 4.54 dd(11.5, 9.9)
6a	4.77 dd(10.0, 5.5)	4.77 dd(10, 5.5)	4.68 dd(10, 6)	4.68 dd(11.5, 4.6)
8	6.10 d(2.0)	6.01 d(2.0)	6.19 s	6.12 s
9	3.86 s(OMe)		3.80 s(OMe)	3.88 s(OMe)
10	6.10 d(2.0)	6.02 d(2.0)	3.90 s(OMe)	2.03 s(Me)
11	11.85 s(OH)		11.75 s(OH)	11.80 s(OH)
12a			3.35 s(OH)	

Table 4-3-50: Cos, MFs, and TSs of rotenoids **4-3-152**~**4-3-167**.

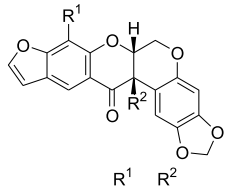
No.	Compounds	MFs	Test solvents	References
4-3-152	6-oxo-dehydroelliptone	$C_{20}H_{12}O_7$	$CDCl_3$	[252]
4-3-153	dehydroelliptone	$C_{20}H_{14}O_6$	$CDCl_3$	[252]
4-3-154	12-deoxo-12*α*-methoxyelliptone	$C_{21}H_{20}O_6$	$CDCl_3$	[253]
4-3-155	elliptone	$C_{20}H_{16}O_6$	$CDCl_3$	[253]
4-3-156	12a-hydroxyelliptone	$C_{20}H_{16}O_7$	$CDCl_3$	[254]
4-3-157	dolineone	$C_{19}H_{12}O_6$	$CDCl_3$	[255]
4-3-158	pachyrrhizone	$C_{20}H_{14}O_7$	$CDCl_3$	[255]
4-3-159	12a-hydroxydolineone	$C_{19}H_{12}O_7$	$CDCl_3$	[255]
4-3-160	12a-hydroxypachyrrhizone	$C_{20}H_{14}O_8$	$CDCl_3$	[255]
4-3-161	12a-hydroxyrotenone	$C_{23}H_{22}O_7$	$CDCl_3$	[255]
4-3-162	amorphigenin	$C_{23}H_{22}O_7$	$CDCl_3$	[256]
4-3-163	dalpanol	$C_{23}H_{24}O_7$	$CDCl_3$	[256]
4-3-164	12a*β*-hydroxydalpanol	$C_{23}H_{24}O_8$	$CDCl_3$	[256]
4-3-165	sarcolobin	$C_{23}H_{22}O_7$	$CDCl_3$	[205]
4-3-166	13-homo-13-oxa-6a,12a-dehydrorotenone	$C_{23}H_{20}O_7$	$CDCl_3$	[257]
4-3-167	usararotenoid C	$C_{23}H_{22}O_7$	$CDCl_3$	[258]



4-3-152 R = O
4-3-153 R = H_2

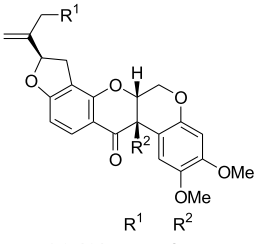


	R^1	R^2
4-3-154	*α*-OMe	H
4-3-155	O	H
4-3-156	O	OH



	R^1	R^2
4-3-157	H	H
4-3-158	OMe	H
4-3-159	H	OH
4-3-160	OMe	OH

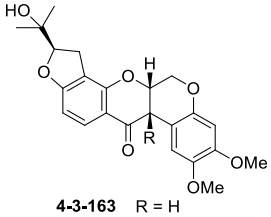
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R1 R2

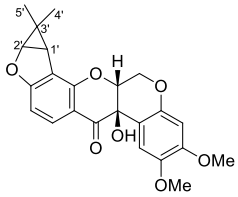
4-3-161 H OH

4-3-162 OH H

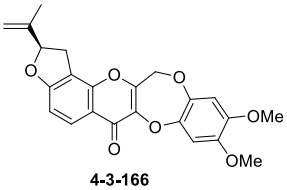


4-3-163 R = H

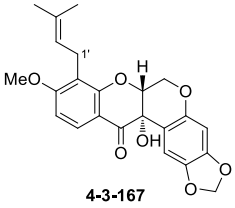
4-3-164 R = OH



4-3-165



4-3-166



4-3-167

Table 4-3-51: ^{1}H NMR spectroscopic data of rotenoids **4-3-152**~**4-3-156**.

H	4-3-152	4-3-153	4-3-154	4-3-155	4-3-156
1	9.06 s	8.54 s	6.86 s	6.81 s	6.56 s
2	4.08 s(OMe)	3.95 s(OMe)	3.86 s(OMe)	3.84 s(OMe)	3.70 s(OMe)
3	4.01 s(OMe)	3.85 s(OMe)	3.85 s(OMe)	3.84 s(OMe)	3.78 s(OMe)
4	6.96 s	6.54 s	6.47 s	6.50 s	6.45 s
6		5.08 s	*α* 4.65 t(10.2)	*α* 4.76 dd(12.0, 3.5)	*α* 4.70 dd(12.0, 2.3)
			β 4.32 dd(10.2, 4.5)	*β* 4.23 dd(12.0, 1.0)	*β* 4.56 d(12.0)
6a			4.92 dd(10.2, 4.8)	5.10 m	4.74 d(2.3)
10	7.68 d(8.9)	7.54 d(8.7)	7.11 d(7.8)	7.18 dd(9.0, 0.5)	7.17 dd(8.6, 1.1)
11	8.28 d(8.9)	8.19 d(8.7)	7.17 d(7.8)	7.93 d(9.0)	7.87 d(8.6)
12			4.62 d(3.4)		
			3.42 s(OMe)		
12a			3.53 t(4.8)	3.97 d(3.5)	4.53 s(OH)
1′	7.40 d(1.4)	7.07 d(1.5)	6.87 d(1.8)	6.95 dd(2.0, 1.5)	6.95 dd(2.3, 1.1)
2′	7.84 d(1.4)	7.72 d(1.5)	7.55 d(1.8)	7.60 d(2.0)	7.56 d(2.3)

Table 4-3-52: ^{1}H NMR spectroscopic data of rotenoids **4-3-157**~**4-3-160**.

H	4-3-157	4-3-158	4-3-159	4-3-160
1	6.72 s	6.71 s	6.52 s	6.49 s
4	6.45 s	6.42 s	6.47 s	6.46 s
6	4.19 d(12.0)	4.20 d(11.9)	4.50 dd(15.8, 4.0)	4.50 dd(12.1, 1.0)
	4.64 dd(12.0, 3.0)	4.69dd(11.9, 3.5)	4.63 dd(15.8, 2.6)	4.71 dd(12.1, 2.4)

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Table 4-3-52 (continued)

H	4-3-157	4-3-158	4-3-159	4-3-160
6a	4.96 dd(4.0, 3.0)	4.97 dd(3.8, 3.5)	4.62 dd(4.0, 2.6)	4.61 dd(2.4, 1.0)
8	7.06 d(1.0)	4.13 s(OMe)	7.02 d(1.0)	4.10 s(OMe)
11	8.21 s	7.91 s	8.19 s	7.88 s
12a	3.89 d(4.0)	3.88 d(3.8)		
1′	6.73 dd(2.5, 1.0)	6.73 d(2.2)	6.74 dd(2.3, 1.0)	6.73 d(2.2)
2′	7.54 d(2.5)	7.55 d(2.2)	7.55 d(2.3)	7.55 d(2.2)
OCH_2O	5.81 d(1.3)	5.80 d(1.1)	5.80 d(1.4)	5.80 d(1.5)
	5.87 d(1.3)	5.85 d(1.1)	5.84 d(1.4)	5.84 d(1.5)

Table 4-3-53: ^{1}H NMR spectroscopic data of rotenoids **4-3-161**~**4-3-165**.

H	4-3-161	4-3-162	4-3-163	4-3-164	4-3-165
1	6.55 s	6.76 s	6.76 s	6.55 s	6.59 s
4	6.48 s	6.46 s	6.45 s	6.49 s	6.51 s
6	4.50 m	4.18 d(12)	4.18 d(12)	4.49 d(13)	ax 4.64 dd(12.1, 2.4)
	4.62 m	4.61 dd(12, 3)	4.62 dd(12, 3)	4.62 dd(13, 2.5)	eq 4.50 dd(12.1, 0.8)
6a	4.58 m	4.93 m	4.93 m	4.59 t(2.5)	4.58 dd(2.4, 0.8)
10	6.53 d(8.5)	6.51 d(8.5)	6.48 d(8.5)	6.52 d(8.5)	6.51 d(8.6)
11	7.82 d(8.5)	7.85 d(8.5)	7.83 d(8.5)	7.82 d(8.5)	7.77 d(8.6)
12a		3.85 d(4)	3.84 d(4)		4.41 s(OH)
1′	2.94 dd(16.0, 9.0)	3.07 dd(15, 9)	3.11 d(9)	3.09 d(9)	2.50 d(5.5)
	3.29 dd(16.0, 9.0)	3.39 dd(15, 9)	3.12 d(9)	3.10 d(9)	
2′	5.24 t(9.0)	5.39 t(9)	4.71 t(9)	4.68 t(9)	4.49 d(5.5)
4′	4.94 s, 5.07 s	5.26 s, 5.28 s	1.22 s	1.22 s	1.12 s
5′	1.76 s	4.27 br s	1.35 s	1.35 s	0.63 s
OMe	3.72 s, 3.82 s	3.77 s, 3.81 s	3.76 s, 3.80 s	3.73 s, 3.82 s	3.74 s, 3.83 s

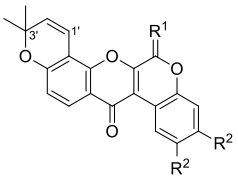
Table 4-3-54: ^{1}H NMR spectroscopic data of rotenoids **4-3-166** and **4-3-167**.

H	4-3-166	4-3-167	H	4-3-166	4-3-167
1	6.93 s	7.70 s	1′	3.49 dd(15.8, 9.9)	3.37 m
				3.15 dd(15.8, 7.9)	
4	6.63 s	6.41 s	2′	5.39 dd(9.9, 7.9)	5.17 t(7.2)
6	5.08 s	ax 4.45 dd(11.8, 9.8)	4′	5.12 s	1.68 s
		eq 4.37 dd(9.8, 5.4)		4.97 s	
6a		4.60 dd(11.8, 5.4)	5′	1.79 s	1.77 s
10	6.88 d(8.6)	6.71 d(8.8)	OMe	3.84 s, 3.84 s	3.91 s
11	8.12 d(8.6)	7.89 d(8.8)	OCH_2O		5.94 s
12a		2.66 br s(OH)			

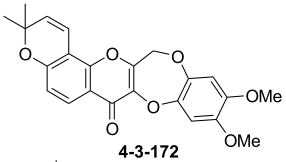
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Table 4-3-55: Cos, MFs, and TSs of rotenoids **4-3-168**~**4-3-176**.

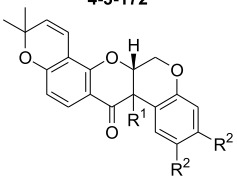
No.	Compounds	MFs	Test solvents	References
4-3-168	6a,12a-dehydromillettone	$C_{22}H_{16}O_6$	$CDCl_3$	[258]
4-3-169	6-methoxy-6a,12a-dehydrodeguelin	$C_{24}H_{22}O_7$	$CDCl_3$	[253]
4-3-170	6-hydroxy-6a,12a-dehydrodeguelin	$C_{23}H_{20}O_7$	$CDCl_3$	[253]
4-3-171	6-oxo-6a,12a-dehydrodeguelin	$C_{23}H_{18}O_7$	$CDCl_3$	[253]
4-3-172	13-homo-13-oxa-6a,12a-dehydrodeguelin	$C_{23}H_{20}O_7$	$CDCl_3$	[257]
4-3-173	(–)-deguelin	$C_{23}H_{22}O_6$	$CDCl_3$	[259]
4-3-174	(+)-12a-epimillettosin	$C_{22}H_{18}O_7$	$CDCl_3$	[250]
4-3-175	derrisin	$C_{23}H_{24}O_8$	CD_3COCD_3	[260]
4-3-176	4′,5′-dihydro-11,5′-dihydroxy-4′-methoxytephrosin	$C_{24}H_{26}O_{10}$	CD_3COCD_3	[261]
			C_5D_5N	[261]



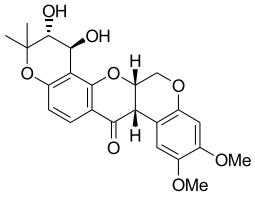
	R^1	R^2
4-3-168	H_2	OCH_2O
4-3-169	OMe, H	OMe
4-3-170	OH, H	OMe
4-3-171	O	OMe



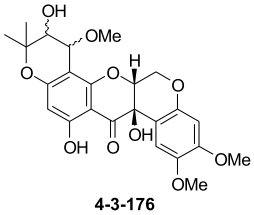
4-3-172



	R^1	R^2
4-3-173	β-H	OMe
4-3-174	α-OH	OCH_2O



4-3-175



4-3-176

Table 4-3-56: ^{1}H NMR spectroscopic data of rotenoids **4-3-168**~**4-3-172**.

H	4-3-168	4-3-169	4-3-170	4-3-171	4-3-172
1	8.33 s	8.64 s	8.47 s	9.02 s	6.94 s
2		3.99 s(OMe)	3.90 s(OMe)	4.05 s(OMe)	3.85 s(OMe)
3		3.94 s(OMe)	3.84 s(OMe)	3.98 s(OMe)	3.85 s(OMe)
4	6.54 s	6.71 s	6.61 s	6.92 s	6.64 s

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Table 4-3-56 (continued)

H	4-3-168	4-3-169	4-3-170	4-3-171	4-3-172
6	4.99 s	5.85 s 3.64 s(OMe)	6.23 d(9.0) 4.51 s(OH)		5.11 s
10	6.87 d(8.8)	6.90 d(9.0)	6.84 d(8.4)	6.95 d(8.4)	6.84 d(9.8)
11	8.05 d(8.8)	8.08 d(9.0)	7.93 d(8.4)	8.08 d(8.4)	8.04 d(9.8)
1′	6.78 d(10.0)	6.85 d(10.0)	6.84 d(10.2)	7.05 d(10.2)	6.72 d(10.1)
2′	5.75 d(10.0)	5.75 d(10.0)	5.74 d(10.2)	5.79 d(10.2)	5.71 d(10.1)
4′, 5′	1.51 s, 1.51 s	1.55 s, 1.55 s	1.52 s, 1.52 s	1.52 s, 1.52 s	1.48 s, 1.48 s
OCH_2O	5.96 s				

Table 4-3-57: ^{1}H NMR spectroscopic data of rotenoids **4-3-173**~**4-3-176**.

H	4-3-173	4-3-174	4-3-175	4-3-176(CD_3COCD_3)	4-3-176(C_5D_5N)
1	6.75 s	7.67 s	6.77 s	6.83 s	7.20 s
2	3.74 s(OMe)		3.65 s(OMe)	3.65 s(OMe)	3.63 s(OMe)
3	3.72 s(OMe)		3.75 s(OMe)	3.78 s(OMe)	3.75 s(OMe)
4	6.38 s	6.37 s	6.45 s	6.51 s	6.74 s
6	*α* 4.57 dd(12.0, 2.8)	*α* 4.44 dd(11.2, 4.6)	4.27 d(11.9)	*α* 4.49 d(11.8)	*α* 4.81 dd(12.0, 2.4)
	β 4.12 dd(12.0, 1.1)	*β* 4.36 dd(9.9, 4.6)	4.75 m	*β* 4.69 dd(2.5, ov)	*β* 4.91 d(12.0)
6a	4.87 ddd(2.8, 1.1, 3.6)	4.59 dd(9.9, 4.6)	5.20 m	4.71 d(ov)	5.02 d(2.4)
10	6.39 d(8.7)	6.54 d(8.4)	6.47 d(8.8)	5.81 s	6.28 s
11	7.68 d(8.7)	7.74 d(8.4)	7.73 d(8.8)	11.83 br s(OH)	12.64 br s(OH)
12a	3.78 d(3.6)		3.91 d(4.4)	5.76 br s(OH)	
1′	6.59 d(10.0)	6.62 d(10.0)	4.75 d(13.5)	4.43 d(4.6) 3.51 s(OMe)	4.67 d(4.5) 3.42 s(OMe)
2′	5.48 d(10.0)	5.62 d(10.0)	3.73 d(13.5)	3.67 dd(7.8, 4.6) 3.98 br d(7.8, OH)	4.00 dd(8.6, 4.5) 6.48 br d(8.8, OH)
4′, 5′	1.39 s, 1.31 s	1.45 s, 1.48 s	1.42 s, 1.33 s	1.38 s, 1.27 s	1.60 s, 1.54 s
OCH_2O		5.91 s			

4.3.5 Pterocarpane-type isoflavones

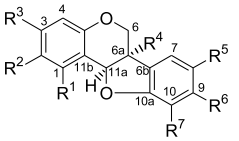
Table 4-3-58: Cos, MFs, and TSs of pterocarpane-type isoflavones **4-3-177**~**4-3-185**.

No.	Compounds	MFs	Test solvents	References
4-3-177	erycibenin C	$C_{18}H_{16}O_6$	CD_3COCD_3	[262]
4-3-178	erythbidin D	$C_{17}H_{16}O_5$	CD_3COCD_3	[263]
4-3-179	(–)-2-hydroxymaackiain	$C_{16}H_{12}O_6$	DMSO-d_6	[264]
4-3-180	erysubin C	$C_{17}H_{14}O_5$	CD_3COCD_3	[265]
4-3-181	brandisianin F	$C_{18}H_{18}O_7$	$CDCl_3$	[266]
4-3-182	uncinacarpan	$C_{17}H_{16}O_5$	CD_3OD	[217]

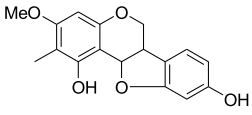
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Table 4-3-58 (continued)

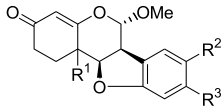
No.	Compounds	MFs	Test solvents	References
4-3-183	kushecarpin A	$C_{17}H_{18}O_6$	$CDCl_3$	[267]
4-3-184	kushecarpin B	$C_{18}H_{18}O_7$	$CDCl_3$	[267]
4-3-185	kushecarpin C	$C_{17}H_{16}O_7$	$CDCl_3$	[267]



	R^1	R^2	R^3	R^4	R^5	R^6	R^7
4-3-177	H	H	OMe	OMe	OCH_2O		H
4-3-178	OMe	H	OMe	H	H	OH	H
4-3-179	H	OH	OH	H	OCH_2O		H
4-3-180	H	CHO	OMe	H	H	OH	H
4-3-181	H	OH	OMe	H	OMe	OMe	OH



4-3-182



	R^1	R^2	R^3
4-3-183	α-OH	H	OMe
4-3-184	β-OMe	OCH_2O	
4-3-185	α-OH	OCH_2O	

Table 4-3-59: ^{1}H NMR spectroscopic data of pterocarpane-type isoflavones **4-3-177**~**4-3-181**.

H	4-3-177	4-3-178	4-3-179	4-3-180	4-3-181
1	7.37 d(8.6)	3.87 s(OMe)	6.89 s	7.93 s	7.06 s
2	6.63 dd(8.6, 2.4)	6.22 d(2.2)		10.30 s(CHO)	
3	3.75 s(OMe)	3.78 s(OMe)		3.96 s(OMe)	3.86 s(OMe)
4	6.36 d(2.4)	6.07 d(2.2)	6.24 s	6.62 s	6.46 s
6	4.04 d(11.3)	α 3.54 t(11.0)	α 4.15 dd(10.6, 5.1)	3.77 t-like(10.7)	3.65 t(11.0)
	4.40 d(11.3)	β 4.21 dd(11.0, 4.4)	β 3.46~3.61 m	4.41 dd(10.7, 4.8)	4.22 dd(11.0, 4.5)
6a	3.15 s(OMe)	3.41 m	3.46~3.61 m	3.68 m	3.49 m
7	6.94 s	7.13 d(8.1)	6.73 s	7.17 d(7.8)	6.57 s
8		6.36 dd(8.1, 2.2)		6.40 dd(7.8, 2.2)	3.99 s(OMe)
9		8.34 br s(OH)		8.38 br s(OH)	3.90 s(OMe)
10	6.37 s	6.29 d(2.2)	6.44 s	6.31 d(2.2)	
11a	5.58 s	5.55 d(6.6)	5.42 d(6.2)	5.59 d(7.3)	5.43 d(7.0)
OCH_2O	5.95 br d(1.0)		5.91 m		
	5.99 br d(1.0)				
OH			8.57 s, 9.08 s		

Table 4-3-60: ^{1}H NMR spectroscopic data of pterocarpane-type isoflavones **4-3-182**~**4-3-185**.

H	4-3-182	4-3-183	4-3-184	4-3-185
1		ax 2.56 ddt(14.0, 4.8, 2.8) eq 2.11 ddd(14.0, 5.2, 2.4)	ax 2.25 ddd(13.6,12.4, 5.6) eq 2.36 ddd(13.6, 5.6, 1.6)	ax 2.56 ddt(2.6, 4.8, 13.6) eq 2.09 ddd(14.0, 5.2, 2.4)

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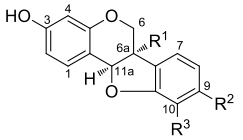
Table 4-3-60 (continued)

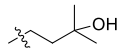
H	4-3-182	4-3-183	4-3-184	4-3-185
2	2.07 s(Me)	ax 2.91 ddd(16.8, 14.0, 4.8)	ax 2.74 dddd(18.4, 12.4, 5.6, 1.6)	ax 2.90 ddd(16.8, 13.6, 4.8)
		eq 2.44 ddd(16.8, 14.4, 2.0)	eq 2.53 ddd(18.4, 5.6, 1.6)	eq 2.43 ddd(16.8, 4.4, 2.0)
3	3.80 s(OMe)			
4	6.13 s	5.58 s	5.49 d(1.5)	5.64 s
6	3.50 dd(11.0, 10.4)	5.00 s	5.25 s	4.91 s
	4.22 dd(10.4, 4.4)	3.57 s(OMe)	3.74 s(OMe)	3.56 s(OMe)
6a	3.43 ddd(11.0, 6.6, 4.4)	3.87 d(8.8)	4.08 d(8.5)	3.82 d(9.6)
7	7.12 d(8.2)	7.12 d(8.0)	6.67 s	6.68 s
8	6.36 dd(8.2, 2.2)	6.49 dd(8.0, 2.4)		
9		3.76 s(OMe)		
10	6.33 d(2.2)	6.36 d(2.4)	6.27 s	6.35 s
11a	5.65 d(6.6)	4.87 d(8.8)	5.37 d(8.0)	4.86 d(9.6)
11b		4.93 s(OH)	3.40 s(OMe)	
OCH_2O			5.86 s	5.91 br d(1.2)
			5.88 s	5.93 br d(1.2)

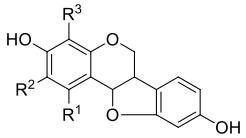
Table 4-3-61: Cos, MFs, and TSs of pterocarpane-type isoflavones **4-3-186**~**4-3-201**.

No.	Compounds	MFs	Test solvents	References
4-3-186	pbaseollidin	$C_{20}H_{20}O_4$	$CDCl_3$	[268]
4-3-187	cristacarpin	$C_{21}H_{22}O_5$	$CDCl_3$	[268]
4-3-188	3-hydroxy-10-(3-hydroxy-3-methylbutyl)-9-methoxy-pterocarpan	$C_{21}H_{24}O_5$	$CDCl_3$	[269]
4-3-189	3,9-dihydroxy-4-(3,3-dimethylallyl)[6a*R*,11a*R*]-ptero-carpan	$C_{20}H_{20}O_4$	C_6D_6	[210]
4-3-190	edudiol	$C_{21}H_{22}O_5$	$CDCl_3$	[217]
4-3-191	3-*O*-methylcalopocarpin	$C_{21}H_{24}O_4$	CD_3OD	[270]
4-3-192	eryvarin J	$C_{25}H_{28}O_4$	$CDCl_3$	[271]
4-3-193	eryvarin K	$C_{21}H_{22}O_5$	$CDCl_3$	[271]
4-3-194	bitucarpin A	$C_{22}H_{24}O_4$	$CDCl_3$	[272]
4-3-195	bitucarpin B	$C_{20}H_{20}O_5$	CD_3OD	[272]
4-3-196	1-methoxyerythrabyssin II	$C_{26}H_{30}O_5$	$CDCl_3$	[273]
4-3-197	eryzerin E	$C_{26}H_{30}O_5$	$CDCl_3$	[225]
4-3-198	eryvarin D	$C_{21}H_{20}O_4$	$CDCl_3$	[244]
4-3-199	eryvarin E	$C_{26}H_{28}O_4$	$CDCl_3$	[244]
4-3-200	erypoegin E	$C_{20}H_{18}O_4$	$CDCl_3$	[222]
4-3-201	glycyrrhizol A	$C_{26}H_{28}O_5$	$CDCl_3$	[274]

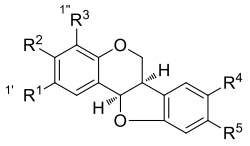
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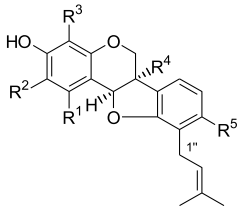
	R^1	R^2	R^3
4-3-186	H	OH	
4-3-187	OH	OMe	Prenyl
4-3-188	H	OMe	



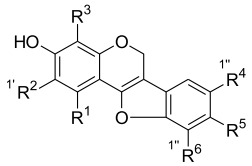
	R^1	R^2	R^3
4-3-189	H	H	Prenyl
4-3-190	OMe	Prenyl	H



	R^1	R^2	R^3	R^4	R^5
4-3-191	Prenyl	OMe	H	H	OH
4-3-192	Prenyl	OH	Prenyl	H	OH
4-3-193	Prenyl	OH	H	OMe	OH
4-3-194	H	OMe	Prenyl	H	OMe
4-3-195	H	OH	Prenyl	OH	OH



	R^1	R^2	R^3	R^4	R^5
4-3-196	OMe	Prenyl	H	H	OH
4-3-197	H	H	Prenyl	OH	OMe



	R^1	R^2	R^3	R^4	R^5	R^6
4-3-198	H	H	H	H	OMe	Prenyl
4-3-199	H	Prenyl	H	H	OMe	Prenyl
4-3-200	H	H	Prenyl	H	OH	H
4-3-201	OMe	Prenyl	H	Prenyl	OH	H

Table 4-3-62: ^{1}H NMR spectroscopic data of pterocarpane-type isoflavones **4-3-186**~**4-3-189**.

H	4-3-186	4-3-187	4-3-188	4-3-189
1	7.39 d(8.4)	7.39 d(8.4)	7.37 d(8.0)	7.29 d(8.4)
2	6.57 dd(8.4, 2.4)	6.55 dd(8.4, 2.5)	6.50 dd(8.5, 2.5)	6.31 d(8.4)
4	6.44 d(2.4)	6.49 d(2.5)	6.36 d(2.5)	
6	*α* 4.24 dd(11.0, 4.9)	*α* 4.23 d(11.7)	4.20 dd(11.0,5.5)	3.45 t-like(11.2)
	β 3.64 t(11.0)	*β* 4.00 d(11.7)	3.60 t(11.0)	3.92 dd(11.2, 5.2)
6a	3.49 m		3.50 ddd(11.0, 7.0, 5.5)	3.02 m
7	6.39 d(7.8)	7.14 d(8.2)	7.00 d(8.0)	6.68 d(8.0)
8	6.38 d(7.8)	6.38 d(8.2)	6.40 d(8.0)	6.21 dd(8.0, 2.4)
9		3.80 s(OMe)	3.79 s(OMe)	
10				6.24 d(2.4)
11a	5.46 d(6.8)	5.26 s	5.44 d(7.0)	5.25 d(6.8)
1′	3.37 d(6.4)	3.25 d(7.3)	2.67 t(8.0)	3.58 d(8.0)
2′	5.28 t(6.5)	5.19 m	1.70 m	5.41 t(8.0)
4′, 5′	1.79 s, 1.72 s	1.73 s, 1.64 s	1.22 s, 1.21 s	1.61 s, 1.71 s
OH				4.81 (3-OH)
				4.16 (9-OH)

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Table 4-3-63: ^{1}H NMR spectroscopic data of pterocarpane-type isoflavones **4-3-190**, **4-3-191**, and **4-3-193**~**4-3-195**.

H	4-3-190	4-3-191	4-3-193	4-3-194	4-3-195
1	3.91 s(OMe)	7.14 s	7.24 s	7.23 d(8.8)	7.12 d(8.8)
2				6.51 d(8.8)	6.49 d(8.3)
3		3.77 s(OMe)		3.70 s(OMe)	
4	6.26 s	6.42 s	6.41 s		
6	3.59 t(11.0, 11.4)	3.47 t(9.5)	3.61 t-like(11.0)	α 4.16 dd(10.8, 4.4)	α 4.27 m
	4.16 dd(11.0, 5.0)	4.18 dd(9.5, 3.7)	4.22 dd(11.0, 5.1)	β 3.49 d(11.2)	β 3.44 m
6a	3.38 ddd(5.0, 6.6, 11.4)	3.44 ddd(9.7, 6.5, 3.7)	3.48 m	3.42 m	3.44 m
7	7.07 d(8.0)	7.05 d(8.1)	6.79 s	6.99 d(8.8)	6.99 s
8	6.35 dd(8.1, 2.1)	6.31 dd(8.1, 2.2)	3.87 s(OMe),	6.31 dd(8.8, 2.4)	
9				3.62 s(OMe)	
10	6.38 d(2.0)	6.24 d(2.2)	6.52 s	6.33 d(2.4)	6.26 s
11a	5.63 d(6.6)	5.38 d(6.5)	5.43 d(6.6)	5.39 d(6.4)	5.41 d(5.8)
1′	3.39 d(6.3)	3.23 d(7.5)	3.33 d(7.3)	3.25 d(6.8)	3.21 d(6.8)
2′	5.24 br t(6.8)	5.26 tq(7.5, 1.4)	5.32 t(7.3)	5.07 t(6.8)	5.17 m
4′, 5′	1.83 s, 1.76 s	1.74 s, 1.71 s	1.78 s, 1.79 s	1.65 br s, 1.54 br s	1.78 s, 1.75 s
OH			5.27 br s, 5.68 s		

Table 4-3-64: ^{1}H NMR spectroscopic data of pterocarpane-type isoflavones **4-3-192**, **4-3-196**, **4-3-197**, **4-3-199**, and **4-3-201**.

H	4-3-192	4-3-196	4-3-197	4-3-199	4-3-201
1	7.13 s	3.95 s(OMe)	7.28 d(8.8)	7.23 s	3.87 s(OMe)
2			6.58 d(8.8)		
3		5.29 s(OH)			
4		6.25 s		6.42 s	6.31 s
6	3.56 t-like(11.0)	3.57 t-like(11.0)	3.96 d(10.5)	5.51 s	5.45 s
	4.25 dd(11.0, 5.1)	4.14 dd(11.0, 4.8)	4.24 d(10.5)		
6a	3.49 m	3.38 m(ov)			
7	7.07 d(8.1)	6.94 d(8.0)	7.14 d(8.1)	7.09 d(8.3)	7.08 s
8	6.35 dd(8.1, 2.2)	6.35 d(8.0)	6.49 d(8.1)	6.85 d(8.3)	
9		5.47 s(OH)	3.81 s(OMe)	3.89 s(OMe)	
10	6.36 d(2.2)				7.10 s
11a	5.50 d(7.3)	5.59 d(6.4)	5.25 s		
1′	3.32 d(7.3)	3.35 m(ov)	3.40 d(7.3)	3.34 d(7.3)	3.41 d(4.3)
2′	5.32 t(7.3)	5.22 t(7.2)	5.23 t(7.3)	5.34 t(7.3)	5.27 m
4′	1.77 s	1.82 s	1.79 s	1.80 s	1.84 s
5′	1.77 s	1.74 s	1.73 s	1.80 s	1.76 d(1.0)
1″	3.38 d(7.3)	3.32 m(ov)	3.26 d(7.3)	3.63 d(7.3)	3.43 d(4.0)
2″	5.20 t(7.3)	5.29 t(7.2)	5.20 t(7.3)	5.35 t(7.3)	5.34 m
4″	1.79 s	1.75 s	1.74 s	1.89 s	1.80 s
5″	1.71 s	1.71 s	1.64 s	1.69 s	1.79 d(1.0)
OH	4.89 br s, 5.57 s		5.41 s		5.48 s, 5.44 s

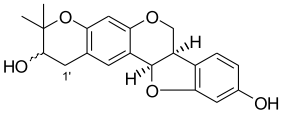
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Table 4-3-65: ^{1}H NMR spectroscopic data of pterocarpane-type isoflavones **4-3-198** and **4-3-200**.

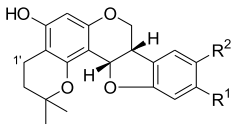
H	4-3-198	4-3-200	H	4-3-198	4-3-200
1	7.37 d(8.1)	7.26 d(8.8)	9	3.88 s(OMe)	
2	6.45 dd(8.1, 2.2)	6.47 d(8.8)	10		7.01 d(1.5)
4	6.43 d(2.2)		1′	3.62 d(7.3)	3.43 d(7.3)
6	5.54 s	5.56 s	2′	5.35 t(7.3)	5.27 t(7.3)
7	7.09 d(8.4)	7.19 d(8.1)	4′, 5′	1.69 s, 1.88 s	1.83 s, 1.75 s
8	6.85 d(8.4)	6.77 dd(8.1, 1.5)	OH	5.15 br s	

Table 4-3-66: Cos, MFs, and TSs of pterocarpane-type isoflavones **4-3-202**~**4-3-215**.

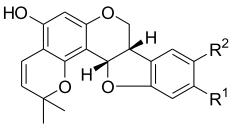
No.	Compounds	MFs	Test solvents	References
4-3-202	rautandiol A	$C_{20}H_{20}O_5$	CD_3OD	[275]
4-3-203	bolucarpan A	$C_{21}H_{20}O_6$	CD_3COCD_3	[226]
4-3-204	bolucarpan B	$C_{21}H_{18}O_6$	CD_3COCD_3	[226]
4-3-205	bolucarpan C	$C_{21}H_{22}O_5$	CD_3COCD_3	[226]
4-3-206	bolucarpan D	$C_{21}H_{20}O_5$	CD_3COCD_3	[226]
4-3-207	eryvarin A	$C_{21}H_{22}O_6$	CD_3COCD_3	[276]
4-3-208	erysubin D	$C_{25}H_{28}O_5$	$CDCl_3$	[265]
4-3-209	erysubin E	$C_{25}H_{26}O_5$	$CDCl_3$	[265]
4-3-210	3-hydroxy-4-(3,3-dimethylallyl)-4″,5″-dehydro-pyrano[8,9:2″,3″][6a*R*,11a*R*]-pterocarpan	$C_{25}H_{26}O_4$	C_6D_6	[210]
4-3-211	glycyrrhizol B	$C_{21}H_{18}O_5$	$CDCl_3$	[274]
4-3-212	rautandiol B	$C_{20}H_{20}O_5$	CD_3OD	[275]
4-3-213	pervilline	$C_{21}H_{20}O_5$	$CDCl_3$	[277]
4-3-214	pervillinine	$C_{21}H_{20}O_5$	$CDCl_3$	[277]
4-3-215	emoroidocarpan	$C_{21}H_{18}O_5$	$CDCl_3$	[277]



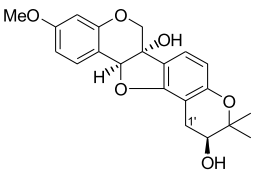
4-3-202



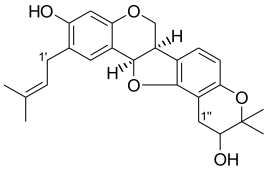
	R^1	R^2
4-3-203	OCH_2O	
4-3-205	OMe	H



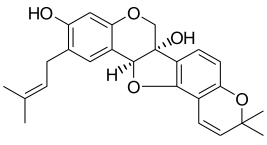
	R^1	R^2
4-3-204	OCH_2O	
4-3-206	OMe	H



4-3-207



4-3-208



4-3-209

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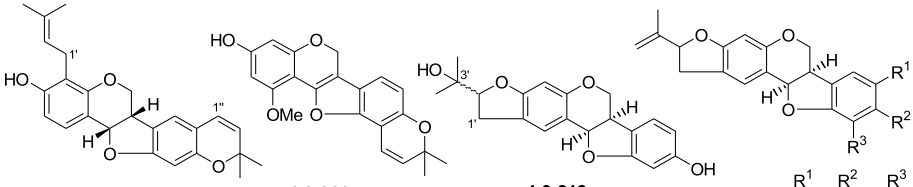


Table 4-3-67: ^{1}H NMR spectroscopic data of pterocarpane-type isoflavones **4-3-202**~**4-3-205**.

H	4-3-202	4-3-203	4-3-204	4-3-205
1	7.17 s			
3		7.45 s(OH)	7.55 s(OH)	7.59 s(OH)
4	6.26 s	6.12 s	6.17 s	6.27 s
6	ax 3.51 dd(10.5, 9.6)	4.17 dd(4.9, 10.8)	4.10 dd(4.8, 10.7)	4.19 dd(4.0, 10.2)
	eq 4.18 dd(9.3, 3.1)	3.54 dd(10.8, 11.3)	3.32 dd(10.7, 11.4)	3.54 dd(10.2, 11.5)
6a	3.46~3.50 m	3.47 ddd(4.9, 6.6, 11.3)	3.47 ddd(4.8, 5.7, 11.4)	3.38 ddd(4.0, 6.2, 11.5)
7	7.06 d(8.1)	6.75 s	6.77 s	7.16 d(8.8)
8	6.31 dd(8.1, 2.4)			6.46 dd(2.2, 8.8)
9				3.80 s(OMe)
10	6.23 d(2.4)	6.28 s	6.30 s	6.41 d(2.2)
11a	5.44 d(6.6)	5.47 d(6.6)	5.46 d(5.7)	5.50 d(6.2)
1′	3.00 dd(16.5, 5.3)	2.80 m	6.62 d(10.0)	2.80 m
	2.69 dd(16.5, 7.8)	3.09 s		3.09 m
2′	3.74 dd(7.8, 5.3)	1.92 m	5.27 d(10.0)	1.92 m
4′, 5′	1.33 s, 1.24 s	1.39 s, 1.39 s	1.43 s, 1.43 s	1.33 s, 1.33 s
OCH_2O		5.92 d(10.0)	5.79 d(10.0)	

Table 4-3-68: ^{1}H NMR spectroscopic data of pterocarpane-type isoflavones **4-3-206**~**4-3-208** and **4-3-211**.

H	4-3-206	4-3-207	4-3-208	4-3-211
1		7.33 d(8.8)	7.25 s	3.93 s(OMe)
2		6.55 dd(8.8, 2.2)		6.11 d(2.0)
3	7.56 s(OH)	3.81 s(OMe)		
4	6.17 s	6.31 d(2.2)	6.41 s	6.12 d(2.0)
6	4.09 dd(4.4, 10.2)	4.06 d(11.7)	3.60 t-like(11.0)	5.44 s
	3.41 dd(10.2, 11.4)	4.14 d(11.7)	4.21 dd(11.0, 5.1)	
6a	3.38 ddd(4.4, 6.4, 11.4)		3.50 m	

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Table 4-3-68 (continued)

H	4-3-206	4-3-207	4-3-208	4-3-211
7	7.11 d(8.3)	7.21 d(8.1)	6.99 d(8.1)	7.05 d(8.5)
8	6.33 dd(2.3, 8.3)	6.57 d(8.1)	6.40 d(8.1)	6.74 d(8.5)
9	3.63 s(OMe)			
10	6.28 d(2.3)			
11a	5.48 d(6.4)	5.30 s	5.47 d(6.6)	
1′	6.65 d(10.0)	2.66 dd(13.2, 9.5) 2.82 dd(13.2, 3.7)	3.35 d(7.3)	6.89 d(10.0)
2′	5.73 d(10.0)	3.51 dd(9.5, 3.7)	5.34 t(7.3)	5.73 d(10.0)
4′, 5′	1.29 s, 1.29 s	1.12 s, 1.17 s	1.79 s, 1.80 s	1.47 s, 1.47 s
1″			2.68 dd(17.6, 5.9) 2.98 dd(17.6, 5.1)	
2″			3.80 dd(5.9, 5.1)	
4″, 5″			1.34 s, 1.33 s	
OH		4.97 br s, 8.51 br s	2.64 br s, 5.27 s	

Table 4-3-69: ^{1}H NMR spectroscopic data of pterocarpane-type isoflavones **4-3-209** and **4-3-210**.

H	4-3-209	4-3-210	H	4-3-209	4-3-210
1	7.24 s	7.35 d(8.4)	11a	5.26 s	5.31 d(6.8)
2		6.37 d(8.4)	1′	3.34 d(6.6)	3.67 d(8.0)
4	6.41 s		2′	5.32 t(6.6)	5.52 t(8.0)
6	3.94 d(11.7) 4.18 d(11.7)	3.52 t-like(10.8) 4.02 dd(10.8, 5.2)	4′, 5′	1.79 s, 1.79 s	1.69 s, 1.80 s
6a		3.09 m	1″	6.49 d(9.5)	6.24 d(9.6)
7	7.07 d(8.1)	6.53 s	2″	5.58 d(9.5)	5.32 d(9.6)
8	6.42 d(8.1)		4″, 5″	1.40 s, 1.43 s	1.37 s, 1.41 s
10		6.79 s	OH	2.37 br s, 5.29 br s	4.85

Table 4-3-70: ^{1}H NMR spectroscopic data of pterocarpane-type isoflavones **4-3-212**~**4-3-215**.

H	4-3-212	4-3-213	4-3-214	4-3-215
1	7.24 s	7.33 s	7.33 s	7.20 s
4	6.26 s	6.35 s	6.35 s	6.38 s
6	ax 3.50 dd(10.0, 10.0)	3.60 dd(10.8, 10.6)	3.60 t(11.0)	3.55 t(11.4)
	eq 4.19 dd(10.0, 3.6)	4.19 dd(10.8, 4.9)	4.19 dd(11.0, 5.0)	4.16 dd(11.4, 5.1)
6a	3.48~3.44 m	3.50 m(10.6, 6.6, 4.9)	3.50 m(11.0, 6.7, 5.0)	3.40 m(11.4, 6.8, 5.1)
7	7.06 d(8.1)	6.72 d(8.0)	6.79 s	6.67 s
8	6.31 dd(8.1, 2.2)	6.42 d(8.0)		
9		3.84 s(OMe)	3.84 s(OMe)	

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Table 4-3-70 (continued)

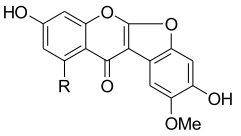
H	4-3-212	4-3-213	4-3-214	4-3-215
10	6.23 d(2.2)		6.41 s	6.33 s
11a	5.43 d(6.6)	5.52 d(6.6)	5.52 d(6.7)	5.40 d(6.8)
1′	3.13 d(8.9)	2.97 dd(15.8, 7.6)	2.97 dd(15.7, 7.7)	2.94 dd(15.6, 8.0)
		3.26 dd(15.8, 9.8)	3.26 dd(15.7, 9.8)	3.23 dd(15.6, 9.8)
2′	4.60 t(8.9)	5.16 dd(9.8, 7.6)	5.16 dd(9.8, 7.7)	5.12 dd(9.8, 8.0)
4′	1.24 s	1.76 s	1.76 s	1.70 s
5′	1.21 s	5.05 br s, 4.88 br s	5.05 br s, 4.88 br s	5.01 d(1.1), 4.85 d(1.1)
OCH_2O				5.83 d(2.5), 5.89 d(2.5)

4.3.6 Coumaronochromone-type isoflavones

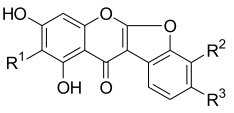
Table 4-3-71: Cos, MFs, and TSs of coumaronochromone-type isoflavones **4-3-216**~**4-3-241**.

No.	Compounds	MFs	Test solvents	References
4-3-216	desmoxyphyllin A	$C_{16}H_{10}O_7$	DMSO-d_6	[278]
4-3-217	desmoxyphyllin B	$C_{16}H_{10}O_6$	DMSO-d_6	[278]
4-3-218	ayamenin A	$C_{16}H_{10}O_6$	CD_3COCD_3	[279]
4-3-219	ayamenin B	$C_{15}H_8O_5$	CD_3COCD_3	[279]
4-3-220	5,7,3′-trihydroxy-6-methoxycoumaronochromone	$C_{16}H_{10}O_7$	CD_3COCD_3	[279]
4-3-221	ayamenin C	$C_{15}H_8O_6$	CD_3COCD_3	[279]
4-3-222	ayamenin D	$C_{16}H_{10}O_7$	CD_3COCD_3	[279]
4-3-223	lupinalbin A	$C_{15}H_8O_6$	CD_3COCD_3	[279]
4-3-224	4′,5′-dimethoxycoumarono-2″-isopropenyl-2″,3″-dihydrofurano(4″,5″:8,7)chromone	$C_{22}H_{18}O_6$	$CDCl_3$	[280]
4-3-225	euchretin B	$C_{25}H_{24}O_7$	CD_3COCD_3	[281]
4-3-226	euchretin F	$C_{25}H_{24}O_7$	CD_3COCD_3	[282]
4-3-227	flemingichromone	$C_{26}H_{26}O_7$	DMSO-d_6	[283]
4-3-228	euchretin C	$C_{30}H_{32}O_7$	CD_3COCD_3	[281]
4-3-229	euchretin M	$C_{30}H_{34}O_8$	$CDCl_3$	[284]
4-3-230	euchretin N	$C_{31}H_{34}O_7$	CD_3COCD_3	[284]
4-3-231	–	$C_{22}H_{18}O_6$	$CDCl_3$	[280]
4-3-232	triquetrumone A	$C_{26}H_{24}O_7$	DMSO-d_6	[285]
4-3-233	euchretin L	$C_{25}H_{24}O_7$	CD_3COCD_3	[284]
4-3-234	formosanatin D	$C_{25}H_{22}O_7$	$CDCl_3$	[286]
4-3-235	triquetrumone B	$C_{26}H_{22}O_7$	DMSO-d_6	[285]
4-3-236	triquetrumone C	$C_{26}H_{24}O_9$	C_5D_5N	[285]
4-3-237	formosanatin A	$C_{30}H_{32}O_8$	$CDCl_3$	[286]
4-3-238	formosanatin B	$C_{30}H_{32}O_9$	$CDCl_3$	[286]
4-3-239	euchretin J	$C_{30}H_{30}O_7$	CD_3COCD_3	[284]
4-3-240	euchretin K	$C_{30}H_{32}O_7$	CD_3COCD_3	[284]
4-3-241	formosanatin C	$C_{30}H_{30}O_7$	$CDCl_3$	[286]

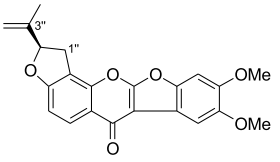
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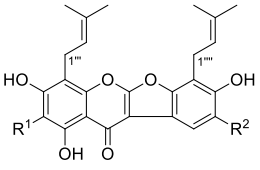
4-3-216 R = OH
4-3-217 R = H



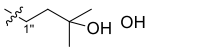
	R^1	R^2	R^3
4-3-218	OMe	H	H
4-3-219	H	H	H
4-3-220	OMe	OH	H
4-3-221	H	OH	H
4-3-222	OMe	H	OH
4-3-223	H	H	OH



4-3-224

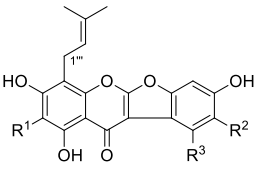


	R^1	R^2
4-3-225	H	OH
4-3-228	Prenyl	OH

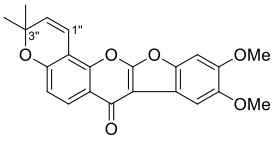


4-3-229

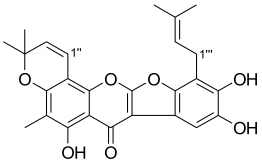
4-3-230 Prenyl OMe



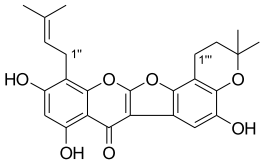
	R^1	R^2	R^3
4-3-226	Prenyl	OH	H
4-3-227	Me	Prenyl	OH



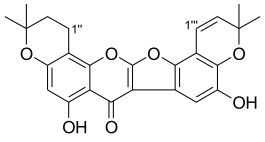
4-3-231



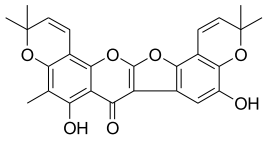
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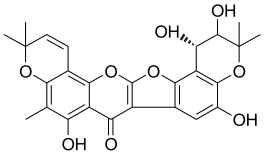
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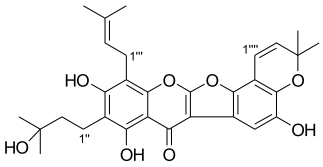
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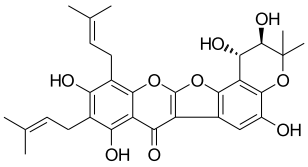
4-3-235



4-3-236

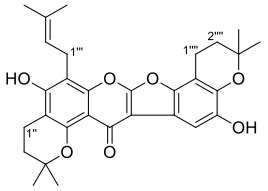


4-3-237

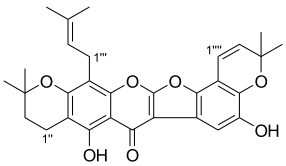


4-3-238

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4-3-239 C1''''-alkene compound
4-3-240 C1''''-alkane compound



4-3-241

Table 4-3-72: ^{1}H NMR spectroscopic data of coumaronochromone-type isoflavones **4-3-216**~**4-3-219**.

H	4-3-216	4-3-217	4-3-218	4-3-219
5	12.91 s(OH)	8.06 d(8.8)	13.13 (OH)	12.92 (OH)
6	6.30 d(2.2)	7.01 dd(8.8, 2.2)	3.91 (OMe)	6.39 d(2.2)
8	6.56 d(2.2)	7.05 d(2.2)	6.73	6.63 d(2.2)
3′	7.18 s	7.17 s	7.70 ddd-like(6.5, 2.3)	7.70 ddd-like
4′			7.50 m	7.50 m
5′	3.88 s(OMe)	3.88 s(OMe)	7.50 m	7.50 m
6′	7.37 s	7.44 s	8.05 ddd-like(5.9, 2.6)	8.03 ddd-like
OH	9.53 br s, 10.94 br s	9.47 br s, 10.89 br s		

Table 4-3-73: ^{1}H NMR spectroscopic data of coumaronochromone-type isoflavones **4-3-220**~**4-3-223**.

H	4-3-220	4-3-221	4-3-222	4-3-223
5	13.17 (OH)	12.95 (OH)	13.21 (OH)	12.99 (OH)
6	3.91 (OMe)	6.39 d(2.2)	3.90 (OMe)	6.38 d(2.1)
8	6.72 s	6.63 d(2.1)	6.70 s	6.60 d(2.1)
3′			7.15 d(2.1)	7.14 d(2.1)
4′	7.01 dd(8.3, 0.9)	7.01 dd(8.3, 1.0)		
5′	7.30 t(*ca*. 8.0)	7.30 t(*ca*. 8.0)	7.03 dd(8.4, 2.1)	7.03 dd(8.4, 2.1)
6′	7.52 dd(7.3, 0.8)	7.52 dd(7.7, 1.6)	7.83 d(8.4)	7.82 dd(8.4)

Table 4-3-74: ^{1}H NMR spectroscopic data of coumaronochromone-type isoflavones **4-3-224** and **4-3-227**.

H	4-3-224	4-3-227	H	4-3-224	4-3-227
5	8.24 d(8.6)	13.17 br s(OH)	5″	1.83 br s	1.66 s
6	6.98 d(8.6)	2.09 s(Me)	1‴		3.48 d(7.0)
3′	7.11 s	7.20 s	2‴		5.16 t(7.0)
6′	7.66 s		4‴		1.80 s
1″, 1‴	3.65 dd(15.9, 9.8)	3.49 d	5‴		1.65 s
	3.31 dd(15.9, 7.9)		OMe	4.00 s, 3.96 s	
2″, 2‴	5.45 br t(8.9)	5.28 t(7.0)	OH		8.69 br s, 9.67 br s
4″	5.16 br s	1.84 s			9.77 br s
	5.00 br s				

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Table 4-3-75: ^{1}H NMR spectroscopic data of coumaronochromone-type isoflavones **4-3-225**, **4-3-226**, and **4-3-228**.

H	4-3-225	4-3-226	4-3-228
5	12.95 s(OH)	13.32 s(OH)	13.33 s(OH)
6	6.40 s		
3′		7.16 s	
6′	7.34 s	7.47 d	7.35 s
CH_2	3.52 br d(7.3)	3.46 br d(7.0)	3.45 br d(6.9)
	3.62 br d(7.3)	3.59 br d(7.0)	3.59 m
CH=C	5.26 br t(7.3)	5.23 m	5.22~5.39 m
	5.38 br t(7.3)		
Me	1.68, 1.70, 1.86, 1.89	1.66, 1.66, 1.80, 1.87	1.67, 1.69, 1.70 br s
			1.79, 1.86, 1.89 br s
OH	7.53 s, 8.77 s, 9.69 s	8.42 br s, 8.42 br s	7.56 s, 8.34 s, 8.81 s

Table 4-3-76: ^{1}H NMR spectroscopic data of coumaronochromone-type isoflavones **4-3-229** and **4-3-230**.

H	4-3-229	4-3-230	H	4-3-229	4-3-230
5	13.28 s(OH)	13.26 s(OH)	4″, 5″	1.25 s, 1.28 s	1.86 s, 1.79 s
7	7.65 s(OH)		1‴	3.55 d(7.0)	3.57 d(7.0)
4′	9.69 s(OH)		2‴	5.25 m	5.26 m
5′	8.86 s(OH)	4.00 s	4‴, 5‴	1.86 s, 1.67 s	1.89 s, 1.75 s
6′	7.36 s	7.36 s	1⁗	3.62 d(7.0)	3.62 d(7.0)
1″	2.83 t(7.0)	3.50 d(7.0)	2⁗	5.39 m	5.38 m
2″	1.78 t(7.0)	5.29 m	4⁗, 5⁗	1.86 s, 1.67 s	1.86 s, 1.72 s

Table 4-3-77: ^{1}H NMR spectroscopic data of coumaronochromone-type isoflavones **4-3-231**~**4-3-236**.

H	4-3-231	4-3-232	4-3-233	4-3-234	4-3-235	4-3-236
5	8.15 d(8.7)	13.33 br s(OH)	12.65 s(OH)	12.65 s(OH)	13.24 br s(OH)	
6	6.94 br d(8.7)	2.07 s(Me)	6.43 s	6.34 s	2.03 s(Me)	2.25 s(Me)
3′	7.11 s					
4′		8.65 br s(OH)				
5′		9.66 br s(OH)		5.47 s(OH)	8.96 br s(OH)	
6′	7.65 s	7.19 s	7.27 s	7.47 s	7.23 s	8.10 s
1″	6.93 br d(10.0)	6.73 d(9.9)	3.52 d(7.0)	2.86 t-like(6.8)	6.74 d(9.6)	6.70 d(9.9)
2″	5.80 d(10.0)	5.81 d(9.9)	5.28 m	1.88 t-like(6.8)	5.82 d(9.6)	5.79 d(9.9)
4″,5″	1.52 s, 1.52 s	1.44 s, 1.44 s	1.67 s, 1.88 s	1.38 s, 1.38 s	1.44 s, 1.44 s	1.32 s, 1.32 s
1‴		3.47 d(7.0)	3.01 quint(6.8)	6.73 d(10.0)	6.70 d(9.6)	5.68 d(6.5)
2‴		5.27 t(7.0)	1.86 t-like(6.8)	5.80 d(10.0)	5.96 d(9.6)	4.45 d(6.5)
4‴,5‴		1.77 s, 1.64 s	1.38 s, 1.38 s	1.52 s, 1.52 s	1.46 s, 1.46 s	1.76 s, 1.51 s
OMe	4.00 s, 3.96 s					

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Table 4-3-78: ^{1}H NMR spectroscopic data of coumaronochromone-type isoflavones **4-3-237**~**4-3-241**.

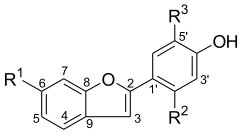
H	4-3-237	4-3-238	4-3-239	4-3-240	4-3-241
5	12.94 s(OH)	13.26 s(OH)			13.13 s(OH)
7			6.18 s(OH)	6.09 s(OH)	
5′			5.50 s(OH)	5.53 s(OH)	
6′	7.29 s	7.40 s	7.62 s	7.58 s	7.46 s
1″	2.69 t(6.8)	3.49 d(7.0)	2.70 quint(6.8)	2.69 quint(6.8)	2.73 t-like(6.8)
2″	1.65 t(6.8)	5.17 t(7.0)	1.87 t-like(6.8)	1.86 t-like(6.8)	1.84 t-like(6.8)
4″, 5″	1.19 s, 1.19 s	1.81 s, 1.68 s	1.50 s, 1.50 s	1.47 s, 1.47 s	1.19 s, 1.19 s
1‴	3.45 d(7.0)	3.41 d(7.0)	3.62 d(7.0)	3.63 d(7.0)	3.46 d(7.0)
2‴	5.14 t(7.0)	5.21 t(7.0)	5.30 m	5.31 m	5.34 t(7.0)
4‴, 5‴	1.78 s, 1.59 s	1.79 s, 1.71 s	1.89 s, 1.79 s	1.80 s, 1.79 s	1.61 s, 1.82 s
1⁗	6.65 d(10.0)	4.89 d(7.5)	6.72 d(10.0)	2.96 quint(6.8)	6.74 d(10.0)
2⁗	5.72 d(10.0)	3.72 d(7.5)	5.76 d(10.0)	1.91 t-like(6.8)	5.79 d(10.0)
4⁗, 5⁗	1.42 s, 1.42 s	1.52 s, 1.25 s	1.47 s, 1.47 s	1.47 s, 1.47 s	1.51 s, 1.51 s

4.3.7 2-arylbenzofuran-type isoflavones

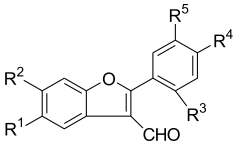
Table 4-3-79: Cos, MFs, and TSs of 2-arylbenzofuran-type isoflavones **4-3-242**~**4-3-266**.

No.	Compounds	MFs	Test solvents	References
4-3-242	erythbidin E	$C_{15}H_{14}O_4$	CD_3COCD_3	[263]
4-3-243	2-(2,4-dihydroxyphenyl)-6-hydroxybenzofuran	$C_{14}H_{10}O_4$	CD_3COCD_3	[263]
4-3-244	eryvarin L	$C_{16}H_{14}O_5$	$CDCl_3$	[271]
4-3-245	puerariafuran	$C_{16}H_{12}O_5$	DMSO-d_6	[287]
4-3-246	spinosan A	$C_{17}H_{12}O_6$	CD_3COCD_3	[288]
4-3-247	spinosan B	$C_{17}H_{14}O_5$	CD_3COCD_3	[288]
4-3-248	2-(2′-hydroxy-4′,5′-methylenedioxyphenyl)-6-meth-oxybenzofuran-3-carbaldehyde	$C_{17}H_{12}O_6$	CD_3COCD_3	[193]
4-3-249	2-(2,4-dihydroxy-5-prenylphenyl)-5,6-methylene-dioxybenzofuran	$C_{20}H_{18}O_5$	CD_3COCD_3	[289]
4-3-250	ebenfuran IV	$C_{22}H_{22}O_6$	CD_3OD	[290]
4-3-251	ebenfuran V	$C_{21}H_{22}O_7$	CD_3OD	[290]
4-3-252	ebenfuran VI	$C_{22}H_{24}O_7$	CD_3OD	[290]
4-3-253	ebenfuran VII	$C_{21}H_{20}O_7$	CD_3OD	[290]
4-3-254	ebenfuran VIII	$C_{22}H_{22}O_7$	CD_3OD	[290]
4-3-255	mulberrofuran Y	$C_{25}H_{28}O_5$	CD_3COCD_3	[291]
4-3-256	mulberrofuren Z	$C_{30}H_{36}O_5$	CD_3COCD_3	[291]
4-3-257	artopetelin H	$C_{29}H_{34}O_5$	CD_3COCD_3	[292]
4-3-258	artopetelin K	$C_{29}H_{34}O_5$	CD_3COCD_3	[292]
4-3-259	eryvarin U	$C_{20}H_{18}O_4$	$CDCl_3$	[232]
4-3-260	kanzonol U	$C_{19}H_{16}O_4$	CD_3COCD_3	[293]
4-3-261	kanzonol V	$C_{24}H_{24}O_4$	CD_3COCD_3	[293]
4-3-262	artopetelin I	$C_{24}H_{26}O_5$	CD_3COCD_3	[292]
4-3-263	artopetelin J	$C_{24}H_{26}O_5$	CD_3COCD_3	[292]
4-3-264	artoindonesianin Y	$C_{29}H_{32}O_4$	CD_3COCD_3	[294]
4-3-265	artopetelin C	$C_{29}H_{34}O_5$	CD_3COCD_3	[295]
4-3-266	artopetelin A	$C_{29}H_{32}O_4$	CD_3COCD_3	[295]

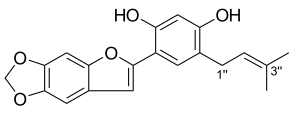
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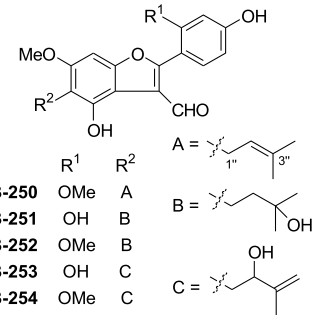
	R^1	R^2	R^3
4-3-242	OMe	OH	H
4-3-243	OH	OH	H
4-3-244	OH	OMe	OMe



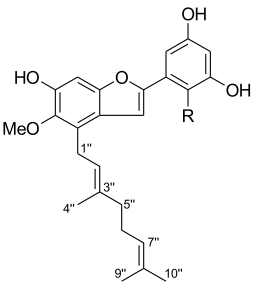
	R^1	R^2	R^3	R^4	R^5
4-3-245	H	OH	OMe	OH	H
4-3-246	OCH_2O		OMe	OH	H
4-3-247	H	OMe	OMe	OH	H
4-3-248	H	OMe	OH	OCH_2O	



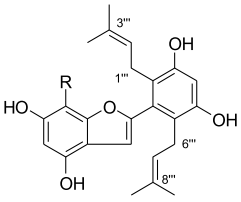
4-3-249



	R^1	R^2
4-3-250	OMe	A
4-3-251	OH	B
4-3-252	OMe	B
4-3-253	OH	C
4-3-254	OMe	C



4-3-255 R = H
4-3-256 R = Prenyl

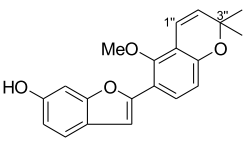


4-3-257 R =

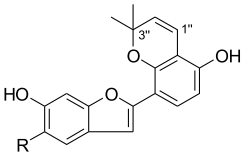


4-3-258 R =

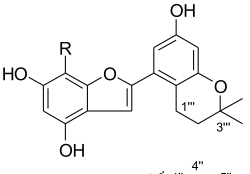




4-3-259



4-3-260 R = H
4-3-261 R = Prenyl



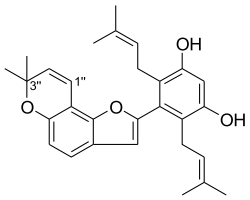
4-3-262 R =



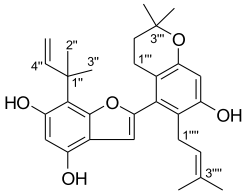
4-3-263 R =



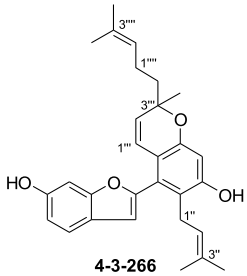
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4-3-264



4-3-265



4-3-266

Table 4-3-80: ^{1}H NMR spectroscopic data of 2-arylbenzofuran-type isoflavones **4-3-242**~**4-3-245**.

H	4-3-242	4-3-243	4-3-244	4-3-245
3	7.17 s	7.14 s	7.14 s	9.89 s(CHO)
4	7.43 d(8.8)	7.36 d(8.5)	7.37 d(8.1)	7.83 d(8.5)
5	6.82 dd(8.8, 2.2)	6.77 dd(8.5, 2.3)	6.75 dd(8.1, 2.2)	6.85 dd(8.5, 2.0)
6	3.84 s(OMe)			
7	7.10 d(2.2)	6.97 br s	7.00 d(2.2)	6.99 d(2.0)
2′	9.14 br s(OH)		3.91 s(OMe)	3.77 s(OMe)
3′	6.57 d(2.2)	6.56 d(2.3)	6.66 s	6.61 d(2.0)
4′	8.58 br s(OH)			
5′	6.51 dd(8.8, 2.2)	6.50 dd(8.5, 2.3)	3.96 s(OMe)	6.55 dd(8.0, 2.0)
6′	7.73 d(8.8)	7.72 d(8.5)	7.50 s	7.46 d(8.0)
OH		8.41 br s, 9.10 br s	5.10 br s, 5.82 br s	

Table 4-3-81: ^{1}H NMR spectroscopic data of 2-arylbenzofuran-type isoflavones **4-3-246**~**4-3-248**.

H	4-3-246	4-3-247	4-3-248
3	9.98 s(CHO)	10.02 s(CHO)	10.00 s(CHO)
4	7.51 s	8.01 d(8.6)	7.50 d(8.4)
5		7.00 dd(8.6, 2.2)	6.66 dd(8.4, 2.2)
6		3.88 s(OMe)	3.86 s(OMe)
7	7.14 s	7.18 d(2.2)	6.71 d(2.2)
2′	3.84 s(OMe)	3.86 s(OMe)	
3′	6.70 d(2.0)	6.71 d(2.1)	7.16 s
5′	6.65 dd(8.4, 2.0)	6.66 dd(8.3, 2.1)	
6′	7.48 d(8.4)	7.52 d(8.3)	7.52 s
OCH_2O	6.07 s		6.08 s

Table 4-3-82: ^{1}H NMR spectroscopic data of 2-arylbenzofuran-type isoflavones **4-3-249**~**4-3-252**.

H	4-3-249	4-3-250	4-3-251	4-3-252
3	7.14 s	9.92 s(CHO)	9.93 s(CHO)	9.77 s(CHO)
4	7.09 s			

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Table 4-3-82 (continued)

H	4-3-249	4-3-250	4-3-251	4-3-252
7	7.00 s	6.65 s	6.72 s	6.72 s
3′	6.60 s	6.62 d(1.9)	6.48 d(1.9)	6.64 d(1.9)
5′		6.57 dd(8.5, 1.9)	6.49 dd(6.9, 1.9)	6.59 dd(8.5, 1.9)
6′	7.60 s	7.43 d(8.5)	7.44 d(9.6)	7.48 d(8.5)
1″	3.34 d(7.5)	3.37 d(7.0)	2.77 m	2.78 m
2″	5.38 m	5.22 t(7.0)	1.67 m	1.67 m
4″, 5″	1.77 s, 1.75 s	1.66 s, 1.79 s	1.29 s, 1.29 s	1.29 s, 1.31 s
OMe		3.84 s, 3.84 s	3.87 s	3.86 s, 3.88 s
OCH_2O	6.01 s			

Table 4-3-83: ^{1}H NMR spectroscopic data of 2-arylbenzofuran-type isoflavones **4-3-253** and **4-3-254**.

H	4-3-253	4-3-254	H	4-3-253	4-3-254
3	9.93 s(CHO)	9.78 s(CHO)	1″	3.07 dd(12.9, 6.6)	3.07 dd(13.0, 6.8)
				2.94 dd(12.9, 7.1)	2.94 dd(13.0, 7.0)
7	6.72 s	6.72 s	2″	4.40 dd(7.1, 6.6)	4.40 dd(7.0, 6.8)
3′	6.49 m	6.58 d(2.0)	4″	1.84 s	1.82 s
5′	6.49 m	6.44 dd(8.5, 2.0)	5″	4.66 br s	4.65 br s
6′	7.45 d(8.7)	7.47 d(8.5)	OMe	3.87 s	3.86 s, 3.86 s

Table 4-3-84: ^{1}H NMR spectroscopic data of 2-arylbenzofuran-type isoflavones **4-3-255** and **4-3-256**.

H	4-3-255	4-3-256	H	4-3-255	4-3-256
3	7.02 d(0.9)	6.80 d(0.7)	1‴	3.59 br d(6.5)	3.58 br d(7.0)
5	3.77 s(OMe)	3.78 s(OMe)	2‴	5.32 m	5.31 m
7	6.91 d(0.9)	6.90 d(0.7)	4‴	1.86 br d(0.9)	1.84 br s
2′	6.83 d(2.1)		5‴	1.99~2.12 m	2.00~2.04 m
4′	6.34 t(2.1)	6.47 d(2.5)	6‴	1.99~2.12 m	2.00~2.04 m
6′	6.83 d(2.1)	6.75 d(2.5)	7‴	5.05 m	5.05 m
1″		3.50 br d(6.0)	9‴	1.56 br d(0.9)	1.56 br s
2″		5.17 m	10‴	1.52 br d(0.9)	1.52 br s
4″, 5″		1.70 br s, 1.66 br s	OH	8.37 br s, 8.37 br s, 8.09 br s	8.31, 8.13, 8.02

Table 4-3-85: ^{1}H NMR spectroscopic data of 2-arylbenzofuran-type isoflavones **4-3-257** and **4-3-258**.

H	4-3-257	4-3-258	H	4-3-257	4-3-258
3	6.59 s	6.56 s	4″	6.43 dd(10.6, 17.5)	4.82 br s, 4.73 br s
4	8.41 s(OH)	8.93 s(OH)	5″	5.03 br d(17.5)	1.65 br s

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Table 4-3-85 (continued)

H	4-3-257	4-3-258	H	4-3-257	4-3-258
				4.92 br d(10.6)	
5	6.31 s	6.34 s	1‴	3.17 br d(6.7)	3.13 br d(6.5)
6	7.53 s(OH)	8.35 s(OH)	2‴	5.09 br t(6.7)	5.05 br t(6.5)
3′	7.97 s(OH)	8.49 s(OH)	4‴	1.40 br s	1.36 br s
4′	6.58 s	6.57 s	5‴	1.53 br s	1.51 br s
5′	7.97 s(OH)	8.49 s(OH)	6‴	3.17 br d(6.7)	3.13 br d(6.5)
1″		4.00 q(7.4)	7‴	5.09 br t(6.7)	5.05 br t(6.5)
2″	1.65 s	1.50 d(7.4)	9‴	1.40 br s	1.36 br s
3″	1.65 s		10‴	1.53 br s	1.51 br s

Table 4-3-86: ^{1}H NMR spectroscopic data of 2-arylbenzofuran-type isoflavones **4-3-259**~**4-3-262**.

H	4-3-259	4-3-260	4-3-261	4-3-262
3	7.10 s	7.20 d(1)	7.16 d(1)	6.98 s
4	7.40 d(8.1)	7.37 br d(8)	7.25 br s	
5	6.76 dd(8.1, 2.2)	6.77 dd(8, 2)		6.35 s
7	6.99 d(2.2)	6.94 ddd(2, 1, 0.5)	6.97 br s	
2′	3.78 s(OMe)			
4′				6.28 d(2.5)
5′	6.69 d(8.8)	6.56 d(8.5)	6.55 d(8.5)	
6′	7.71 d(8.8)	7.62 d(8.5)	7.60 d(8.5)	6.97 d(2.5)
1″	6.68 d(10.3)	6.73 d(10)	6.73 d(10)	
2″	5.70 d(10.3)	5.74 d(10)	5.73 d(10)	1.72 s
3″				1.72 s
4″	1.46 s	1.53 s	1.53 s	6.48 dd(10.6, 17.5)
5″	1.46 s	1.53 s	1.53 s	5.06 dd(17.5, 1.4)
				4.96 dd(10.6, 1.4)
1‴			3.38 br d(7.5)	2.89 t(6.8)
2‴			5.39 tm(7.5, 1)	1.85 t(6.8)
4‴, 5‴			1.73 br s, 1.73 br s	1.34 s, 1.34 s
OH		8.37 s, 8.80 s	8.32 s, 8.75 s	

Table 4-3-87: ^{1}H NMR spectroscopic data of 2-arylbenzofuran-type isoflavones **4-3-263**~**4-3-266**.

H	4-3-263	4-3-264	4-3-265	4-3-266
3	6.98 s	6.53 br d	6.66 s	6.66 d(0.8)
4		7.28 d(8.3)	8.46 s(OH)	7.46 d(8.2)
5	6.38 s	6.75 d(8.3)	6.33 s	6.85 dd(8.2, 2.0)
6			7.63 s(OH)	8.51 s(OH)
7				6.98 br d(2.0)
3′			8.17 s(OH)	8.66 s(OH)

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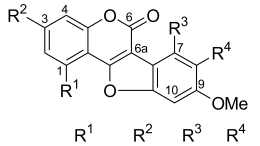
Table 4-3-87 (continued)

H	4-3-263	4-3-264	4-3-265	4-3-266
4′	6.28 d(2.5)	6.51 s	6.40 s	6.48 s
6′	6.95 d(2.5)			
1″	4.07 q(7.2)	6.75 d(9.9)		3.22 br d(7.0)
2″	1.58 d(7.2)	5.68 d(9.9)	1.64 s	5.09-5.16 m
3″			1.64 s	
4″	4.99 br s, 4.84 br s	1.47 s	6.43 dd(10.6, 17.5)	1.40 br s
5″	1.69 br s	1.47 s	5.02 dd(17.5, 1.3)	1.55 br s
			4.91 dd(10.6, 1.3)	
1‴, 1⁗	2.88~2.92 m	3.17 br d	3.27 br d(6.8)	6.13 d(10.2)
2‴, 2⁗	1.84 t(6.7)	5.20 m	5.11 br t(6.8)	5.48 d(10.2)
4‴, 4⁗	1.33 s	1.63 br s	1.42 br s	1.36 s
5‴, 5⁗	1.33 s	1.70 br s	1.55 br s	1.65~1.71 m
1⁗			2.48 t(6.8)	2.07~2.15 m
2⁗			1.69 t(6.8)	5.09~5.16 m
4⁗, 5⁗			1.28 s, 1.28 s	1.57 br s, 1.64 br s

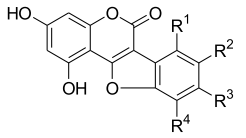
4.3.8 Coumestan-type isoflavones

Table 4-3-88: Cos, MFs, and TSs of coumestan-type isoflavones **4-3-267**~**4-3-275**.

No.	Compounds	MFs	Test solvents	References
4-3-267	hedysarimcoumestan A	$C_{17}H_{12}O_6$	DMSO-d_6	[296]
4-3-268	hedysarimcoumestan B	$C_{16}H_{10}O_6$	DMSO-d_6	[296]
4-3-269	hedysarimcoumestan E	$C_{17}H_{12}O_7$	DMSO-d_6	[296]
4-3-270	hedysarimcoumestan F	$C_{17}H_{12}O_7$	DMSO-d_6	[296]
4-3-271	1,3,9-trimethoxycoumestan	$C_{18}H_{14}O_6$	DMSO-d_6	[296]
4-3-272	aureol	$C_{15}H_8O_6$	DMSO-d_6	[296]
4-3-273	hedysarimcoumestan D	$C_{21}H_{18}O_6$	DMSO-d_6	[296]
4-3-274	hedysarimcoumestan G	$C_{21}H_{18}O_7$	DMSO-d_6	[296]
4-3-275	hedysarimcoumestan H	$C_{21}H_{18}O_7$	DMSO-d_6	[296]



	R^1	R^2	R^3	R^4
4-3-267	OH	OMe	H	H
4-3-268	OH	OH	H	H
4-3-269	OH	OH	H	OMe
4-3-270	OH	OMe	OH	H
4-3-271	OMe	OMe	H	H



	R^1	R^2	R^3	R^4
4-3-272	H	H	OH	H
4-3-273	H	H	OMe	Prenyl
4-3-274	OH	H	OMe	Prenyl
4-3-275	OH	Prenyl	OMe	H

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Table 4-3-89: ^{1}H NMR spectroscopic data of coumestan-type isoflavones **4-3-267**~**4-3-271**.

H	4-3-267	4-3-268	4-3-269	4-3-270	4-3-271
1					4.00 s(OMe)
2	6.45 d(2.4)	6.39d(1.8)	6.39 d(1.8)	6.47 d(2.1)	6.64 d(1.5)
3	3.81 s(OMe)			3.83 s(OMe)	3.88 s(OMe)
4	6.62 d(2.4)	6.42 d(1.8)	6.36 d(1.8)	6.73 d(2.1)	6.77 d(1.5)
7	7.75 dd(8.4)	7.76 d(8.4)	7.30 s		7.76 d(8.5)
8	7.05 dd(8.4, 2.1)	7.08 dd(8.4, 2.1)	3.84 s(OMe)	6.44 d(1.8)	7.07 dd(8.5, 2.0)
9	3.84 s(OMe)	3.86 s(OMe)	3.84 s(OMe)	3.80 s(OMe)	3.85 s(OMe)
10	7.47 d(2.1)	7.50 d(2.1)	7.55 s	6.98 d(1.8)	7.46 d(2.0)
OH	11.07 s	10.97 s, 10.53 s	10.90 s, 10.46 s	9.34 s, 11.15 s	

Table 4-3-90: ^{1}H NMR spectroscopic data of coumestan-type isoflavones **4-3-272**~**4-3-275**.

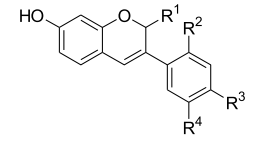
H	4-3-272	4-3-273	4-3-274	4-3-275
2	6.36 d(1.8)	6.37 d(1.8)	6.49 d(2.1)	6.53 d(1.8)
4	6.39 d(1.8)	6.36 d(1.8)	6.50 d(2.1)	6.55 d(1.8)
7	7.65 d(8.4)	7.62 d(8.4)		
8	6.91 dd(8.4, 2.1)	7.11 d(8.4)	6.44 s	
9		3.86 s(OMe)	3.85 s(OMe)	3.91 s(OMe)
10	7.12 d(2.1)			6.87 s
1′		3.56 d(7.0)	3.47 d(7.5)	3.38 d(7.2)
2′		5.29 t(7.0)	5.26 t(7.5)	5.23 m
4′, 5′		1.83 s, 1.63 s	1.80 s, 1.60 s	1.78 s, 1.63 s
OH	10.90 s, 10.48 s, 9.94 s	10.90 s, 10.48 s		9.31 s, 9.62 s

4.3.9 Isoflav-3-ene-type isoflavones

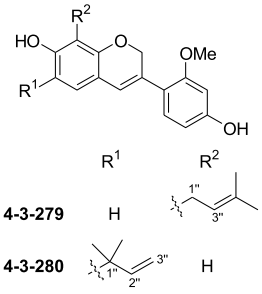
Table 4-3-91: Cos, MFs, and TSs of isoflav-3-ene-type isoflavones **4-3-276**~**4-3-282**.

No.	Compounds	MFs	Test solvents	References
4-3-276	bolusanthin III	$C_{16}H_{14}O_4$	CD_3COCD_3	[297]
4-3-277	eryvarin H	$C_{17}H_{16}O_5$	CD_3COCD_3	[271]
4-3-278	2-methoxyjudaicin	$C_{18}H_{16}O_6$	DMSO-d_6	[298]
4-3-279	erypoegin A	$C_{21}H_{22}O_4$	$CDCl_3$	[222]
4-3-280	burttinol A	$C_{21}H_{22}O_4$	$CDCl_3$	[299]
4-3-281	erypoegin B	$C_{21}H_{20}O_4$	$CDCl_3$	[222]
4-3-282	eryvarin I	$C_{21}H_{20}O_4$	CD_3COCD_3	[271]

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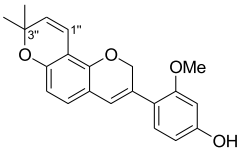


	R^1	R^2	R^3	R^4
4-3-276	H	OH	OMe	H
4-3-277	H	OMe	OH	OMe
4-3-278	OMe	OMe	OCH_2O	

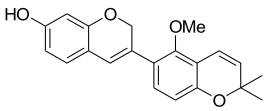


4-3-279 H

4-3-280 H



4-3-281



4-3-282

Table 4-3-92: ^{1}H NMR spectroscopic data of isoflav-3-ene-type isoflavones **4-3-276**~**4-3-278**.

H	4-3-276	4-3-277	4-3-278
2	5.01 br s	4.92 s	5.83 s
			3.33 s(OMe)
4	6.62 br s	6.56 s	6.83 s
5	6.95 d(8.1)	6.94 d(8.1)	7.04 d(8.9)
6	6.43 dd(8.1, 2.3)	6.41 dd(8.1, 2.2)	6.43 dd(8.9, 2.4)
8	6.34 d(2.3)	6.33 d(2.2)	6.42 d(2.4)
2′		3.77 s(OMe)	3.75 s(OMe)
3′	6.51 d(2.0)	6.57 s	6.83 s
4′	3.75 s(OMe)		
5′	7.21 dd(8.3, 2.2)	3.84 s(OMe)	
6′	6.47 d(6.0)	6.95 s	6.84 s
OH		7.81 br s, 8.47 br s	
OCH_2O			5.99 s

Table 4-3-93: ^{1}H NMR spectroscopic data of isoflav-3-ene-type isoflavones **4-3-279**~**4-3-282**.

H	4-3-279	4-3-280	4-3-281	4-3-282
2	4.97 s	4.97 s	5.00 d(1.5)	4.95 s
4	6.50 s	6.52 s	6.47 d(1.5)	6.64 s
5	6.82 d(8.1)	6.95 s	6.82 d(8.8)	6.98 d(8.1)
6	6.40 d(8.1)		6.34 d(8.8)	6.43 dd(8.1, 2.2)
8		6.42 s		6.35 d(2.2)
2′	3.79 s(OMe)	3.75 s(OMe)	3.79 s(OMe)	3.70 s(OMe)
3′	6.42 d(2.2)	6.42 d(2.1)	6.42 d(2.2)	

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Table 4-3-93 (continued)

H	4-3-279	4-3-280	4-3-281	4-3-282
5′	6.41 dd(8.1, 2.2)	6.41 dd(8.7, 2.1)	6.41 dd(8.1, 2.2)	6.57 d(8.8)
6′	7.15 d(8.1)	7.13 d(8.7)	7.15 d(8.1)	7.13 d(8.8)
1″	3.41 d(7.3)		6.65 d(10.3)	6.63 d(10.3)
2″	5.27 t(7.3)	6.19 dd(10.2, 18.1)	5.59 d(10.3)	5.79 d(10.3)
3″		5.33 d, 5.28 d		
4″, 5″	1.82 s, 1.74 s	1.43 s, 1.43 s	1.42 s, 1.42 s	1.42 s, 1.42 s
OH		5.98 br s		8.48 br s

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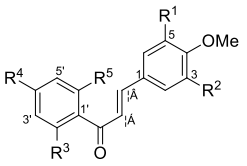
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4.4 Chalcones

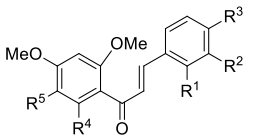
4.4.1 Chalcone-type chalcones

Table 4-4-1: Cos, MFs, and TSs of chalcone-type chalcones **4-4-1**~**4-4-17**.

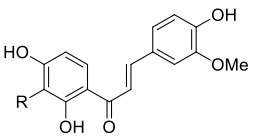
No.	Compounds	MFs	Test solvents	References
4-4-1	crotaoprostrin	$C_{18}H_{18}O_5$	$CDCl_3$	[300]
4-4-2	2′-hydroxy-3,4,5,4′,6′-pentamethoxychalcone	$C_{20}H_{22}O_7$	–	[301]
4-4-3	2′,4′-dihydroxy-4,6′-dimethoxychalcone	$C_{17}H_{16}O_5$	C_5D_5N	[302]
4-4-4	4′-hydroxy-4,2′,6′-trimethoxychalcone	$C_{18}H_{18}O_5$	DMSO-d_6	[302]
4-4-5	4′,6′-di-*O*-methylchalconaringenin	$C_{17}H_{16}O_5$	DMSO-d_6	[303]
4-4-6	2′-hydroxy-2,4′,6′-trimethoxychalcone	$C_{18}H_{18}O_5$	$CDCl_3$	[304]
4-4-7	2′-hydroxy-2,3,4′,6′-tetramethoxychalcone	$C_{19}H_{20}O_6$	$CDCl_3$	[305]
4-4-8	2′-hydroxy-3,4,3′,4′,6′-pentamethoxychalcone	$C_{20}H_{22}O_7$	CD_3COCD_3	[306]
4-4-9	2′,4′,6′,2,3,4-hexamethoxychalcone	$C_{21}H_{24}O_7$	$CDCl_3$	[307]
4-4-10	2′,4′-dimethoxy-3,4-methylenedioxychalcone	$C_{18}H_{16}O_5$	$CDCl_3$	[308]
4-4-11	2′,4′,6′-trimethoxy-3,4-methylenedioxychalcone	$C_{19}H_{18}O_6$	$CDCl_3$	[308]
4-4-12	2′,4′,4-trihydroxy-3′,3-dimethoxychalcone	$C_{17}H_{16}O_6$	CD_3OD	[309]
4-4-13	2′,4′,4-trihydroxy-3-methoxychalcone	$C_{16}H_{14}O_5$	CD_3OD	[309]
4-4-14	2′,4′-dihydroxy-6′-methoxy-3′,5′-dimethylchalcone	$C_{18}H_{18}O_4$	$CDCl_3$	[310]
4-4-15	2,2′,4′-trihydroxy-6′-methoxy-3′,5′-dimethylchalcone	$C_{18}H_{18}O_5$	$CDCl_3$	[310]
4-4-16	3′-formyl-4′,6′-dihydroxy-2′-methoxy-5′-methylchalcone	$C_{18}H_{16}O_5$	$CDCl_3$	[311]
4-4-17	2,4,6,*β*-tetramethoxy-3′,4′-methylenedioxychalcone	$C_{20}H_{20}O_7$	$CDCl_3$	[308]



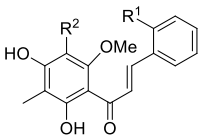
	R^1	R^2	R^3	R^4	R^5
4-4-1	OMe	OMe	OH	H	H
4-4-2	OMe	OMe	OH	OMe	OMe
4-4-3	H	H	OH	OH	OMe
4-4-4	H	H	OMe	OH	OMe



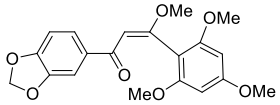
	R^1	R^2	R^3	R^4	R^5
4-4-5	H	H	OH	OH	H
4-4-6	OMe	H	H	OH	H
4-4-7	OMe	OMe	H	OH	H
4-4-8	H	OMe	OMe	OH	OMe
4-4-9	OMe	OMe	OMe	OMe	H
4-4-10	H	OCH_2O		H	H
4-4-11	H	OCH_2O		OMe	H



4-4-12 R = OMe
4-4-13 R = H



	R^1	R^2
4-4-14	H	Me
4-4-15	OH	Me
4-4-16	H	CHO



4-4-17

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Table 4-4-2: ^{1}H NMR spectroscopic data of chalcone-type chalcones **4-4-1**~**4-4-5**.

H	4-4-1	4-4-2	4-4-3	4-4-4	4-4-5
2, 6	6.92 s	6.84 s	7.72 d(8.8)	7.59 d(8.8)	7.58 d(8.6)
3, 5			7.00 d(8.8)	6.94 d(8.8)	6.83 d(8.6)
4			3.70 s(OMe)	3.78 s(OMe)	10.08 s(OH)
2′	12.88 s(OH)	14.31 s(OH)	15.12 s(OH)	3.64 s(OMe)	13.65 s(OH)
3′	7.06 dd(8.5, 1.1)	6.2 d(2.4)	6.57 d(2.2)	6.12	6.11 d(2.3)
4′	7.53 m		13.08 s(OH)	9.84 s(OH)	
5′	6.98 dd(8.1, 1.1)	5.97 d(2.4)	6.36 d(2.2)	6.12	6.15 d(2.3)
6′	7.92 dd(8.1, 1.5)		3.82 s(OMe)	3.64 s(OMe)	
α	7.56 d(15.4)	7.80 d(16)	8.14 d(15.6)	6.79 d(16.1)	7.62 s
β	7.87 d(15.4)	7.71 d(16)	8.14 d(15.6)	7.15 d(16.1)	7.62 s
OMe	3.95 s	3.84 s, 3.90 s			3.90 s
	3.96 s	3.91 s, 3.92 s			3.82 s
	3.96 s	3.92 s			

Table 4-4-3: ^{1}H NMR spectroscopic data of chalcone-type chalcones **4-4-6**~**4-4-9**.

H	4-4-6	4-4-7	4-4-8	4-4-9
2	3.88 s(OMe)		7.32 d(1.8)	3.80 s(OMe)
3	6.91 dd(8.3, 1.9)		3.90 s(OMe)	3.82 s(OMe)
4	7.34 dt(7.8, 1.7)	6.96 dd(8.0, 1.5)	3.87 s(OMe)	3.86 s(OMe)
5	6.96 dt(7.6, 1.8)	7.10 t(8.0)	7.02 d(8.3)	6.66 d(8.8)
6	7.57 dd(8.7, 1.7)	7.25 dd(8.0, 1.5)	7.29 dd(8.3, 1.8)	7.29 d(8.8)
2′	14.39 s(OH)	14.36 br s(OH)	13.88 s(OH)	3.74 s(OMe)
3′	6.08 d(2.3)	5.98 d(1.5)	3.70 s(OMe)	6.13 s
4′	3.80 s(OMe)			3.83 s(OMe)
5′	5.93 d(2.3)	6.13 d(1.5)	6.32 s	6.13 s
6′	3.88 s(OMe)			3.74 s(OMe)
α	7.94 d(15.7)	7.96 d(16.0)	7.87 d(15.6)	6.90 d(16.2)
β	8.12 d(15.7)	8.10 d(16.0)	7.74 d(15.6)	7.55 d(16.2)
OMe		3.92 s, 3.91 s	4.03 s, 3.96 s	
		3.88 s, 3.85 s		

Table 4-4-4: ^{1}H NMR spectroscopic data of chalcone-type chalcones **4-4-10**~**4-4-13**.

H	4-4-10	4-4-11	4-4-12	4-4-13
2	7.12 d(1.6)	7.05 d(2)	7.37 d(2)	7.36 d(2)
3			3.83 s(OMe)	3.93 s(OMe)
5	6.82 d(8)	6.79 d(8)	6.84 d(9)	6.84 d(8)
6	7.07 dd(8, 1.6)	6.98 dd(8, 2)	7.22 dd(2, 9)	7.21 dd(2, 8)
2′	3.91 s(OMe)	3.77 s(OMe)		
3′	6.50 d(2)	6.16 s	3.97 s(OMe)	6.28 d(2)

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Table 4-4-4 (continued)

H	4-4-10	4-4-11	4-4-12	4-4-13
4	3.87 s(OMe)	3.86 s(OMe)		
5′	6.56 dd(8.8, 2)	6.16 s	6.47 d(9)	6.40 dd(2, 9)
6′	7.75 d(8.8)	3.77 s(OMe)	7.83 d(9)	8.01 d(9)
α	7.35 d(16)	6.78 d(16)	7.64 d(15)	7.63 d(15)
β	7.60 d(16)	7.28 d(16)	7.80 d(15)	7.77 d(15)
OCH_2O	6.01 s	5.99 s		

Table 4-4-5: ^{1}H NMR spectroscopic data of chalcone-type chalcones **4-4-14**~**4-4-17**.

H	4-4-14	4-4-15	4-4-16	4-4-17
2	7.65 d(7.2)		7.43 m	3.73 s(OMe)
3	7.41 m	6.84 d(8.0)	7.53 m	6.10 s
4	7.41 m	7.26 ddd(1.5, 7.3, 8.0)	7.53 m	3.80 s(OMe)
5	7.41 m	6.98 dd(7.3, 7.6)	7.53 m	6.10 s
6	7.65 d(7.2)	7.62 dd(1.5, 7.6)	7.43 m	3.73 s(OMe)
2′	13.60 s(OH)	13.67 s(OH)	13.90 s(OH)	7.32 d(2)
3′	2.14 s(Me)	2.14 s(Me)	2.08 s(Me)	
4′			12.60 s(OH)	
5′	2.16 s(Me)	2.15 s(Me)	10.10 s(CHO)	6.76 d(8.4)
6′	3.66 s(OMe)	3.67 s(OMe)	3.90 s(OMe)	7.46 dd(8.4, 2)
α	7.99 d(15.7)	8.05 d(15.8)	7.86 d(16)	6.33 s
β	7.84 d(15.7)	8.15 d(15.8)	7.96 d(16)	3.83 s(OMe)
OCH_2O				5.98 s

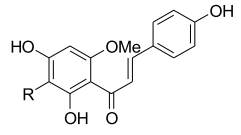
Table 4-4-6: Cos, MFs, and TSs of chalcone-type chalcones **4-4-18**~**4-4-47**.

No.	Compounds	MFs	Test solvents	References
4-4-18	xanthohumol	$C_{21}H_{22}O_5$	CD_3OD	[312]
			CD_3CN-D_2O	[312]
4-4-19	3′-(3″-methyl-3″-hydroxy-butyl)-2′,4,4′-trihydroxy-6′-meth-oxychalcone	$C_{21}H_{24}O_6$	CD_3CN-D_2O	[312]
4-4-20	3′-(3″-hydroxymethyl-but-2″-enyl)-2′,4,4′-trihydroxy-6′-methoxychalcone	$C_{21}H_{22}O_6$	CD_3CN-D_2O	[312]
4-4-21	xanthohumol D	$C_{21}H_{22}O_6$	CD_3OD	[312]
			CD_3CN-D_2O	[312]
4-4-22	1-[2,4-dihydroxy-3-(3-hydroxy-2-methoxy-3-methylbutyl)-6-methoxyphenyl]-3-(4-hydroxyphenyl)propenone	$C_{22}H_{26}O_7$	DMSO-d_6	[313]
4-4-23	2′,4′-dihydroxy-4,6′-dimethoxy-3′-prenylchalcone	$C_{22}H_{24}O_5$	CD_3OD	[312]
4-4-24	4-acetoxy-2′,4′-dihydroxy-6′-methoxy-3′-prenylchalcone	$C_{23}H_{24}O_6$	CD_3CN-D_2O	[312]
			CD_3OD	

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Table 4-4-6 (continued)

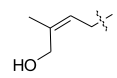
No.	Compounds	MFs	Test solvents	References
4-4-25	(*E*)-1-[2,4-dihydroxy-3-[3-methylbut-2-enyl]phenyl]-3-[4-hydroxyphenyl]-prop-2-en-1-one	$C_{20}H_{20}O_4$	CD_3OD	[314]
4-4-26	2′,4′,4,2″-tetrahydroxy-3′-[3″-methylbut-3″-enyl]chalcone	$C_{20}H_{20}O_5$	DMSO-d_6	[315]
4-4-27	xanthogalenol	$C_{21}H_{22}O_5$	DMSO-d_6	[303]
4-4-28	4′-*O*-methyl-xanthohumol	$C_{22}H_{24}O_5$	DMSO-d_6	[303]
4-4-29	xanthohumol G	$C_{21}H_{24}O_7$	CD_3OD	[316]
4-4-30	*trans*-hydroxyxanthohumol	$C_{21}H_{22}O_6$	CD_3OD	[316]
4-4-31	brosimacutin M	$C_{20}H_{22}O_6$	CD_3COCD_3	[317]
4-4-32	licochalcone E	$C_{21}H_{22}O_4$	CD_3COCD_3	[318]
4-4-33	licoagrochalcone C	$C_{21}H_{22}O_5$	CD_3COCD_3	[319]
4-4-34	5-prenylbutein	$C_{20}H_{20}O_5$	CD_3COCD_3	[320]
4-4-35	2′,3-dihydroxy-4-methoxy-4′-γ,γ-dimethylallyloxychalcone	$C_{21}H_{22}O_5$	$CDCl_3$	[321]
4-4-36	bartericin A	$C_{25}H_{28}O_5$	CD_3COCD_3	[322]
4-4-37	stipulin	$C_{25}H_{28}O_4$	$CDCl_3$	[322]
4-4-38	bartericin D	$C_{25}H_{28}O_5$	CD_3COCD_3	[323]
4-4-39	Angusticornin B	$C_{25}H_{28}O_6$	CD_3COCD_3	[323]
4-4-40	paratocarpin E	$C_{25}H_{28}O_5$	CD_3COCD_3	[324]
4-4-41	abyssinone VI 4-*O*-methyl ether	$C_{26}H_{30}O_4$	$CDCl_3$	[325]
4-4-42	2′,4,4′-trihydroxy-3′-geranylchalcone	$C_{25}H_{28}O_4$	$CDCl_3$	[326]
4-4-43	2′,3,4,4′-tetrahydroxy-3′-geranylchalcone	$C_{25}H_{28}O_5$	$CDCl_3$	[326]
4-4-44	2′,4,4′-trihydroxy-3′-[6-hydroxy-3,7-dimethyl-2(*E*),7-octadienyl] chalcone	$C_{25}H_{28}O_5$	$CDCl_3$	[326]
4-4-45	2′,4,4′-trihydroxy-3′-[2-hydroxy-7-methyl-3-methylene-6-octaenyl] chalcone	$C_{25}H_{28}O_5$	$CDCl_3$	[326]
4-4-46	xanthoangelol J	$C_{25}H_{30}O_5$	CD_3COCD_3	[327]
4-4-47	2,4,4′-trihydroxy-3-[(2*E*)-5-methoxy-3,7-dimethylocta-2,6-dienyl]chalcone	$C_{26}H_{30}O_5$	$CDCl_3$	[328]



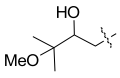
4-4-19 R =



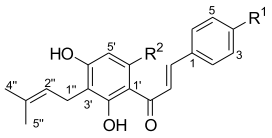
4-4-21 R =



4-4-20 R =

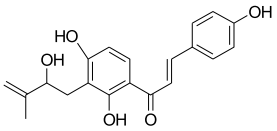


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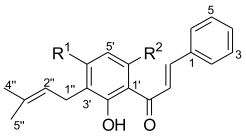


	R^1	R^2
4-4-18	OH	OMe
4-4-23	OMe	OMe
4-4-24	OAc	OMe
4-4-25	OH	H

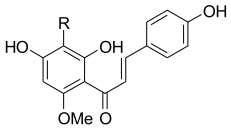
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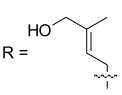
4-4-26



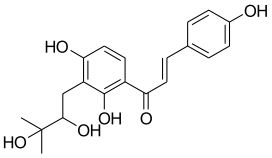
4-4-27 OMe OH
4-4-28 OMe OMe



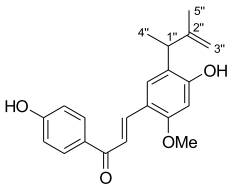
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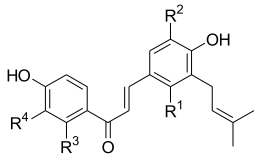
4-4-30 R =



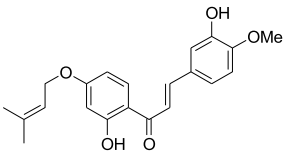
4-4-31



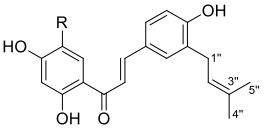
4-4-32



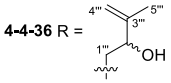
	R1	R2	R3	R4
4-4-33	OMe	H	H	OH
4-4-34	H	OH	OH	H



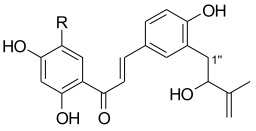
4-4-35



4-4-36 R =



4-4-37 R = Prenyl

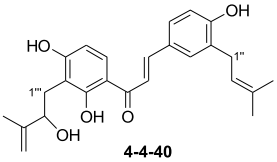


4-4-38 R =

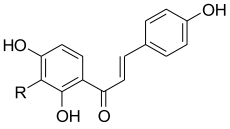


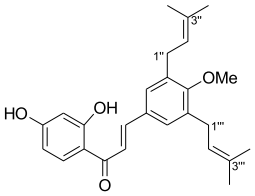
4-4-39 R =





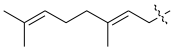
4-4-40



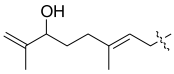


4-4-41

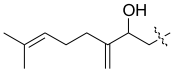
4-4-42 R =



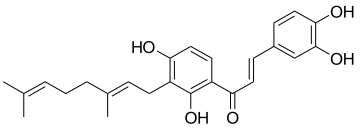
4-4-44 R =



4-4-45 R =



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4-4-43

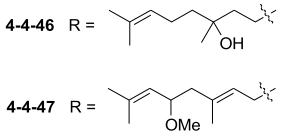


Table 4-4-7: ^{1}H NMR spectroscopic data of chalcone-type chalcones **4-4-18**~**4-4-20**.

H	4-4-18(CD_3CN-D_2O)	4-4-18(CD_3OD)	4-4-19	4-4-20
2, 6	7.56 d(8.4)	7.50 d(8.6)	7.56 d(8.5)	7.58 d(8.5)
3, 5	6.87 d(8.4)	6.87 d(8.6)	6.88 d(8.5)	6.89 d(8.5)
5′	6.09 s	6.02 s	6.10 s	6.11 s
6′	3.88 s(OMe)	3.90 s(OMe)	3.87 s(OMe)	3.88 s(OMe)
α	7.80 d(16.0)	7.79 d(15.7)	7.80 d(15.5)	7.81 d(15.9)
β	7.68 d(16.0)	7.67 d(15.7)	7.67 d(15.5)	7.68 d(15.9)
1″	3.20 d(7.0)	3.23 d(7.2)	2.55 m	3.26 d(7.3)
2″	5.15 t(7.0)	5.20 t(7.2)	1.56 m	5.39 t(7.3)
4″, 5″	1.73 s, 1.64 s	1.75, 1.63 s	1.20 s, 1.20 s	3.86 s, 1.74 s

Table 4-4-8: ^{1}H NMR spectroscopic data of chalcone-type chalcones **4-4-21**~**4-4-23**.

H	4-4-21 (CD_3CN-D_2O)	4-4-21(CD_3OD)	4-4-22	4-4-23
2, 6	7.57 d(8.4)	7.50 d(8.6)	7.57 d(8.8)	7.57 d(8.6)
3, 5	6.88 d(8.4)	6.82 d(8.6)	6.84 d(8.8)	6.96 d(8.6)
4			10.05 s(OH)	3.84 s(OMe)
2′			14.60 s(OH)	
4′			10.47 s(OH)	
5′	6.09 s	6.04 s	6.09 s	6.01 s
6′	3.88 s(OMe)	3.91 s(OMe)	3.88 s(OMe)	3.90 s(OMe)
α	7.80 d(16.0)	7.79 d(15.5)	7.75 d(15.1)	7.83 d(15.5)
β	7.68 d(16.0)	7.68 d(15.5)	7.67 d(15.1)	7.67 d(15.5)
1″	2.87 dd(14.0, 5.0)	2.96 dd(13.8, 5.4)	2.79 dd(13.7, 2.2)	3.23 d(6.4)
	2.77 dd(14.0, 7.5)	2.79 dd(13.8, 7.3)	2.47 dd(13.7, 9.6)	
2″	4.30 dd(7.5, 5.0)	4.33 dd(7.3, 5.4)	3.60 dd(9.6, 2.2)	5.19 d(6.4)
3″			3.16 s(OMe)	
4″	4.79 s, 4.72 s	4.80 s, 4.71 s	1.12 s	1.75 s
5″	1.75 s	1.81 s	1.11 s	1.64 s

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Table 4-4-9: ^{1}H NMR spectroscopic data of chalcone-type chalcones **4-4-24**~**4-4-26**.

H	4-4-24 (CD_3CN-D_2O)	4-4-24(CD_3OD)	4-4-25	4-4-26
2, 6	7.67 d(8.5)	7.62 d(8.7)	7.60 d(8.4)	7.78-7.72 m
3, 5	7.31 d(8.5)	7.35 d(8.7)	6.83 d(8.4)	6.83 d(8.5)
4	–	2.03 s(OAc)		
2′				14.06 s(OH)
5′	6.09 s	6.03 s	6.42 d(9.4)	6.42 d(8.9)
6′	3.88 s(OMe)	3.91 s(OMe)	7.82 d(9.4)	8.02 d(8.9)
α	7.88 d(15.8)	7.88 d(15.5)	7.61 d(15.5)	7.72~7.78 m
β	7.66 d(15.8)	7.68 d(15.5)	7.78 d(15.5)	7.72~7.78 m
1″	3.20 d(7.2)	3.23 d(7.1)	–	2.82 dd(13.0, 6.7)
				2.72 dd(13.0, 6.9)
2″	5.14 t(7.2)	5.20 t(7.1)	5.25 br t(3.3)	4.27 t(6.9)
4″	1.72 s	1.76 s	1.65 s	4.62 s, 4.58 s
5″	1.63 s	1.65 s	1.77 s	1.73 s

Table 4-4-10: ^{1}H NMR spectroscopic data of chalcone-type chalcones **4-4-27**~**4-4-31**.

H	4-4-27	4-4-28	4-4-29	4-4-30	4-4-31
2, 6	7.54 d(8.4)	7.59 d(8.3)	7.51 d(8.5)	7.50 d(8.5)	7.73 d(8.8)
3, 5	6.84 d(8.4)	6.84 d(8.3)	6.83 d(8.5)	6.82 d(8.5)	6.93 d(8.8)
4	10.07 s(OH)	10.09 s(OH)			
2′	14.17 s(OH)	14.20 s(OH)	3.92 s(OMe)	3.90 s(OMe)	
3′			6.07 s	6.02 s	
4′	3.80 s(OMe)	3.91 s(OMe)			
5′	6.11 s	6.27 s			8.02 d(8.8)
6′	10.93 s(OH)	3.98 s(OMe)			6.49 d(8.8)
α	7.98 d(15.5)	7.75 d(15.5)	7.81 d(15.5)	7.80 d(15.5)	7.77 d(15.3)
β	7.69 d(15.5)	7.69 d(15.5)	7.69 d(15.5)	7.67 d(15.5)	7.85 d(15.3)
1″	3.13 s(7.0)	3.16 d(7.0)	2.60 dd(14.3, 10.0)	3.31 (ov)	2.61 dd(14.1, 9.6)
			3.03 dd(14.3, 2.6)		3.26 dd(14.1, 1.5)
2″	5.09 t(7.0)	5.09 t(7.0)	3.56 dd(10.0, 2.6)	5.49 m	3.66 dd(9.6, 1.5)
4″	1.69 s	1.70 s	1.24 s	1.81 br s	1.27 s
5″	1.60 s	1.60 s	1.24 s	3.90 br s	1.30 s

Table 4-4-11: ^{1}H NMR spectroscopic data of chalcone-type chalcones **4-4-32**~**4-4-36**.

H	4-4-32	4-4-33	4-4-34	4-4-35	4-4-36
2	3.83 s(OMe)	3.78 s(OMe)	7.11 or 7.19 d(2.0)	7.27 d(2.1)	7.58 d(2.0)
3	6.64 s				
4				3.94 s(OMe)	
5		6.77 d(8.5)	6.46 dd(9.3, 2.6)	6.86 d(8.2)	6.94 d(8.2)

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Table 4-4-11 (continued)

H	4-4-32	4-4-33	4-4-34	4-4-35	4-4-36
6	7.47 s	7.67 d(8.5)	7.11 or 7.19 d(2.0)	7.13 dd(8.2, 2.1)	7.55 dd(8.3, 2.0)
2′	7.96 d(8.7)	7.64 d(2.5)	13.68 s(OH)	13.45 s(OH)	13.48 s(OH)
3′	6.93 d(8.7)		6.35 d(2.6)	6.45 d(2.4)	6.37 s
5′	6.93 d(8.7)	6.96 d(8.5)	6.46 d(9.3, 2.6)	6.48 dd(8.8, 2.4)	
6′	7.96 d(8.7)	7.63 dd(8.5, 2.5)	8.05 d(9.3)	7.80 d(8.8)	7.99 s
α	7.62 d(15.5)	7.67 d(15.5)	7.63 d(15.4)	7.42 d(15.2)	7.74 d(15.3)
β	8.00 d(15.5)	7.98 d(15.5)	7.74 d(15.4)	7.79 d(15.2)	7.82 d(15.3)
1″	3.84 m	3.40 d(7.0)	3.36 d	4.55 d(6.7)	3.38 d(7.3)
2″		5.27 m	5.37 t(7.2)	5.47 dd(6.7, 6.7)	5.39 br t(7.4)
3″	4.89 d(16)				
4″	1.34 d(7)	1.67 d(0.8)	1.65 s	1.79 s	1.77 s
5″	1.67 s	1.79 d(1.0)	1.72 s	1.74 s	1.76 s
1‴					2.94 dd(14.4, 3.4)
					2.86 dd(14.4, 8.3)
2‴					4.43 dd(8.2, 3.2)
4‴					5.00 br s, 4.82 br s
5‴					1.84 s

Table 4-4-12: ^{1}H NMR spectroscopic data of chalcone-type chalcones **4-4-37**~**4-4-41**.

H	4-4-37	4-4-38	4-4-39	4-4-40	4-4-41
2	7.42 br s	7.62 d(2.1)	7.57 d(2.2)	7.58 d(2.4)	7.33 s
4					3.77 s(OMe)
5	6.87 d(8.3)	6.92 d(8.3)	6.89 d(8.3)	6.92 d(8.4)	
6	7.44 d(8.3)	7.59 dd(8.3, 2.1)	7.58 dd(8.3, 2.2)	7.54 dd(2.4, 8.4)	7.33 s
2′	13.34 s(OH)	13.53 br s(OH)	13.51 br s(OH)		
3′	6.43 br s	6.41 s	6.34 br s		6.44 br s
5′				6.47 d(8.7)	6.45 dd(8.4, 2.0)
6′	7.65 s	7.92 s	8.00 s	7.95 d(8.7)	7.84 d(8.4)
α	7.46 d(15.4)	7.73 d(15.4)	7.75 d(15.3)	7.71 br d(15.6)	7.44 d(16.0)
β	7.84 d(15.4)	7.82 d(15.4)	7.80 d(15.3)	7.82 br d(15.6)	7.83 d(16.0)
1″	3.42 d(7.1)	2.90 dd(4.8, 14.1)	2.91 dd(4.1, 13.6)	3.35 br d(7.5)	3.40 br d(6.8)
		2.96 dd(9.7, 14.1)	3.50 dd(7.2, 13.6)		
2″	5.35 t(7.1)	4.46 dd(4.8, 9.7)	4.44 dd(4.0, 7.8)	5.36 m	5.31 m
4″	1.82 s	4.80 br s, 4.99 br s	4.97 br s, 4.79 br s	1.71 s	1.79 br s
5″	1.82 s	1.84 s	1.82 s	1.73 s	1.77 br s
1‴	3.37 d(7.1)	3.30 d(7.1)	2.91 dd(4.1, 13.6)	2.90 dd(7.8, 16.1)	3.40 br d(6.8)
			3.50 dd(7.2, 13.6)	3.11 dd(3.0, 16.1)	
2‴	5.35 t(7.1)	5.35 br t(7.1)	4.44 dd(4.0, 7.8)	4.41 dd(3.0, 7.8)	5.31 m
4‴	1.82 s	1.75 s	4.97 br s, 4.79 br s	4.76 br s, 4.95 br s	1.79 br s
5‴	1.82 s	1.75 s	1.82 s	1.83 s	1.77 br s

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Table 4-4-13: ^{1}H NMR spectroscopic data of chalcone-type chalcones **4-4-42** and **4-4-44**~**4-4-46**.

H	4-4-42	4-4-44	4-4-45	4-4-46
2, 6	7.55 d(8.6)	7.56 d(8.6)	7.56 d(8.7)	7.67 d(8.4)
3, 5	6.87 d(8.6)	6.88 d(8.6)	6.88 d(7.8)	6.87 d(8.4)
α	7.54 d(15.4)	7.45 d(15.4)	7.47 d(15.4)	7.70 d(15.3)
β	7.83 d(15.4)	7.84 d(15.4)	7.83 d(15.4)	7.78 d(15.3)
2′	13.8 br s(OH)	13.9 br s(OH)	13.9 br s(OH)	13.9 s(OH)
5′	6.42 d(8.9)	6.40 d(8.9)	6.53 d(8.9)	6.45 d(8.8)
6′	7.71 d(8.9)	7.71 d(8.9)	7.75 d(8.9)	7.91 d(8.8)
1″	3.49 d(7.2)	3.49 t(7.1)	2.83 dd(14.9, 8.5) 3.25 dd(14.9, 1.9)	2.71 m
2″	5.31 t(7.2)	5.34 t(7.0)	4.43 d(8.3)	1.65 m
4″	2.10 m	2.12 m	2.18 br s	1.50 m
5″	2.10 m	1.68 m	2.18 br s	2.08 m
6″	5.06 t(6.1)	4.05 t(6.2)	5.16 m	5.10 tt(7.3, 1.5)
8″	1.67 s	4.83 br s, 4.92 br s	1.70 s	1.58 s
9″	1.59 s	1.72 s	1.63 s	1.61 s
10″	1.83 s	1.85 s	4.92 br s, 5.11 br s	1.19 s
OMe				

Table 4-4-14: ^{1}H NMR spectroscopic data of chalcone-type chalcones **4-4-43** and **4-4-47**.

H	4-4-43	4-4-47	H	4-4-43	4-4-47
2	7.18 d(1.7)	7.57 d(8.6)	1″	3.49 d(7.1)	3.56 dd(16.1, 6.4) 3.46 dd(16.1, 8.1)
3		6.88 d(8.6)	2″	5.30 t(6.8)	5.38 dd(8.1, 6.4)
5	6.90 d(8.2)	6.88 d(8.6)	4″	2.10 m	2.34 dd(13.5, 8.2) 2.15 dd(13.5, 5.4)
6	7.13 dd(8.2, 1.7)	7.57 d(8.6)	5″	2.10 m	4.06 ddd(9.2, 8.2, 5.4)
α	7.41 d(15.4)	7.47 d(15.4)	6″	5.06 t(6.0)	4.99 d(9.2)
β	7.76 d(15.4)	7.84 d(15.4)	8″	1.67 s	1.75 s
2′	13.8 br s(OH)		9″	1.59 s	1.69 s
5′	6.42 d(8.9)	6.43 d(8.9)	10″	1.83 s	1.85 s
6′	7.70 d(8.9)	7.72 d(8.9)	OMe		3.25 s

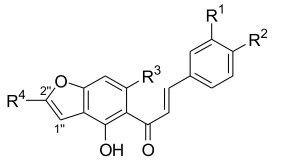
Table 4-4-15: Cos, MFs, and TSs of chalcone-type chalcones **4-4-48**~**4-4-62**.

No.	Compounds	MFs	Test solvents	References
4-4-48	2′-hydroxy-3,4-dimethoxy-[2″,3″:4′,3′]-furanochalcone	$C_{19}H_{16}O_5$	$CDCl_3$	[321]
4-4-49	2″-(2‴-hydroxyisopropyl)-furano[4″,5″:3′,4′]4,2′-dihydroxy-6′-methoxychalcone	$C_{21}H_{20}O_6$	CD_3CN-D_2O	[312]
4-4-50	2″-isopropyl-furano[4″,5″:3′,4′]4,2′-dihydroxy-6′-methoxy-chalcone	$C_{21}H_{20}O_5$	CD_3OD	[312]

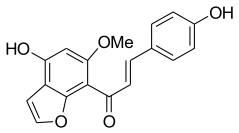
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Table 4-4-15 (continued)

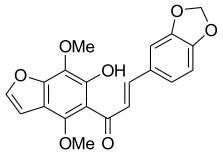
No.	Compounds	MFs	Test solvents	References
4-4-51	furano[4″,5″:3′,4′]4,2′-dihydroxy-6′-methoxychalcone	$C_{18}H_{14}O_5$	CD_3OD	[312]
4-4-52	furano[4″,5″:2′,3′]4,4′-dihydroxy-6′-methoxychalcone	$C_{18}H_{14}O_5$	CD_3OD	[312]
4-4-53	3,4-methylenedioxy-2′-hydroxy-3′,6′-dimethoxy-[2″,3″:4′,5′]-furanochalcone	$C_{20}H_{16}O_7$	$CDCl_3$	[329]
4-4-54	2″-(2‴-hydroxyisopropyl)-dihydrofurano[4″,5″:3′,4′]2′,4-dihydroxy-6′-methoxy chalcone	$C_{21}H_{22}O_6$	CD_3CN-D_2O	[312]
	(*E*)-2″-(2‴-hydroxyisopropyl)-dihydrofurano[2″,3″:4′,3′]-2′,4-dihydroxy-6′-methoxychalcone	$C_{21}H_{22}O_6$	$CDCl_3$	[330]
4-4-55	2″-(2‴-hydroxyisopropyl)-3″-methoxy-2′,3′-dihydrofurano-[4″,5″:3′,4′]2′,4-dihydroxy-6′-methoxychalcone	$C_{22}H_{24}O_7$	CD_3OD	[312]
4-4-56	2″-(2‴-hydroxyisopropyl)-2″,3″-dihydrofurano[4″,5″:2′,3′]-4,4′-dihydroxy-6′-methoxychalcone	$C_{21}H_{22}O_6$	CD_3OD	[312]
	5″-(2‴-hydroxyisopropyl)dihydrofurano-[2″,3″-B]-4,4′-dihydroxy-6′-methoxychalcone	$C_{21}H_{22}O_6$	DMSO-d_6	[331]
	(*E*)-2″-(2‴-hydroxyisopropyl)-dihydrofurano[2″,3″:2′,3′]-4′-hydroxy-6′-methoxychalcone	$C_{21}H_{22}O_6$	$CDCl_3$	[330]
4-4-57	2″-(2‴-hydroxyisopropyl)-3″-hydroxy-2″,3″-dihydrofurano[4″,5″:2′,3′]4,4′-dihydroxy-6′-methoxychalcone	$C_{21}H_{22}O_7$	CD_3OD	[312]
4-4-58	licoagrochalcone D	$C_{21}H_{22}O_5$	CD_3COCD_3	[319]
4-4-59	cedrediprenone	$C_{25}H_{28}O_5$	CD_3OD	[332]
4-4-60	bartericin B	$C_{25}H_{28}O_5$	CD_3COCD_3 $CDCl_3$	[322]
4-4-61	hedysarumine B	$C_{25}H_{28}O_5$	CD_3COCD_3	[324]
4-4-62	(+)-tephropurpurin	$C_{24}H_{24}O_7$	$CDCl_3$	[333]



	R^1	R^2	R^3	R^4
4-4-48	OMe	OMe	H	H
4-4-49	H	OH	OMe	
4-4-50	H	OH	OMe	
4-4-51	H	OH	OMe	H

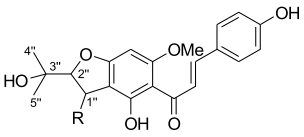


4-4-52

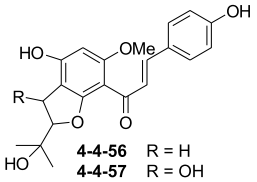


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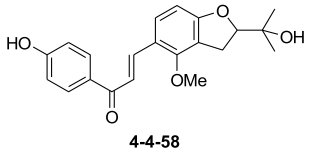
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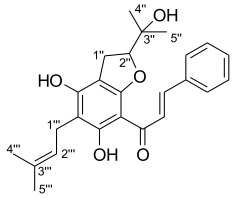
4-4-54 R = H
4-4-55 R = OMe



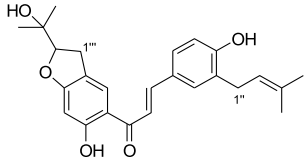
4-4-56 R = H
4-4-57 R = OH



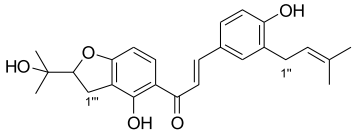
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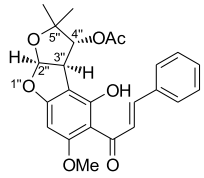
4-4-59



4-4-60



4-4-61



4-4-62

Table 4-4-16: ^{1}H NMR spectroscopic data of chalcone-type chalcones **4-4-48**~**4-4-52**.

H	4-4-48	4-4-49	4-4-50	4-4-51	4-4-52
2	7.17d(2.1)	7.59 d(8.5)	7.52 d(8.5)	7.54 d(8.5)	7.49 d(8.5)
3	3.96 s(OMe)	6.89 d(8.5)	6.83 d(8.5)	6.84 d(8.5)	6.81 d(8.5)
4	3.93 s(OMe)				
5	6.91 d(8.2)	6.89 d(8.5)	6.83 d(8.5)	6.84 d(8.5)	6.81 d(8.5)
6	7.27 dd(8.2, 2.1)	7.59 d(8.5)	7.52 d(8.5)	7.54 d(8.5)	7.49 d(8.5)
2′	14.07 s(OH)				
5′	7.08 dd(8.8, 0.9)	6.67 s	6.68 s	6.77 s	6.41 s
6′	7.85 d(8.8)	3.95 s(OMe)	3.97 s(OMe)	4.00 s(OMe)	3.88 s(OMe)
α	7.53 d(15.5)	7.73 s	7.73 s	7.75 s	7.29 d(16.0)
β	7.89 d(15.5)	7.73 s	7.74 s	7.75 s	7.53 d(16.0)
1″	7.01 dd(2.1, 0.9)	6.75 s	6.43 s	6.87 d(2.2)	6.85 d(2.2)
2″	7.57 d(2.1)			7.58 d(2.2)	7.75 d(2.2)
3″			3.03 m		
4″, 5″		1.57 s	1.32 d(7.3)		

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Table 4-4-17: ^{1}H NMR spectroscopic data of chalcone-type chalcones **4-4-53**, **4-4-54**, and **4-4-58**.

H	4-4-53	4-4-54 (CD_3CN-D_2O)	4-4-54($CDCl_3$)	4-4-58
2	7.17 s	7.57 d(8.5)	7.49 d(8.4)	4.00 s(OMe)
3		6.88 d(8.5)	6.86 d(8.4)	
5	6.84 d(8.0)	6.88 d(8.5)	6.86 d(8.4)	6.53 d(8.5)
6	6.11 dd(8.0, 1.6)	7.57 d(8.5)	7.49 d(8.4)	7.71 d(8.5)
2′	12.10 s(OH)		14.42 (OH)	8.06 d(8.5)
3′				6.96 d(8.5)
5′	3.98 s(OMe)	6.15 s	6.01 s	6.96 d(8.5)
6′	4.02 s(OMe)	3.90 s(OMe)	3.91 s(OMe)	8.06 d(8.5)
α	7.46 d(16.0)	7.76 d(16.0)	7.75 s	7.70 d(16.5)
β	7.67 d(16.0)	7.68 d915.3)	7.75 s	8.04 d(16.5)
1″	6.79 d(2.2)	2.93 dd(15.1, 8.0)	3.05 dd(15.1, 8.1)	3.43 dd(16.0, 10.0)
		3.06 dd(15.1, 9.4)	3.13 dd(15.1, 8.1)	3.44 dd(16.0, 8.0)
2″	7.66 d(2.2)	4.75 dd(9.4, 8.0)	4.77 t(8.5)	4.71 dd(10.0, 8.0)
4″, 5″		1.21 s, 1.16 s	1.37 s, 1.26 s	1.25 s, 1.28 s
OCH_2O	6.03 s			

Table 4-4-18: ^{1}H NMR spectroscopic data of chalcone-type chalcones **4-4-55**~**4-4-57**.

H	4-4-55	4-4-56(CD_3OD)	4-4-56(DMSO-d_6)	4-4-56($CDCl_3$)	4-4-57
2	7.51 d(8.5)	7.47 d(8.5)	7.45 d(8.8)	7.40 d(8.4)	7.42 d(8.5)
3	6.82 d(8.5)	6.79 d(8.5)	6.75 d(8.8)	6.79 d(8.4)	6.79 d(8.5)
5	6.82 d(8.5)	6.79 d(8.5)	6.75 d(8.8)	6.79 d(8.4)	6.79 d(8.5)
6	7.51 d(8.5)	7.47 d(8.5)	7.45 d(8.8)	7.40 d(8.4)	7.42 d(8.5)
5′	5.96 s	6.01 s	5.95 s	5.93 s	6.16 s
6′	3.91 s(OMe)	3.76 s(OMe)	3.62 s(OMe)	3.72 s(OMe)	3.71 s(OMe)
α	7.78 d(15.5)	7.12 d(16.0)	6.97 d(16.0)	7.05 d(15.7)	6.75 d(16.0)
β	7.72 d(15.5)	7.49 d(16.0)	7.26 d(16.0)	7.52 d(15.7)	7.23 d(16.0)
1″	3.74 d(4.4)	3.00 dd(16.0, 8.5)	2.90 dd(16.0, 9.0)	3.00 m	3.59 d(7.1)
	3.65 s(OMe)	3.03 dd(16.0, 9.4)	2.93 dd(16.0, 9.0)		
2″	4.47 d(4.4)	4.65 dd(9.4, 8.5)	4.52 t(9.0)	4.59 t(8.9)	4.71 d(7.1)
4″, 5″	1.42 s, 1.39 s	1.26 s, 1.18 s	1.07 s, 1.06 s	1.30 s, 1.12 s	1.31 s, 1.16 s

Table 4-4-19: ^{1}H NMR spectroscopic data of chalcone-type chalcones **4-4-59**~**4-4-62**.

H	4-4-59	4-4-60(CD_3COCD_3)	4-4-60($CDCl_3$)	4-4-61	4-4-62
2	7.65 m	7.62 d(1.9)	7.42 d(2.0)	7.61 br s	7.61 m
3	7.37 m				7.39 m
4	7.37 m				7.39 m
5	7.37 m	6.95 d(8.3)	6.87 d(8.3)	6.91 br d(6.9)	7.39 m
6	7.65 m	7.59 dd(8.2, 2.0)	7.48 dd(2.0, 8.3)	7.56 br d(6.9)	7.61 m
2′		14.02 s(OH)	13.81 s(OH)		3.94 s(OMe)
3′		6.25 br s	6.43 s		5.99 s

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Table 4-4-19 (continued)

H	4-4-59	4-4-60(CD_3COCD_3)	4-4-60($CDCl_3$)	4-4-61	4-4-62
5′				6.37 d(8.1)	
6′		8.02 s	7.72 s	8.02 d(8.1)	14.28 s(OH)
α	8.20 d(15.8)	7.75 d(15.3)	7.43 d(15.4)	7.72 d(15.3)	7.85 d(15.5)
β	7.74 d(15.8)	7.83 d(15.3)	7.84 d(15.3)	7.81 d(15.3)	7.78 d(15.5)
1″	3.04 m	3.38 d(7.1)	3.42 d(7.2)	3.35 br d(7.2)	
2″	4.78 t(8.6)	5.39 br t(7.2)	5.35 dt(1.4, 7.2)	5.36 m	6.47 d(6.2)
3″					4.03 d(6.2)
4″	1.38 s	1.77 s	1.83 s	1.71 s	5.43 s 2.16 s(OAc)
5″	1.28 s	1.75 s	1.83 s	1.73 s	1.12 s, 1.27 s
1‴	3.25 d(7.6)	3.25 dd(7.6, 15.4) 3.18 dd(9.7, 15.3)	3.16 d(8.5)	3.13 m	
2‴	5.16 t(6.8)	4.77 br t(7.7)	4.74 t(8.6)	4.79 dd(9.6, 1.8)	
4‴	1.74 s	1.29 s	1.37 s	1.23 s	
5‴	1.63 s	1.24 s	1.26 s	1.27 s	

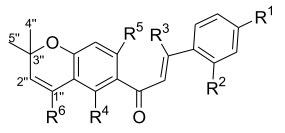
Table 4-4-20: Cos, MFs, and TSs of chalcone-type chalcones **4-4-63**~**4-4-93**.

No.	Compounds	MFs	Test solvents	References
4-4-63	2″,2″-dimethyl-(2*H*)-pyrano[5″,6″:3′,4′]2′,4-dihydroxy-6′-methoxychalcone	$C_{21}H_{20}O_5$	CD_3CN-D_2O	[312]
	dehydrocycloxanthohumol	$C_{21}H_{20}O_5$	DMSO-d_6	[334]
4-4-64	4″-methoxy-2″,2″-dimethyl-(2*H*)-pyrano[5″,6″:3′,4′]2′,4-dihydroxy-6′-methoxychalcone	$C_{22}H_{22}O_6$	CD_3OD	[312]
4-4-65	3″,3″-dimethylpyrano[3′,4′]2,4,2′-trihydroxychalcone	$C_{20}H_{18}O_5$	CD_3OD	[335]
4-4-66	7-methoxypraecansone B	$C_{23}H_{24}O_5$	$CDCl_3$	[336]
4-4-67	2″,2″-dimethyl-3″,4″-dihydro-(2*H*)-pyrano[2″,3″:3′,4′]2′,4-dihydroxy-6′-methoxychalcone	$C_{21}H_{22}O_5$	CD_3OD	[312]
4-4-68	3′,4′-(3-hydroxy-2,2-dimethyldihydropyrano)-4,2′-di-hydroxychalcone	$C_{20}H_{20}O_5$	CD_3OD	[337]
4-4-69	xanthohumol B	$C_{21}H_{22}O_6$	DMSO-d_6	[303]
4-4-70	dorsmannin A	$C_{20}H_{20}O_4$	$CDCl_3$	[338]
4-4-71	3,4-dimethoxy-2′-hydroxy-6″,6″-dimethylchromeno-[2″,3″:4′,3′]-chalcone	$C_{22}H_{22}O_5$	$CDCl_3$	[329]
4-4-72	2′-methoxy-4,6′-dihydroxylonchocarpin	$C_{22}H_{22}O_5$	$CDCl_3$	[339]
4-4-73	1″,2″-dihydroxanthohumol C	$C_{21}H_{22}O_5$	CD_3OD	[316]
4-4-74	desmethylxanthohumol B	$C_{20}H_{20}O_6$	CD_3OD	[316]
4-4-75	6′-methoxyhelikrausichalcone	$C_{21}H_{22}O_5$	CD_3OD	[332]
4-4-76	2′-hydroxy-3,4,4′,5-tetramethoxy-5′,6′-(2″,2″-dimethyl-pyrano)chalcone	$C_{24}H_{26}O_7$	–	[301]
4-4-77	2′-hydroxy-4,4′-dimethoxy-5′,6′-(2″,2″-dimethylpyrano)-chalcone	$C_{22}H_{22}O_5$	$CDCl_3$	[301]

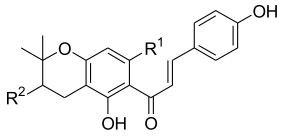
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Table 4-4-20 (continued)

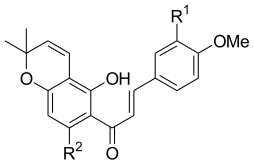
No.	Compounds	MFs	Test solvents	References
4-4-78	2′-hydroxy-3,4,4′-trimethoxy-5′,6′-(2″,2″-dimethyl-pyrano)chalcone	$C_{23}H_{24}O_6$	$CDCl_3$	[301]
4-4-79	cedreprenone	$C_{21}H_{20}O_4$	CD_3OD	[332]
4-4-80	2″,2″-dimethyl-3″,4″-dihydro-(2*H*)-pyrano[5″,6″:2′,3′]4,4′-dihydroxy-6′-methoxychalcone	$C_{21}H_{22}O_5$	CD_3OD	[312]
4-4-81	2″,2″-dimethyl-3″-hydroxy-4″,5″-dihydro-(2*H*)-pyrano-[5″,6″:2′,3′]4,4′-dihydroxy-6′-methoxychalcone	$C_{21}H_{22}O_6$	CD_3OD	[312]
4-4-82	licoagrochalcone B	$C_{21}H_{20}O_4$	CD_3COCD_3	[319]
4-4-83	bartericin C	$C_{25}H_{28}O_5$	$CDCl_3$	[322]
4-4-84	3,4,4′,5′-bis-(2,2-dimethylchromano)-2′-hydroxychalcone	$C_{25}H_{28}O_4$	$CDCl_3$	[314]
4-4-85	xanthohumol E	$C_{25}H_{26}O_5$	DMSO-d_6	[303]
4-4-86	angusticornin A	$C_{25}H_{26}O_5$	$CDCl_3$	[323]
4-4-87	xanthoangelol I	$C_{25}H_{28}O_4$	CD_3OD	[327]
4-4-88	1-(3,4-dihydro-3,5-dihydroxy-2-methyl-2-(3-methyl-2-butenyl)-2*H*-1-benzopyran-6-yl-3-(4-hydroxyphenyl)-2(*E*)-propen-1-one	$C_{25}H_{28}O_5$	$CDCl_3$-CD_3OD (10:1)	[328]
4-4-89	cyclokuraridin	$C_{26}H_{30}O_6$	CD_3COCD_3	[340]
4-4-90	mallotophilippen C	$C_{30}H_{34}O_5$	$CDCl_3$	[341]
4-4-91	mallotophilippen D	$C_{30}H_{34}O_6$	$CDCl_3$	[341]
4-4-92	poinsettifolin B	$C_{30}H_{34}O_5$	$CDCl_3$-CD_3OD (9:1)	[342]
4-4-93	tonkinochromane C	$C_{30}H_{34}O_4$	CD_3COCD_3	[343]



	R^1	R^2	R^3	R^4	R^5	R^6
4-4-63	OH	H	H	OH	OMe	H
4-4-64	OH	H	H	OH	OMe	OMe
4-4-65	OH	OH	H	OH	H	H
4-4-66	H	H	OMe	OMe	OMe	H

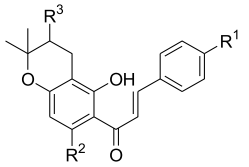


	R^1	R^2
4-4-67	OMe	H
4-4-68	H	OH
4-4-69	OMe	OH
4-4-70	H	H

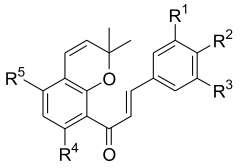


	R^1	R^2
4-4-71	OMe	H
4-4-72	H	OMe

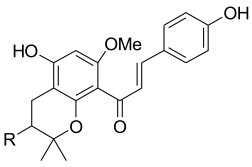
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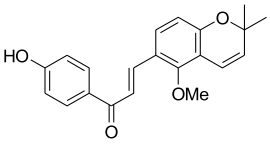
	R^1	R^2	R^3
4-4-73	OH	OMe	H
4-4-74	OH	OH	OH
4-4-75	H	OMe	OH



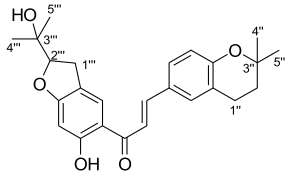
	R^1	R^2	R^3	R^4	R^5
4-4-76	OMe	OMe	OMe	OH	OMe
4-4-77	H	OMe	H	OH	OMe
4-4-78	H	OMe	OMe	OH	OMe
4-4-79	H	H	H	OMe	OH



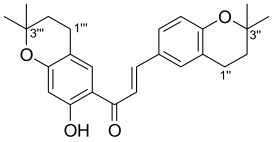
4-4-80 R = H
4-4-81 R = OH



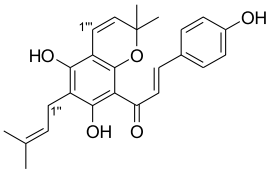
4-4-82



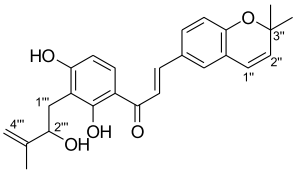
4-4-83



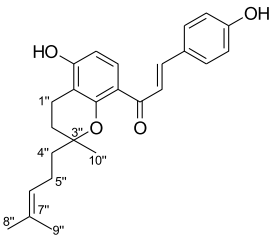
4-4-84



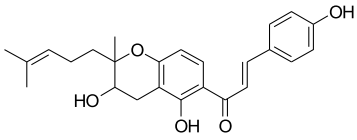
4-4-85



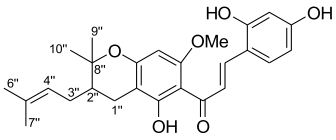
4-4-86



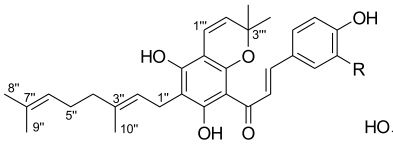
4-4-87



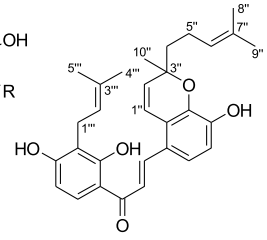
4-4-88



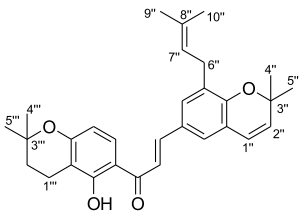
4-4-89



4-4-90 R = H
4-4-91 R = OH



4-4-92



4-4-93

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Table 4-4-21: ^{1}H NMR spectroscopic data of chalcone-type chalcones **4-4-63**~**4-4-66**.

H	4-4-63(CD_3CN-D_2O)	4-4-63(DMSO-d_6)	4-4-64	4-4-65	4-4-66
2	7.58 d(8.6)	7.60 d(8.4)	7.53 d(8.9)		7.23 m
3	6.88 d(8.6)	6.85 d(8.4)	6.83 d(8.9)	6.34 d(2.2)	7.17 m
4		10.11 s(OH)			7.22 m
5	6.88 d(8.6)	6.85 d(8.4)	6.83 d(8.9)	6.36 dd(8.6, 2.2)	7.17 m
6	7.58 d(8.6)	7.60 d(8.4)	7.53 d(8.9)	7.51 d(8.6)	7.32 m
2′		14.61 s(OH)			3.73 s(OMe)
5′	6.02 s	6.11 s	6.79 s	6.35 d(8.8)	5.88 s
6′	3.92 s(OMe)	3.93 s(OMe)	3.99 s(OMe)	7.84 d(8.8)	3.67 s(OMe)
α	7.79 d(15.3)	7.72 s	7.74 s	7.70 d(15.2)	5.89 s
β	7.72 d(15.3)	7.72 s	7.74 s	8.12 d(15.2)	3.84 s(OMe)
1″	6.60 d(10.4)	6.56 d(10.0)	3.10 s(OMe)	6.71 d(10.0)	6.37 d(9.9)
2″	5.58 d(10.4)	5.61 d(10.0)	6.74 s	5.66 d(10.0)	5.45 d(9.9)
4″, 5″	1.42 s, 1.42 s	1.42 s, 1.42 s	1.59 s, 1.59 s	1.44 s, 1.44 s	1.37 s, 1.37 s

Table 4-4-22: ^{1}H NMR spectroscopic data of chalcone-type chalcones **4-4-67**~**4-4-71**.

H	4-4-67	4-4-68	4-4-69	4-4-70	4-4-71
2	7.51 d(8.5)	7.53 d(8.7)	7.58 d(8.7)	7.55 d(8.6)	7.16 d(1.8)
3	6.83 d(8.5)	6.85 d(8.6)	6.84 d(8.7)	6.88 d(8.6)	
4			10.09 br s(OH)		
5	6.83 d(8.5)	6.85 d(8.6)	6.84 d(8.7)	6.88 d(8.6)	6.91 d(8.1)
6	7.51 d(8.5)	7.53 d(8.7)	7.58 d(8.7)	7.55 d(8.6)	7.25 dd(8.1, 1.8)
2′			14.78 s(OH)	13.97 br s(OH)	13.78 s(OH)
5′	5.96 s	6.46 d(8.5)	6.01 s	6.39 d(9.0)	6.39 d(8.8)
6′	3.90 s(OMe)	7.49 d(8.6)	3.88 s(OMe)	7.70 d(9.0)	7.7 d(8.8)
α	7.82 d(15.5)	7.57 d(15.2)	7.77 d(15.5)	7.47 d(15.4)	7.42 d(15.3)
β	7.70 d(15.5)	7.59 d(15.4)	7.70 d(15.5)	7.84 d(15.4)	7.84 d(15.3)
1″	2.60 t(7.0)	2.97 dd(17.2, 5.5)	2.71 dd(16.5, 5.2)	2.73 t(6.8)	6.76 d(10.0)
		2.64 dd(17.2, 7.0)	2.38 dd(16.5, 7.0)		
2″	1.81 t(7.0)	3.85 dd(7.0, 5.5)	3.66 dd(6.9, 5.3)	1.84 t(6.8)	5.60 d(10.0)
4″, 5″	1.34 s, 1.34 s	1.42 s, 1.37 s	1.29 s, 1.22 s	1.37 s, 1.37 s	1.47 s, 1.47 s
OMe					3.97 s, 3.94 s

Table 4-4-23: ^{1}H NMR spectroscopic data of chalcone-type chalcones **4-4-72**~**4-4-74**, **4-4-76**, and **4-4-77**.

H	4-4-72	4-4-73	4-4-74	4-4-76	4-4-77
2, 6	7.57 d(8.5)	7.50 d(8.5)	7.50 d(8.5)	6.86 s	7.56 d(8.6)
3, 5	6.95 d(8.5)	6.83 d(8.5)	6.83 d(8.5)		6.93 d(8.6)
2′	3.86 s(OMe)			14.24 s(OH)	14.31 s(OH)
5′	6.07 s	5.95 s	5.93 s	6.07 s	6.06 s
α	8.04 d(15.6)	7.82 d(15.6)	7.94 d(15.6)	8.05 d(16)	8.02 d(15.5)
β	7.79 d(15.6)	7.70 d(15.6)	7.63 d(15.6)	7.72 d(16)	7.77 d(15.5)

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Table 4-4-23 (continued)

H	4-4-72	4-4-73	4-4-74	4-4-76	4-4-77
1″	6.60 d(9.9)	2.59 t(6.8)	2.85 dd(16.9, 5.5) 2.51 dd(16.9, 6.9)	6.60 d(12)	6.58 d(9.8)
2″	5.46 d(9.9)	1.81 t(6.8)	3.79 dd(6.9, 5.5)	5.47 d(12)	5.45 d(9.8)
4″, 5″	1.56 s, 1.56 s	1.34 s, 1.34 s	1.39 s, 1.45 s	1.50 s, 1.50 s	1.55 s, 1.55 s
OMe		3.90 s		3.87 s, 3.90 s 3.90 s, 3.91 s	3.86 s 3.86 s

Table 4-4-24: ^{1}H NMR spectroscopic data of chalcone-type chalcones **4-4-75** and **4-4-78**~**4-4-81**.

H	4-4-75	4-4-78	4-4-79	4-4-80	4-4-81
2	7.61 m	7.16 d(2.0)	7.62 m	7.40 d(9.7)	7.38 d(8.6)
3	7.40 m		7.41 m	6.79 d(9.7)	6.77 d(8.6)
4	7.40 m		7.41 m		
5	7.40 m	6.90 d(8.3)	7.41 m	6.79 d(9.7)	6.77 d(8.6)
6	7.61 m	7.20 dd(8.3, 2.0)	7.62 m	7.40 d(9.7)	7.38 d(8.6)
2′		14.34 s(OH)			
5′	6.10 s	6.07 s	6.10 s	6.10 s	6.09 s
α	7.65 d(15.8)	8.03 d(15.5)	7.71 d(15.8)	6.76 d(16.0)	6.74 d(15.3)
β	8.04 d(15.8)	7.76 d(15.5)	8.09 d(15.8)	7.23 d(16.0)	7.22 d(15.3)
1″	2.80 dd(17.0, 5.5) 2.47 dd(17.0, 6.8)	6.60 d(9.9)	6.56 d(9.9)	2.61 t(7.0)	2.84 dd(16.7, 5.7) 2.47 dd(16.7, 5.7)
2″	3.77 dd(6.8, 5.5)	5.47 d(9.9)	5.52 d(9.9)	1.75 t(7.5)	3.67 dd(7.5, 5.7)
4″, 5″	1.36 s, 1.41 s	1.56 s, 1.56 s	1.52 s, 1.52 s	1.21 s, 1.21 s	1.20 s, 1.13 s
OMe	3.84 s	3.86 s, 3.93 s, 3.94 s	3.86 s	3.68 s	3.65 s

Table 4-4-25: ^{1}H NMR spectroscopic data of chalcone-type chalcones **4-4-82**~**4-4-86**.

H	4-4-82	4-4-83	4-4-84	4-4-85	4-4-86
2	3.83 s(OMe)	7.39 d(1.8)	7.37 br s	7.54 d(8.6)	7.30 d(2.0)
3				6.86 d(8.6)	
4				9.95 s(OH)	
5	6.65 dd(8.5, 0.5)	6.84 d(8.5)	6.82 d(8.5)	6.86 d(8.6)	6.83 d(8.4)
6	7.77 d(8.5)	7.47 dd(8.5, 1.8)	7.47 dd(8.5, 2.2)	7.54 d(8.6)	7.44 dd(8.4, 2.0)
2′	8.08 d(8.5)	13.86 s(OH)	13.16 s(OH)	14.38 s(OH)	13.98 br s(OH)
3′	6.98 d(8.5)	6.43 br s	7.45 s		
4′				10.11 s(OH)	9.08 br s(OH)
5′	6.98 d(8.5)				6.55 d(9.0)
6′	8.08 d(8.5)	7.72 s	7.63 br s		7.89 d(9.0)
α	7.77 d(15.5)	7.43 d(15.3)	7.39 d(15.2)	7.90 d(15.5)	7.78 d(15.3)
β	7.98 d(15.5)	7.85 d(15.3)	7.82 d(15.2)	7.68 d(15.5)	7.83 d(15.3)
1″	6.67 dd(10.0, 0.5)	2.85 t(6.7)	2.81 q(6.8)	3.21 d(7.0)	6.38 d(10.0)
2″	5.84 d(10.0)	1.87 t(6.7)	1.84 t(6.8)	5.12 t(7.0)	5.70 d(10.0)
4″, 5″	1.45 s, 1.45 s	1.39 s, 1.38 s	1.37 s, 1.37 s	1.71 s, 1.62 s	1.48 s, 1.48 s

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Table 4-4-25 (continued)

H	4-4-82	4-4-83	4-4-84	4-4-85	4-4-86
1‴		3.16 d(8.7)	2.81 q(6.8)	6.66 d(9.9)	2.92 dd(14.9, 8.4) 3.22 dd(14.9, 2.0)
2‴		4.74 t(8.7)	1.84 t(6.8)	5.60 d(9.9)	4.44 br d(8.0) 2.58 br s(OH)
4‴		1.28 s	1.37 s	1.49 s	4.90 br s, 5.00 br s
5‴		1.26 s	1.37 s	1.49 s	1.90 s

Table 4-4-26: ^{1}H NMR spectroscopic data of chalcone-type chalcones **4-4-87**~**4-4-89**.

H	4-4-87	4-4-88	4-4-89
2	7.47 d(8.5)	7.46 d(8.7)	
3	6.80 d(8.5)	6.82 d(8.7)	
5	6.80 d(8.5)	6.82 d(8.7)	5.91 s
6	7.47 d(8.5)	7.46 d(8.7)	
2′			15.08 s(OH)
3′			6.49 d(2.0)
5′	6.40 d(8.5)	6.44 d(8.5)	6.44 dd(8.8, 2.0)
6′	7.44 d(8.5)	7.52 d(8.5)	7.52 d(8.8)
α	–	7.50 d(15.7)	8.02 d(15.6)
β	7.55 d(15.6)	7.61 d(15.7)	8.15 d(15.6)
1″	2.67 m	2.97 dd(17.1, 5.6)	2.72 dd(16.8, 5.2)
	2.72 m	2.65 dd(17.1, 7.2)	2.14 dd(16.8, 10.0)
2″	1.86 m	3.91 dd(7.2, 5.6)	1.73 m
3″			2.27 m, 1.87 m
4″	1.67 m	1.71 m	5.20 t(6.8)
5″	2.12 br q(7.8)	2.13 m	
6″	5.03 tt(7.6, 1.5)	5.01 t(7.0)	1.53 s
7″			1.66 s
8″	1.44 s	1.60 s	
9″	1.60 s	1.43 s	1.42 s
10″	1.35 s	1.34 s	1.23 s
OMe			3.91 s

Table 4-4-27: ^{1}H NMR spectroscopic data of chalcone-type chalcones **4-4-90**~**4-4-93**.

H	4-4-90	4-4-91	4-4-92	4-4-93
2	7.51 d(8.5)	7.11 d(1.9)		7.46 d(2.0)
3	6.87 d(8.5)			
4	5.45 s(OH)			
5	6.87 d(8.5)	6.89 d(8.2)	6.68 d(8.5)	
6	7.51 d(8.5)	7.08 dd(8.2, 1.9)	7.12 d(8.5)	7.51 d(2.0)
2′				14.13 s(OH)
5′	6.43 s(OH)		6.31 d(9.0)	6.33 d(8.9)

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Table 4-4-27 (continued)

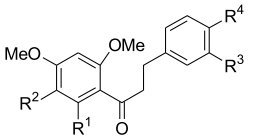
H	4-4-90	4-4-91	4-4-92	4-4-93
6′			7.55 d(9.0)	7.94 d(8.9)
7′	14.6 s(OH)	14.6 s(OH)		
α	8.01 d(15.7)	7.96 d(15.7)	7.32 d(15.2)	7.76 d(15.4)
β	7.74 d(15.7)	7.65 d(15.7)	7.99 d(15.2)	7.80 d(15.4)
1″	3.43 d(7.1)	3.43 d(7.1)	6.74 d(10.2)	6.54 or 5.81 d(9.8)
2″	5.31 t(7.1)	5.3 t(7.1)	5.65 d(10.2)	6.54 or 5.81 d(9.8)
4″	2.12 t(7.1)	2.12 t(7.1)	1.60 dd(11, 7) 1.66 dd(11, 7)	1.44 s
5″	2.12 m	2.12 m	1.99 m	1.44 s
6″	5.05 t(7.1)	5.05 t(7.1)	4.96 t(7.2)	3.30 d(7.4)
7″				5.30 br t(7.4)
8″	1.69 s	1.69 s	1.44 s	
9″	1.61 s	1.61 s	1.53 s	1.71 s
10″	1.83 s	1.82 s	1.32 s	1.76 s
1‴	6.58 d(9.9)	6.57 d(9.9)	3.26 d(7.2)	2.67 t(6.8)
2‴	5.47 d(9.9)	5.46 d(9.9)	5.14 t(7.2)	1.84 t(6.8)
4‴, 5‴	1.54 s, 1.54 s	1.53 s, 1.53 s	1.68 s, 1.56 s	1.34 s, 1.34 s

4.4.2 Dihydrochalcone-type chalcones

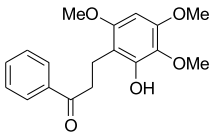
Table 4-4-28: Cos, MFs, and TSs of dihydrochalcone-type chalcones **4-4-94**~**4-4-109**.

No.	Compounds	MFs	Test solvents	References
4-4-94	2′,4′,6′-trimethoxy-3,4-methylenedioxydihydrochalcone	$C_{19}H_{20}O_6$	$CDCl_3$	[308]
4-4-95	2′-hydroxy-3′,4′,6′-trimethoxydihydrochalcone	$C_{18}H_{20}O_5$	CD_3COCD_3	[344]
4-4-96	2-hydroxy-3,4,6-trimethoxydihydrochalcone	$C_{18}H_{20}O_5$	CD_3COCD_3	[344]
4-4-97	4,2′,4′,β-tetrahydroxy-6′-methoxy-α,β-dihydrochalcone	$C_{16}H_{16}O_6$	C_5D_5N	[302]
4-4-98	(–)-2′,4′,6′-trihydroxy-3′-methoxy-α-hydroxymethyl-β-hydroxy-dihydrochalcone	$C_{17}H_{18}O_7$	$CDCl_3$-DMSO-d_6	[345]
4-4-99	dihydroxanthohumol	$C_{21}H_{24}O_5$	DMSO-d_6	[313]
4-4-100	brosimacutin H	$C_{20}H_{24}O_6$	CD_3OD	[346]
4-4-101	brosimacutin I	$C_{20}H_{24}O_6$	CD_3OD	[346]
4-4-102	deoxydihydroxanthoangelol H	$C_{21}H_{24}O_4$	CD_3OD	[327]
4-4-103	pierotin B	$C_{22}H_{18}O_7$	DMSO-d_6	[347]
4-4-104	longicaudatin	$C_{26}H_{22}O_7$	DMSO-d_6	[348]
4-4-105	3′-(7″-allylphenyl)-2′,4′,4″-trihydroxy-6′-methoxy-dihydrochalcone	$C_{25}H_{24}O_5$	$CDCl_3$	[349]
4-4-106	(–)-linderatin	$C_{25}H_{30}O_4$	$CDCl_3$	[350]
4-4-107	(–)-neolinderatin	$C_{35}H_{46}O_4$	$CDCl_3$	[350]
4-4-108	iryantherin K	$C_{35}H_{38}O_7$	$CDCl_3$-DMSO-d_6	[351]
4-4-109	iryantherin L	$C_{35}H_{38}O_7$	$CDCl_3$-DMSO-d_6	[351]

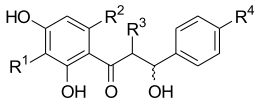
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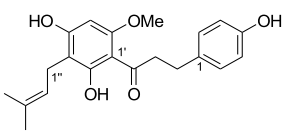
	R^1	R^2	R^3	R^4
4-4-94	OMe	H	OCH_2O	
4-4-95	OH	OMe	H	H



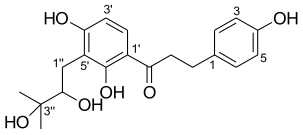
4-4-96



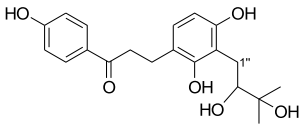
	R^1	R^2	R^3	R^4
4-4-97	H	OMe	H	OH
4-4-98	OMe	OH	α'-CH_2OH	H



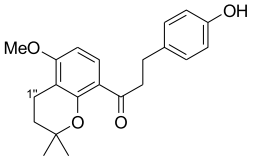
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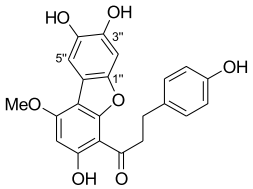
4-4-100



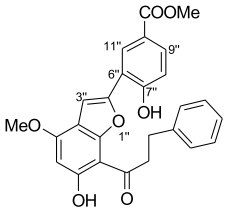
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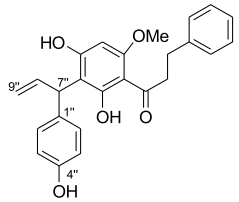
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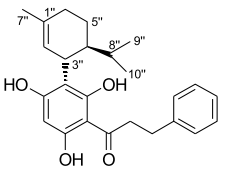
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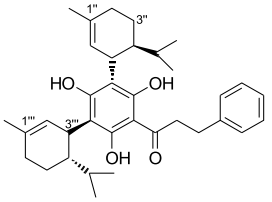
4-4-104



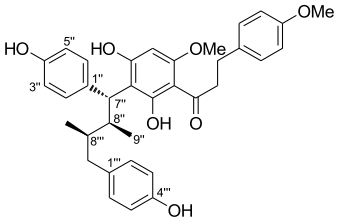
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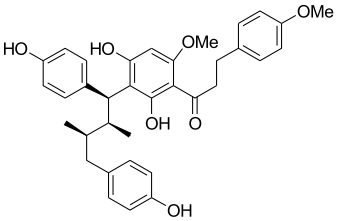
4-4-106



4-4-107



4-4-108



4-4-109

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Table 4-4-29: ^{1}H NMR spectroscopic data of dihydrochalcone-type chalcones **4-4-94**~**4-4-98**.

H	4-4-94	4-4-95	4-4-96	4-4-97	4-4-98
2	6.71 d(2.0)	7.28 m	7.85 s(OH)	7.52 d(8.5)	7.26~7.39 m
3		7.28 m	3.72 s(OMe)	7.19 d(8.5)	7.26~7.39 m
4		7.19 m	3.85 s(OMe)		7.26~7.39 m
5	6.71 d(7.5)	7.28 m	6.25 s	7.19 d(8.5)	7.26~7.39 m
6	6.65 dd(7.5, 2.0)	7.28 m	3.78 s(OMe)	7.52 d(8.5)	7.26~7.39 m
2′	3.76 s(OMe)	13.69 s(OH)	8.04 d(7.4)		12.14 s(OH)
3′	6.09 s	3.68 s(OMe)	7.51 t(7.4)	6.51 d(2.1)	3.93 s(OMe)
4′	3.82 s(OMe)	3.95 s(OMe)	7.61 tt(7.4,1.3)		
5′	6.09 s	6.29 s	7.51 t(7.4)	6.47 d(2.1)	6.01 s
6′	3.76 s(OMe)	3.96 s(OMe)	8.04 d(7.4)	3.80 s(OMe)	
α	3.02 m	3.33 t(7.4)	3.14 m	2.93 dd(16.3, 2.9)	3.07 ddd(4.0, 5.1, 10.7)
				3.27 d(16.3, 12.8)	
α′					4.49 dd(10.7, 11.2)
					4.23 dd(11.4, 5.1)
					6.50 br s(OH)
β	2.91 m	2.96 t(7.4)	2.96 m	5.52 dd(12.8, 2.9)	5.61 br s
					2.53 d(4.1, OH)
OCH_2O	5.90 s				

Table 4-4-30: ^{1}H NMR spectroscopic data of dihydrochalcone-type chalcones **4-4-99**~**4-4-102**.

H	4-4-99	4-4-100	4-4-101	4-4-102
2	7.01 d(8.3)	7.05 d(8.5)		7.05 d(8.6)
3	6.66 d(8.5)	6.81 d(8.5)		6.73 d(8.6)
4	9.12 s(OH)			
5	6.66 d(8.5)	6.81 d(8.5)	6.29 d(8.2)	6.73 d(8.6)
6	7.01 d(8.3)	7.05 d(8.5)	6.74 d(8.2)	7.05 d(8.6)
2′	14.18 s(OH)		7.90 d(8.8)	
3′			6.81 d(8.8)	
4′	10.51 s(OH)			3.88 s(OMe)
5′	6.05 s	6.39 d(9.0)	6.81 d(8.8)	6.57 d(8.9)
6′	3.79 s(OMe)	7.62 d(9.0)	7.90 d(8.8)	7.56 d(8.9)
α	3.17 t(8.1)	3.18 t(7.6)	3.17 t(7.5)	3.23 t(7.7)
β	2.76 t(8.1)	2.90 t(7.6)	2.86 t(7.5)	2.86 t(7.7)
1″	3.12 d(7.1)	2.68 dd(13.9, 10.1)	2.56 dd(14.0, 9.9)	2.66 t(6.9)
		3.05 dd(13.9, 2.4)	3.28 dd(14.0, 1.6)	
2″	5.11 t(7.1)	3.58 dd(10.1, 2.4)	3.53 dd(9.9, 1.6)	1.84 t(6.9)
4″, 5″	1.60 s, 1.69 s	1.24 s, 1.24 s	1.24 s, 1.24 s	1.36 s, 1.36 s

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Table 4-4-31: ^{1}H NMR spectroscopic data of dihydrochalcone-type chalcones **4-4-103**~**4-4-106**.

H	4-4-103	4-4-104	4-4-105	4-4-106
2	7.10 d(8.3)	7.33~7.16 m	7.26 m	7.30 m
3	6.69 d(8.3)	7.33~7.16 m	7.31 m	7.30 m
4	9.18 s(OH)	7.33~7.16 m	7.21 m	7.30 m
5	6.69 d(8.3)	7.33~7.16 m	7.31 m	7.30 m
6	7.10 d(8.3)	7.33~7.16 m	7.26 m	7.30 m
2′	13.48 s(OH)	13.49 s(OH)		
3′	6.46 s	6.41 s		
4′	4.02 s(OMe)	3.95 s(OMe)		
5′			5.39 s	5.92 s
6′			3.84 s(OMe)	14.02 s(OH)
α	3.47 t(7.6)	3.65 t(7.3)	3.35 t(8.0)	3.41 t(8.0)
β	2.88 t(7.6)	3.08 t(7.3)	3.01 t(8.0)	3.02 t(8.0)
2″	7.02 s		7.17 d(8.0)	5.49 br s
3″	9.17 s(OH)	7.33~7.16 m	6.81 d(8.0)	3.90 m
4″	9.07 s(OH)			
5″	7.27 s		6.81 d(8.0)	
6″			7.17 d(8.0)	
7″		11.39 s(OH)	5.40 d(6.0)	1.78 s
8″		7.07 d(8.5)	6.43 ddd(17.5, 10.5, 6.0)	1.50 m
9″		7.77 dd(1.9, 8.5)	5.13 d(18.0)	0.86 d(6.6)
			5.38 d(18.0)	
10″		3.72 s(COOMe)		0.86 d(6.6)
11″		8.3 d(1.9)		

Table 4-4-32: ^{1}H NMR spectroscopic data of dihydrochalcone-type chalcones **4-4-107**~**4-4-109**.

H	4-4-107	4-4-108	4-4-109
2, 6	7.32 m	7.09 d(8.5)	7.08 d(8.1)
3, 5	7.32 m	6.77 d(8.5)	6.77 d(8.1)
4	7.32 m	3.68 s(OMe)	3.58 s(OMe)
2′	6.91 s(OH)	14.34 s(OH)	14.48 s(OH)
4′	6.82 s(OH)		
5′		5.81 s	5.64 s
6′	14.02 s(OH)	3.73 s(OMe)	3.73 s(OMe)
α	3.39 t(8)	3.16 t(7.5)	3.15 t(6.6)
β	3.00 t(8)	2.86 t(7.5)	2.83 t(6.6)
2″	5.50 br s	7.30 d(8.3)	7.08 d(8.1)
3″	4.00 d(9)	6.61 d(8.3)	6.59 d(8.1)
5″		6.61 d(8.3)	6.59 d(8.1)
6″		7.30 d(8.3)	7.08 d(8.1)
7″	1.78 s	4.15 d(11.6)	4.39 d(11.0)
8″	1.50 m	2.98 ddq(2.8, 6.8, 11.7)	2.8~2.9 m

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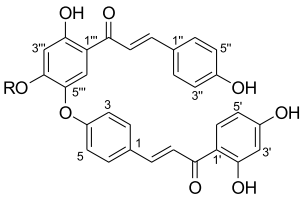
Table 4-4-32 (continued)

H	4-4-107	4-4-108	4-4-109
9″	0.81 m	0.68 d(6.9)	0.65 d(6.6)
10″	0.81 m		
2‴	5.50 br s	6.88 d(8.1)	6.88 d(8.1)
3‴	3.85 d(9)	6.67 d(8.1)	6.71 d(8.1)
5‴		6.67 d(8.1)	6.71 d(8.1)
6‴		6.88 d(8.1)	6.88 d(8.1)
7‴	1.78 s	2.35 dd(13.4, 8.2)	2.41 d(6.6)
		2.50 dd(13.4, 6.6)	2.42 d(6.6)
8‴	1.50 m	1.7-1.9 m	1.7~1.9 m
9‴	0.81 m	0.63 d(6.9)	0.74 d(5.9)
10‴	0.81 m		

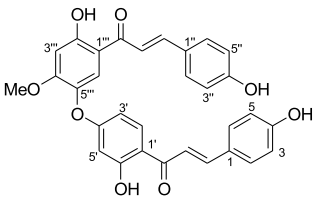
4.4.3 Dimeric chalcones

Table 4-4-33: Cos, MFs, and TSs of dimeric chalcones **4-4-110**~**4-4-119**.

No.	Compounds	MFs	Test solvents	References
4-4-110	rhuschalcone II	$C_{30}H_{22}O_8$	CD_3COCD_3	[352]
			CD_3CN	[352]
4-4-111	rhuschalcone III	$C_{31}H_{24}O_8$	CD_3COCD_3	[352]
4-4-112	rhuschalcone IV	$C_{31}H_{24}O_8$	CD_3COCD_3	[352]
4-4-113	rhuschalcone V	$C_{30}H_{24}O_8$	CD_3COCD_3	[352]
4-4-114	3-3″linked-(2′-hydroxy-4-*O*-isoprenylchalcone)-(2‴-hydroxy-4″-*O*-isoprenyldihydrochalcone)	$C_{40}H_{40}O_6$	$CDCl_3$	[353]
4-4-115	*rel*-1*β*-(4,6-dihydroxy-2-methoxy)-benzoyl-*rel*-2*α*-(2,6-dimethoxy-4-hydroxy)-benzoyl-*rel*-(3*β*,4*α*)-diphenylcyclo-butane	$C_{33}H_{30}O_8$	C_5D_5N	[354]
4-4-116	*rel*-(1*α*,2*β*)-di-(2,6-dimethoxy-4-hydroxy)-benzoyl-*rel*-(3*α*,4*β*)-diphenylcyclobutane	$C_{34}H_{32}O_8$	C_5D_5N	[354]
4-4-117	dimeric 4,2′,4′-triacetoxydihydrochalcone	$C_{42}H_{36}O_{14}$	$CDCl_3$	[355]
4-4-118	dimeric 4,2′,4′-trimethoxymethoxydihydrochalcone	$C_{42}H_{48}O_{14}$	$CDCl_3$	[355]
4-4-119	lophirone L	$C_{30}H_{24}O_9$	CD_3COCD_3	[356]

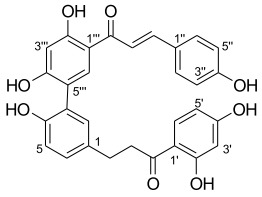


4-4-110 R = H
4-4-111 R = Me

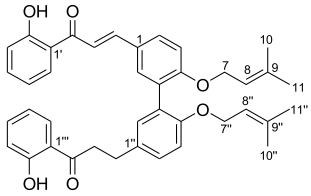


4-4-112

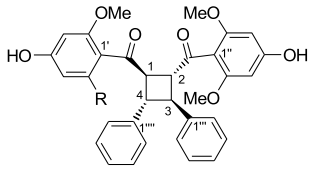
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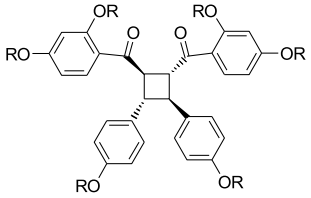
4-4-113



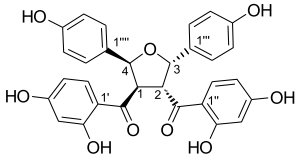
4-4-114



4-4-115 R = OH
4-4-116 R = OMe



4-4-117 R = Ac
4-4-118 R = CH_2OMe



4-4-119

Table 4-4-34: ^{1}H NMR spectroscopic data of dimeric chalcones **4-4-110** and **4-4-111**.

H	4-4-110(CD_3COCD_3)	4-4-110(CD_3CN)	4-4-111
2, 6	7.85 d(8.8)	7.76 d(8.8)	7.81 d(8.9)
3, 5	7.00 d(8.8)	7.00 d(8.8)	6.94 d(8.7)
3′	6.93 d(2.3)	6.37 d(2.4)	6.36 d(1.6)
5′	6.46 dd(8.9, 2.3)	6.46 dd(8.9, 2.4)	6.46 dd(8.6, 1.6)
6′	8.13 d(8.9)	8.02 d(8.9)	8.05 d(8.9)
α	7.80~7.90 m	7.51 d(15.4)	7.80 d(14.6)
β	7.80~7.90 m	7.85 d(15.4)	7.84 d(14.6)
2″, 6″	7.74 d(8.6)	7.65 d(8.6)	7.73 d(8.5)
3″, 5″	6.90 d(8.6)	6.87 d(8.7)	6.89 d(8.4)
3‴	6.61 s	6.58 s	6.70 s
6‴	8.10 s	7.93 s	8.08 s
α′	7.80~7.90 m	7.67 d(15.3)	7.79 d(15.2)
β′	7.80~7.90 m	7.86 d(15.3)	7.89 d(15.2)
Ome			3.87 s

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Table 4-4-35: ^{1}H NMR spectroscopic data of dimeric chalcones **4-4-112**~**4-4-114**.

H	4-4-112	4-4-113	4-4-114
2	7.78 d(8.7)	7.26 d(2.1)	6.42 or 6.50 d(2)
3	6.96 d(8.6)		
5	6.96 d(8.6)	6.91 d(8.6)	7.24 or 7.29 d(8)
6	7.78 d(8.7)	7.19 dd(8.3, 2.2)	6.40 or 6.48 dd(8, 2)
7, 7′			4.53 dd(17.6), 4.57 dd(17.6)
8, 8′			5.48 m
3′	6.45 d(2.5)	6.34 d(2.3)	7.21 dd(8, 2)
4′			7.44 m
5′	6.54 dd(8.9, 2.5)	6.44 dd(7.8, 2.3)	7.42 m
6′	8.17 d(9.0)	7.87 d(7.8)	7.62 or 7.82 dd(8, 2)
α	7.82 d(15.3)	3.14 t(7.5)	7.58 d(15)
β	7.88 d(15.3)	3.01 t(7.6)	7.89 d(15)
2″	7.67 d(8.7)	7.76 d(8.6)	6.42 or 6.50 d(2)
3″	6.86 d(8.7)	6.92 d(8.6)	7.24 or 7.29 d(8)
5″	6.86 d(8.7)	6.92 d(8.6)	7.42 m
6″	7.67 d(8.7)	7.76 d(8.6)	6.40 or 6.48 dd(8, 2)
3‴	6.35 s	6.51 s	7.21 dd(8, 2)
4‴			7.44 m
5‴			7.42 m
6‴	7.83 s	8.10 s	7.62 or 7.82 dd(8, 2)
α′	7.70 d(15.5)	7.85 d(14.8)	3.05 t(7)
β′	7.76 d(15.5)	7.88 d(14.8)	3.24 t(7)
Me			1.74 s, 1.74 s, 1.76 s, 1.76 s
OMe	3.89 s		
OH			12.7 s, 13.4 s

Table 4-4-36: ^{1}H NMR spectroscopic data of dimeric chalcones **4-4-115**~**4-4-119**.

H	4-4-115	4-4-116	4-4-117	4-4-118	4-4-119
1	5.31 t(9)	4.57 m	4.34 m	4.30 m	4.72 dd(8, 2)
2	4.81 t(9)	4.57 m	4.34 m	4.30 m	4.72 dd(8, 2)
3	4.22 t(9)	4.39 m	3.91 m	4.08 m	5.42 d(8)
4	4.50 t(9)	4.39 m	3.91 m	4.08 m	5.42 d(8)
2′	3.26 s(OMe)	3.44 s(OMe)			
3′	6.11 d(2)	6.32 s	6.92 d(2.5)	6.75 d(2.5)	6.08 d(2)
5′	6.48 d(2)	6.32 s	6.85 dd(8.5, 2.5)	6.66 d(8.5, 2.5)	6.10 dd(8, 2)
6′		3.44 s(OMe)	7.85 d(8.5)	7.70 d(8.5)	7.38 d(8)
2″	3.53 s(OMe)	3.44 s(OMe)			
3″	6.38 s	6.32 s	6.92 d(2.5)	6.75 d(2.5)	6.08 d(2)
5″	6.38 s	6.32 s	6.85 dd(8.5, 2.5)	6.66 d(8.5, 2.5)	6.10 dd(8, 2)
6″	3.53 s(OMe)	3.44 s(OMe)	7.85 d(8.5)	7.70 d(8.5)	7.38 d(8)
2‴, 6‴	7.54 m	7.51 m	7.28 d(8.5)	7.20 d(8.5)	7.40 d(8)
3‴, 5‴	7.31 m	7.28 m	7.02 d(2.5)	6.94 d(2.5)	6.80 d(8)
4‴	7.21 m	7.19 m			
2⁗, 6⁗	7.58 m	7.51 m	7.28 d(8.5)	7.20 d(8.5)	7.40 d(8)

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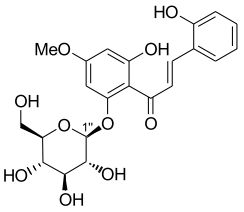
Table 4-4-36 (continued)

H	4-4-115	4-4-116	4-4-117	4-4-118	4-4-119
3′′′′, 5′′′′	7.31 m	7.28 m	7.02 d(2.5)	6.94 d(2.5)	6.80 d(8)
4′′′′	7.21 m	7.19 m			
OMe				3.45 s(×4)	
				3.17 s(×2)	
OCH_2/OAc			2.28 s	5.16 s(×2)	
			2.31 s	5.13 s(×2)	
			2.37 s	4.85 d(7.0)	
				4.84 d(7.0)	
OH					12.50 s

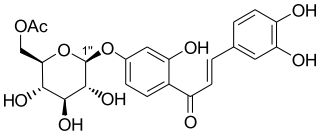
4.4.4 Chalcone glycoside-type chalcones

Table 4-4-37: Cos, MFs, and TSs of chalcone glycoside-type chalcones **4-4-120**~**4-4-129**.

No.	Compounds	MFs	Test solvents	References
4-4-120	androechin	$C_{22}H_{24}O_{10}$	DMSO-d_6	[357]
4-4-121	bidenoside G	$C_{23}H_{24}O_{11}$	CD_3OD	[358]
4-4-122	4′-*O*-*β*-D-glucopyranosyl-2′,4-dihydroxy-3′,3-dimeth-oxychalcone	$C_{23}H_{26}O_{11}$	CD_3OD	[309]
4-4-123	4′-*O*-*β*-D-glucopyranosyl-2′,4-dihydroxy-3-methoxy-chalcone	$C_{22}H_{24}O_{10}$	CD_3OD	[309]
4-4-124	4′-*O*-*β*-D-glucuronyl-2′,4-dihydroxy-6′-methoxy-3′-prenylchalcone	$C_{27}H_{30}O_{11}$	CD_3CN-D_2O	[312]
4-4-125	3′-(3-methyl-2-butenyl)-4′-*O*-*β*-D-glucopyranosyl-4,2′-dihydroxychalcone	$C_{26}H_{30}O_9$	CD_3OD	[359]
4-4-126	4′-*O*-*β*-D-(2′′-*p*-coumaroyl)glucopyranosyl-4,2′,3′-trihydroxychalcone	$C_{30}H_{38}O_{12}$	CD_3OD	[359]
4-4-127	4′-*O*-*β*-D-(2′′-*p*-coumaroyl-6′′-acetyl)-glucopyranosyl-4,2′,3′-trihydroxychalcone	$C_{32}H_{30}O_{13}$	CD_3OD	[359]
4-4-128	chalcononaringenin 2′,4′-di-*O*-*β*-D-glucoside	$C_{27}H_{32}O_{15}$	C_5D_5N	[360]
4-4-129	chalcononaringenin-2′-*O*-*β*-D-glucoside-4′-*O*-*β*-gent-iobioside	$C_{33}H_{42}O_{20}$	C_5D_5N	[360]

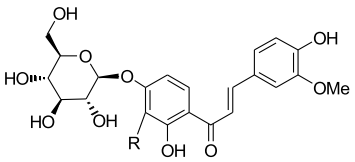


4-4-120

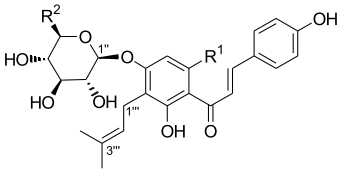


4-4-121

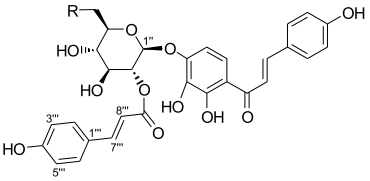
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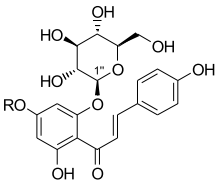
4-4-122 R = OMe
4-4-123 R = H



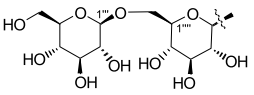
	R^1	R^2
4-4-124	OMe	COOH
4-4-125	H	CH_2OH



4-4-126 R = OH
4-4-127 R = OAc



4-4-128 R =



4-4-129 R =

Table 4-4-38: ^{1}H NMR spectroscopic data of chalcone glycoside-type chalcones **4-4-120**, **4-4-128**, and **4-4-129**.

H	4-4-120	4-4-128	4-4-129
2	10.17 s(OH)	7.96 d(8.6)	7.96 d(8.6)
3	6.91 dd(8.0, 1.5)	7.06 d(8.6)	7.07 d(8.6)
4	7.25 ddd(8.0, 8.0, 1.5)		
5	6.84 ddd(8.0, 8.0, 1.5)	7.06 d(8.6)	7.07 d(8.6)
6	7.79 dd(8.0, 1.5)	7.96 d(8.6)	7.96 d(8.6)
3′	6.33 d(2.3)	7.19 d(2.1)	7.12 d(2.1)
4′	3.82 s(OMe)		
5′	6.17 d(2.3)	6.66 d(2.1)	6.72 d(2.1)
6′	13.55 s(OH)	14.46 s(OH)	14.46 s(OH)
α	8.07 d(16.0)	8.66 d(15.3)	8.66 d(15.6)
β	8.00 d(16.0)	8.17 d(15.3)	8.19 d(15.6)
1″	5.13 d(7.0)	5.93 d(7.6)	5.88 d(7.6)
1‴		5.90 d(7.9)	6.00 d(7.6)
1⁗			5.01 d(7.6)
Sugar protons	3.10~3.80 m		

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Table 4-4-39: ^{1}H NMR spectroscopic data of chalcone glycoside-type chalcones **4-4-121**~**4-4-123**.

H	4-4-121	4-4-122	4-4-123
2	7.10 d(2.1)	7.49 d(2)	7.49 d(2)
5	6.72 d(8.2)	6.95 d(8)	6.94 d(8)
6	7.03 dd(8.2, 2.1)	7.35 dd(8, 2)	7.34 dd(8, 2)
3′	6.70 d(2.7)		6.72 d(2)
5′	6.68 dd(9.1, 2.7)	6.93 d(9)	6.79 dd(9, 2)
6′	7.52 d(9.1)	8.06 d(9)	8.24 d(9)
α	7.46 d(15.2)	7.78 d(15)	7.79 d(15)
β	7.67 d(15.2)	7.96 d(15)	7.94 d(15)
1″	4.89 d(7.3)	5.20 d(7)	5.13 d
2″	3.44 dd(8.6, 7.3)	3.5~4.0 m	3.5~4.0 m
3″	3.41 dd(9.0, 8.6)	3.5~4.0 m	3.5~4.0 m
4″	3.32 dd(9.2, 9.0)	3.5~4.0 m	3.5~4.0 m
5″	3.60 m	3.5~4.0 m	3.5~4.0 m
6″	4.16 dd(12.0, 6.2)	3.5~4.0 m	3.5~4.0 m
	4.32 dd(12.0, 2.1)		
OMe		3.98 s, 4.04 s	4.04 s
OAc	1.91 s		

Table 4-4-40: ^{1}H NMR spectroscopic data of chalcone glycoside-type chalcones **4-4-124**~**4-4-127**.

H	4-4-124	4-4-125	4-4-126	4-4-127
2, 6	7.58 d(8.5)	6.92 d(8.0)	6.95 d(8.0)	6.89 d(8.0)
3, 5	6.88 d(8.5)	7.28 d(8.0)	7.25 d(8.0)	7.33 d(8.0)
5′	6.30 s	6.78 d(8.0)	6.80 d(8.0)	6.81 d(8.0)
6′	3.91 s(OMe)	7.10 d(8.0)	7.55 d(8.0)	7.13 d(8.0)
α	7.77 d(15.5)	7.40 d(16.0)	7.45 d(15.0)	7.40 d(16.0)
β	7.71 d(15.5)	7.82 d(16.0)	7.97 d(15.0)	7.30 d(16.0)
1″	5.22 d(7.1)	5.18 d(7.5)	5.15 d(7.5)	5.12 d(7.6)
2″	3.54~3.65 m	3.41 t(9.0)	4.45 br t(8.6)	4.48 br t(8.5)
3″	3.54~3.65 m	3.47 t(9.0)	3.48 t(9.0)	3.48 t(9.0)
4″	3.54~3.65 m	3.50 t(9.0)	3.42 t(9.0)	3.49 t(9.0)
5″	4.09 d(9.7)	3.38 m	3.50 m	3.62 m
6″		3.62 dd(12.0, 2.5)	3.72 dd(12.0, 3.5)	4.05 dd(12.0, 3.5)
		3.95 dd(12.0, 5,5)	3.93 dd(12.0, 5.5)	4.68 dd(12.0, 5.5)
1‴	3.32 dd(14.2, 7.4)	3.51 dd(12.0, 6.5)		
	3.23 dd(14.2, 6.3)	3.58 dd(12.0, 7.0)		
2‴	5.16 dd(7.4, 6.3)	5.09 br t(6.8)	7.46 d(8.0)	7.46 d(8.0)
3‴			6.73 d(8.0)	6.70 d(8.0)
4‴	1.74 s	1.75 d(1.5)		
5‴	1.62 s	1.68 d(1.5)	6.73 d(8.0)	6.70 d(8.0)
6‴			7.46 d(8.0)	7.46 d(8.0)
7‴			7.41 d(16.0)	7.50 d(15.5)
8‴			6.38 d(16.0)	6.20 d(15.5)
OAc				1.98 s

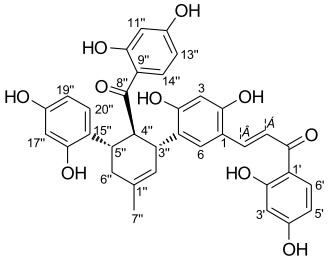
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4.4.5 Diels-alder adduct-type chalcones

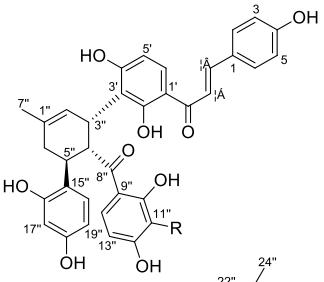
Table 4-4-41: Cos, MFs, and TSs of Diels-alder adduct-type chalcones **4-4-130**~**4-4-174**.

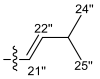
No.	Compounds	MFs	Test solvents	References
4-4-130	guangsangon C	$C_{35}H_{30}O_{10}$	CD_3COCD_3	[361]
4-4-131	artonin X	$C_{40}H_{38}O_9$	CD_3COCD_3	[362]
4-4-132	kuwanon R	$C_{40}H_{38}O_9$	CD_3COCD_3	[362]
4-4-133	mongolicin G	$C_{40}H_{40}O_{10}$	CD_3COCD_3	[363]
4-4-134	guangsangon A	$C_{39}H_{38}O_{10}$	CD_3COCD_3	[361]
4-4-135	guangsangon E	$C_{39}H_{36}O_9$	CD_3COCD_3	[361]
4-4-136	guangsangon J	$C_{39}H_{36}O_9$	CD_3COCD_3	[364]
4-4-137	sorocenol H	$C_{39}H_{36}O_9$	CD_3COCD_3	[365]
4-4-138	mongolicin C	$C_{34}H_{26}O_9$	CD_3COCD_3	[366]
4-4-139	wittiorumin F	$C_{39}H_{36}O_9$	CD_3COCD_3	[367]
4-4-140	sanggenol M	$C_{45}H_{46}O_{11}$	DMSO-d_6	[368]
4-4-141	Sanggenol J	$C_{45}H_{44}O_{12}$	CD_3COCD_3	[369]
4-4-142	cathayanon A	$C_{40}H_{36}O_{12}$	DMSO-d_6	[370]
4-4-143	cathayanon B	$C_{40}H_{36}O_{12}$	CD_3COCD_3	[370]
4-4-144	mongolicin D	$C_{45}H_{44}O_{10}$	CD_3COCD_3	[366]
4-4-145	wittiorumin D	$C_{35}H_{30}O_{10}$	CD_3COCD_3	[367]
4-4-146	guangsangon K	$C_{35}H_{30}O_{11}$	CD_3COCD_3	[371]
4-4-147	guangsangon M	$C_{35}H_{30}O_{10}$	CD_3COCD_3	[371]
4-4-148	guangsangon N	$C_{35}H_{30}O_{10}$	CD_3COCD_3	[371]
4-4-149	guangsangon D	$C_{35}H_{30}O_{10}$	CD_3COCD_3	[361]
4-4-150	guangsangon F	$C_{40}H_{36}O_{10}$	CD_3COCD_3	[364]
4-4-151	guangsangon H	$C_{40}H_{38}O_{10}$	CD_3COCD_3	[364]
4-4-152	guangsangon G	$C_{35}H_{28}O_{10}$	CD_3COCD_3	[364]
4-4-153	guangsangon I	$C_{35}H_{26}O_{11}$	CD_3COCD_3	[364]
4-4-154	wittiorumin A	$C_{35}H_{28}O_{11}$	CD_3COCD_3	[367]
4-4-155	wittiorumin B	$C_{40}H_{36}O_{12}$	CD_3COCD_3	[367]
4-4-156	wittiorumin C	$C_{40}H_{36}O_{11}$	CD_3COCD_3	[367]
4-4-157	sorocenol C	$C_{39}H_{32}O_9$	CD_3COCD_3	[372]
4-4-158	sorocenol D	$C_{39}H_{30}O_8$	CD_3COCD_3	[372]
4-4-159	sorocenol E	$C_{39}H_{32}O_8$	CD_3COCD_3	[372]
4-4-160	yunanensin A	$C_{39}H_{28}O_8$	CD_3COCD_3	[373]
4-4-161	mongolicin B	$C_{28}H_{18}O_7$	CD_3COCD_3	[366]
4-4-162	soroceal	$C_{32}H_{28}O_7$	CD_3COCD_3	[374]
4-4-163	sorocein A	$C_{39}H_{34}O_8$	CD_3COCD_3	[374]
4-4-164	sorocein B	$C_{40}H_{34}O_9$	CD_3COCD_3	[374]
4-4-165	mongolicin A	$C_{39}H_{34}O_8$	CD_3COCD_3	[366]
4-4-166	sorocenol G	$C_{39}H_{32}O_8$	CD_3OD	[365]
4-4-167	sorocein L	$C_{39}H_{38}O_9$	CD_3COCD_3	[375]
4-4-168	palodesangren A	$C_{30}H_{26}O_7$	C_5D_5N	[376]
4-4-169	palodesangren B	$C_{30}H_{26}O_7$	C_5D_5N	[376]
4-4-170	palodesangren C	$C_{30}H_{26}O_6$	C_5D_5N	[376]
4-4-171	palodesangren D	$C_{30}H_{26}O_6$	C_5D_5N	[376]
4-4-172	palodesangren E	$C_{31}H_{28}O_7$	C_5D_5N	[376]
4-4-173	palodesangretin I	$C_{31}H_{28}O_8$	C_5D_5N	[377]
4-4-174	palodesangretin II	$C_{31}H_{28}O_8$	C_5D_5N	[377]

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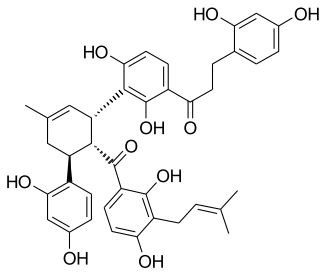


4-4-130

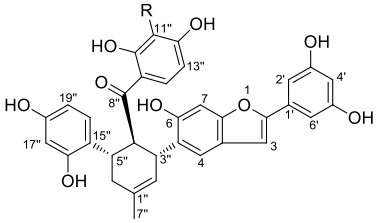


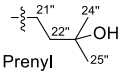
4-4-131 R = 

4-4-132 R = Prenyl

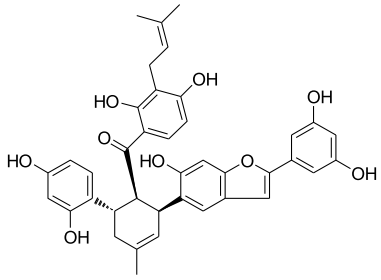


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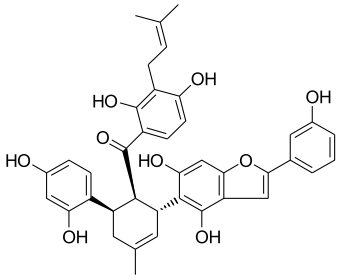


4-4-134 R = 

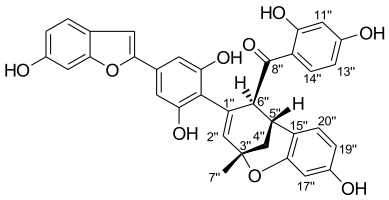
4-4-136 R = Prenyl



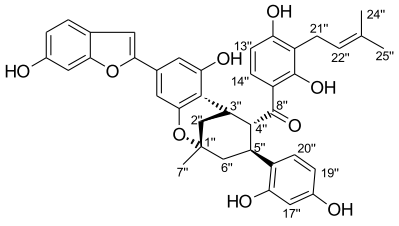
4-4-135



4-4-137

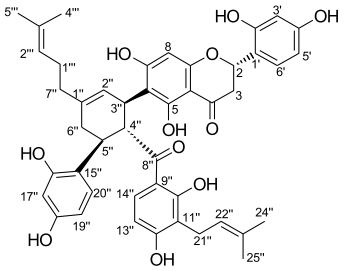


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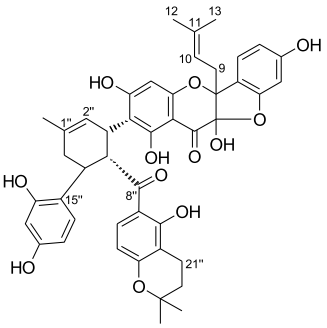


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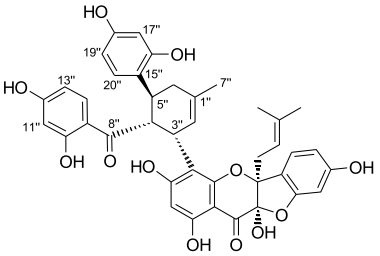
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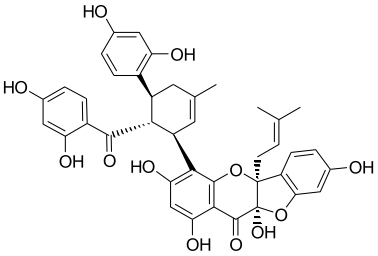
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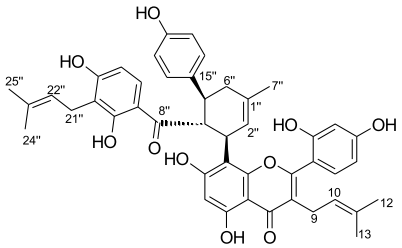
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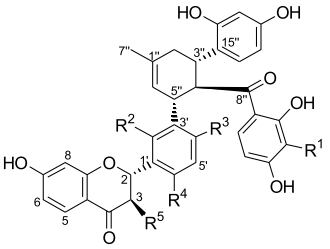
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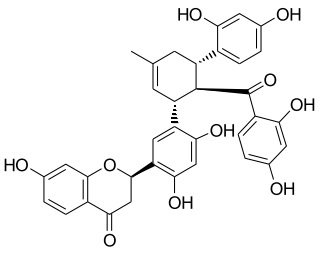
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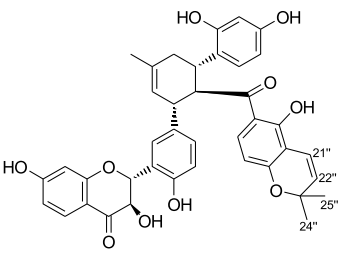
4-4-144



	R^1	R^2	R^3	R^4	R^5
4-4-145	H	OH	OH	H	H
4-4-146	H	OH	OH	H	OH
4-4-148	H	H	OH	OH	H
4-4-149	H	H	H	OH	OH
4-4-151	Prenyl	H	H	OH	OH

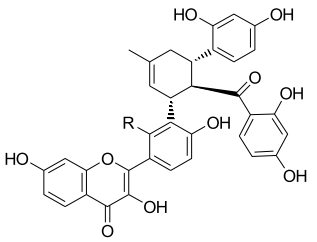


4-4-147

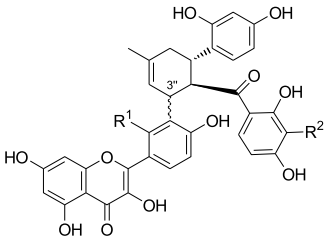


4-4-150

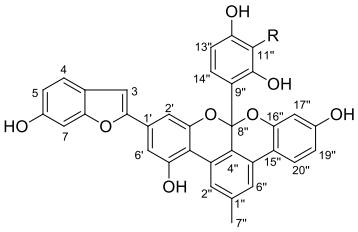
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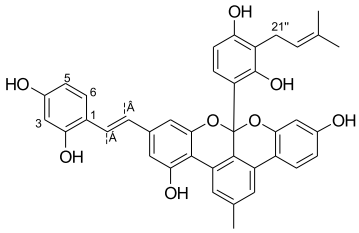
4-4-152 R = H
4-4-153 R = OH



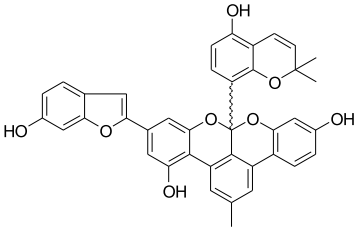
	R^1	R^2	C-3"
4-4-154	H	H	*R*
4-4-155	OH	Prenyl	*R*
4-4-156	H	Prenyl	*S*



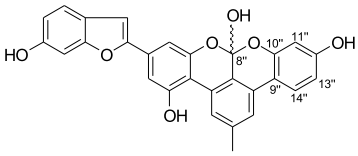
4-4-157 R =
4-4-158 R = Prenyl



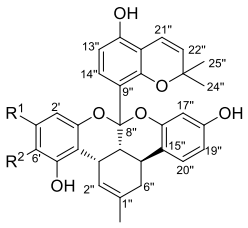
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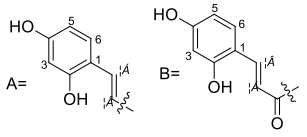
4-4-160

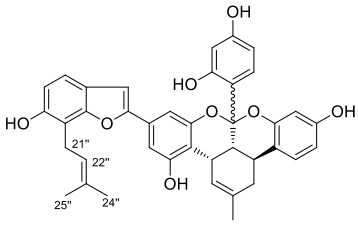


4-4-161



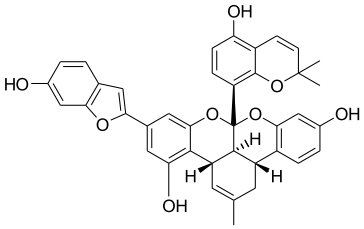
	R^1	R^2
4-4-162	CHO	H
4-4-163	A	H
4-4-164	H	B



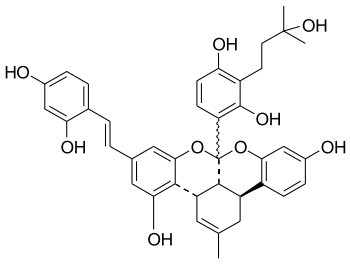


4-4-165

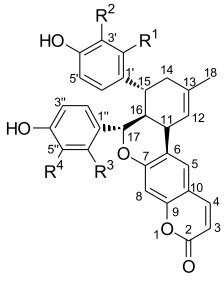
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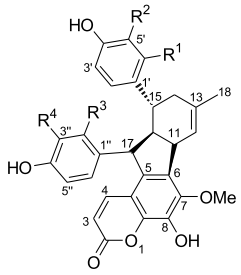
4-4-166



4-4-167



	R^1	R^2	R^3	R^4
4-4-168	H	OH	OMe	H
4-4-169	OMe	H	H	OH
4-4-170	H	H	OMe	H
4-4-171	OMe	H	H	H
4-4-172	OMe	H	OMe	H



	R^1	R^2	R^3	R^4
4-4-173	H	OH	OMe	H
4-4-174	OMe	H	H	OH

Table 4-4-42: ^{1}H NMR spectroscopic data of Diels-alder adduct-type chalcones **4-4-130**~**4-4-133**.

H	4-4-130	4-4-131	4-4-132	4-4-133
2		7.70 d(9)	7.70 d(9)	
3	6.36 s	6.90 d(9)	6.90 d(9)	6.39 d(2.5)
5		6.90 d(9)	6.90 d(9)	6.25 dd(8.5, 2.5)
6	7.62 s	7.70 d(9)	7.70 d(9)	6.91 d(8.5)
2′	13.79 s(OH)	14.20 s(OH)	14.21 s(OH)	
3′	6.38 d(2.5)			
5′	6.53 dd(9.0, 2.5)	6.37 d(9)	6.37 d(9)	6.33 d(9.0)
6′	7.92 d(9.0)	7.93 d(9)	7.93 d(9)	7.69 d(9.0)
α	7.79 d(15.0)	7.69 d(15)	7.69 d(15)	3.15 m
β	8.12 d(15.0)	7.77 d(15)	7.76 d(15)	2.84 t(7.5)
2″	5.38 s	5.68 br s	5.68 br s	5.67 br s
3″	4.37 br s	4.19 br s	4.19 br	4.10 br s
4″	4.72 br s	4.68 dd(4, 5)	4.68 dd(4, 5)	4.66 t(4.5)
5″	3.63 br s	3.81 m	3.81 m	3.97 br s
6″	2.19 m	2.22 dd(4, 17)	2.22 dd(4, 17)	2.50 br d(18.5)
	2.58 m	2.52 br d(17)	2.51 br d(17)	2.23 m

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Table 4-4-42 (continued)

H	4-4-130	4-4-131	4-4-132	4-4-133
7″	1.77 s	1.94 br s	1.94 br s	1.94 s
10″	13.07 s(OH)	13.40 s(OH)	12.86 s(OH)	
11″	6.09 d(2.5)			
13″	5.97 dd(2.5, 8.5)	6.48 d(9)	6.45 d(9)	6.45 d(9.0)
14″	7.80 d(8.5)	8.34 d(9)	8.33 d(9)	8.38 d(9.0)
17″	6.22 d(2.5)	6.51 d(2)	6.51 d(2)	6.55 d(2.0)
19″	6.11 dd(2.5, 8.5)	6.30 dd(2, 8)	6.31 dd(2, 8)	6.31 dd(8.5, 2.0)
20″	6.94 d(8.5)	6.96 d(8)	6.97 d(8)	6.97 d(8.5)
21″		6.54 d(16)	3.26 br d(7)	3.28 d(7.0)
22″		6.65 d(16)	5.16 br t(7)	5.20 t(7.0)
23″		2.38 m		
24″		1.03 d(7)	1.59 br s	1.61 s
25″		1.03 d(7)	1.72 br s	1.74 s

Table 4-4-43: ^{1}H NMR spectroscopic data of Diels-alder adduct-type chalcones **4-4-134**~**4-4-137**.

H	4-4-134	4-4-135	4-4-136	4-4-137
3	6.97 s	7.04 s	6.96 s	6.93 s
4	7.39 s	7.45 s	7.41 s	7.20 d(8.2)
5				6.67 d(8.2)
7	6.71 s	6.81 s	6.74 s	6.50 br s
2′	6.79 d(2.0)	6.83 d(2.0)	6.80 d(2.0)	6.77 d(2.0)
4′	6.34 t(2.0)	6.33 t(2.0)	6.35 t(2.0)	
6′	6.79 d(2.0)	6.83 d(2.0)	6.80 d(2.0)	6.77 d(2.0)
2″	5.41 s	5.55 s	5.41 s	5.72 d(6.5)
3″	4.31 br s	4.38 br s	4.32 br s	4.07 dd(14.0, 6.5)
4″	4.69 br s	4.68 dd(6.5, 7.0)	4.49 br s	4.75 dd(14.0, 5.8)
5″	3.78 br s	3.67 m	3.69 br s	4.44 t(6.8)
6″	2.20 m, 2.52 m	2.07 m, 2.46 m	2.60 m, 2.21 m	2.05 m, 2.52 m
7″	1.79 s	1.89 s	1.74 s	1.95 s
10″	13.08 s(OH)	13.03 s(OH)	13.47 s(OH)	
13″	5.91 d(8.0)	6.42 d(8.5)	5.98 d(8.5)	6.43 d(9.0)
14″	7.29 d(8.0)	8.03 d(8.5)	7.35 d(8.5)	8.25 d(9.0)
17″	6.20 d(2.0)	6.26 d(1.5)	6.22 d(1.5)	6.36 d(2.2)
19″	6.09 dd(2.0, 8.0)	6.14 d(1.5, 8.5)	6.11 d(1.5, 8.5)	6.26 dd(8.4, 2.0)
20″	6.92 d(8.0)	6.88 d(8.5)	6.93 d(8.5)	6.95 d(8.4)
21″	2.51 m	3.19 d(7.0)	3.11 d(7.0)	3.20 d(6.8)
22″	1.48 m	5.12 t(7.0)	5.05 t(7.0)	5.12 dd(7.2, 1.2)
24″	1.13 s	1.56 s	1.64 s	1.57 s
25″	1.13 s	1.67 s	1.53 s	1.68 s

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Table 4-4-44: ^{1}H NMR spectroscopic data of Diels-alder adduct-type chalcones **4-4-138** and **4-4-139**.

H	4-4-138	4-4-139	H	4-4-138	4-4-139
3	6.99 s	7.00 s	6″	4.98 br s	2.09 m, 1.76 m
4	7.38 d(8.5)	7.37 d(8.5)	7″	1.64 s	1.36 s
5	6.79 br d(8.5)	6.74 dd(8.5, 2.5)	11″	6.31 br s	
7	6.96 br s	6.91 d(2.5)	13″	6.58 br d(8.5)	6.48 d(9.0)
2′	6.82 br s	6.71 d(2.0)	14″	8.06 d(8.5)	7.92 d(9.0)
6′	6.82 br s	6.68 d(2.0)	17″	6.27 br s	6.14 d(2.5)
2″	5.87 br s	2.33 dd(2.5, 13.0)	19″	6.46 br d(8.5)	5.97 dd(8.5, 2.5)
		1.74 (ov)			
3″		3.64 d(2.5)	20″	7.34 d(8.5)	6.71 d(8.5)
4″	1.84 br d(17.0)	4.43 d(10.0)	21″		3.20 d(7.0)
	1.31 br s				
5″	3.46 br s	3.40 m	22″		5.16 t(7.0)

Table 4-4-45: ^{1}H NMR spectroscopic data of Diels-alder adduct-type chalcones **4-4-140**, **4-4-150**, and **4-4-151**.

H	4-4-140	4-4-150	4-4-151
2	5.45 dd(3.3, 12.5)	5.01 d(10.0)	4.99 d(12.0)
	5.44 dd(3.3, 12.5)		
3	2.58 dd(3.3, 17.0)	4.52 d(10.0)	4.52 d(12.0)
	3.01 dd(12.5, 17.0)		
5	12.41 s(OH)	7.74 d(9.0)	7.72 d(8.5)
6		6.63 d(9.0, 2.5)	6.59 d(8.5, 2.0)
8	5.79 s	6.44 d(2.5)	6.56 d(2.0)
3′	6.34 br d(2.0)	6.59 d(8.0)	6.59 d(8.5)
4′		7.06 dd(2.0, 8.0)	7.05 dd(2.0, 8.5)
5′	6.27 dd(2.0, 8.0)		
6′	7.10 d(8.0)	7.56 d(2.0)	7.55 d(2.0)
2″	5.22 br s	5.40 s	5.37 s
3″	4.25 br d(11.0)	4.31 br s	4.37 br s
4″	4.73 t(11.0)	4.37 br s	4.39 br s
5″	3.54 ddd(5.0, 11.0, 11.0)	3.67 br s	3.66 br s
6″	2.44 br d(12.7), 2.11 m	2.59 m, 2.19 m	2.18 m, 2.53 m
7″	2.02 m	1.77 s	1.75 s
10″	13.00 s(OH)	13.48 s(OH)	13.37 s(OH)
13″	6.11 d(8.5)	5.94 d(9.5)	6.21 d(8.0)
14″	7.42 d(8.5)	7.05 d(9.5)	7.40 d(8.0)
17″	6.14 br d(2.0)	6.22 d(2.5)	6.20 d(2.0)
19″	5.99 dd(2.0, 8.0)	6.08 dd(2.5, 9.0)	6.06 dd(2.0, 8.0)
20″	6.76 d(8.0)	6.88 d(9.0)	6.89 d(8.0)
21″	3.09 br d(6.5)	6.46 d(10.0)	3.11 d(7.0)
22″	5.06 m	5.54 d(10.0)	5.08 t(7.0)
24″	1.59 br s	1.33 s	1.65 s

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Table 4-4-45 (continued)

H	4-4-140	4-4-150	4-4-151
25″	1.65 br s	1.32 s	1.54 s
1‴	2.10 m		
2‴	5.18 m		
4‴	1.60 br s		
5‴	1.68 br s		

Table 4-4-46: ^{1}H NMR spectroscopic data of Diels-alder adduct-type chalcones **4-4-141**~**4-4-144**.

H	4-4-141	4-4-142①	4-4-143	4-4-144
3	6.98 s(OH)			
5	12.04 s(OH)			
6		5.65 s	5.74 s	6.01 s
7	9.09 s(OH)			
8	5.73 s			
9	3.08 br dd(8, 14.5)	2.64 dd(7.5, 15)	2.97 dd(8.4, 15)	3.19 m
	2.72 br dd(6, 14.5)	2.93 dd(6.9, 15)	3.03 dd(5.6,15)	
10	5.19 br t(7)	5.23 br s	5.17 m	5.17 m
12	1.51 br s	1.46 s	1.52 s	1.60 s
13	1.59 br s	1.67 s	1.80 s	1.47 s
3′	6.29 d(2)	6.00~6.03 m	6.64 br s	6.73 br s
4′	8.64 s(OH)			
5′	6.47 dd(2, 8)	6.00~6.03 m	6.68 dd(2, 8)	6.58 br d(9.6)
6′	7.30 d(8)	7.39 d(8)	6.77 d(8)	7.25 d(9.6)
2″	5.54 br s	5.23 br s	5.27 br s	5.20 br s
3″	4.08 br	4.20 br s	4.21 m	4.45 m
4″	4.54 t(5.5)	4.04 t(7)	4.14 br s	4.53 t(10.5)
5″	3.83 td(5.5, 5.5)	3.82 m	3.75 br s	3.22 m
6″	2.24 br d(16)	2.15 m	2.10-2.20 br s	2.59 br s
	2.43 br d(16)	2.48 m		1.95 br d(6.0)
7″	1.87 br s	1.51 s	1.64 s	1.53 s
10″	12.89 s(OH)			
11″		6.29 d(2)	5.92 d(2)	
13″	6.20 d(9)	6.42 dd(2, 8)	5.98 dd(2, 8)	6.00 d(8.7)
14″	8.21 d(9)	6.97 d(8)	7.45 d(8)	7.19 d(8.7)
16″	8.56 s(OH)			6.91 d(8.4)
17″	6.46 d(2)	6.22 d(2)	6.18 d(2)	6.53 d(8.4)
18″	8.04 s(OH)			
19″	6.28 dd(2, 8)	6.10 dd(2, 8)	5.98 dd(2, 8)	6.53 d(8.4)
20″	6.93 d(8)	6.77 d(8)	6.31 d(8)	6.91 d(8.4)
21″	2.51 t(7)			3.08 d(7.2)
22″	1.76 t(7)			5.02 m
24″	1.27 s			1.53 s
25″	1.29 s			1.64 s

① Recorded at 90 °C.

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Table 4-4-47: ^{1}H NMR spectroscopic data of Diels-alder adduct-type chalcones **4-4-145**~**4-4-148**.

H	4-4-145	4-4-146	4-4-147	4-4-148
2	5.91 br d(10)	5.48 d(12.0)	5.61 br d(13.5)	5.67 br d(13.0)
3	2.80 (ov)	4.72 d(12.0)	2.96 dd(13.5, 16.5)	3.04 dd(13.9, 18.0)
			2.55 br d(16.5)	2.61 br d(18.0)
5	7.46 d(8.5)	7.74 d(9.0)	7.72 d(9.0)	7.74 d(9.0)
6	6.50 dd(8.5, 2.5)	6.59 dd(2.5, 9.0)	6.52 dd(2.5, 9.0)	6.58 dd(2.5, 9.0)
8	6.55 d(2.5)	6.72 d(2.5)	6.68 d(2.5)	6.54 d(2.5)
3′			6.24 s	6.19 s
5′	6.36 d(9.0)	6.25 d(8.5)		
6′	7.52 d(9.0)	7.09 d(8.5)	7.39 s	7.38 s
2″	5.35 s	5.54 s	5.34 s	5.35 s
3″	4.50 br s	4.53 br s	4.36 br s	4.23 br s
4″	4.79 br s	4.55 br s	4.53 br s	4.31 br s
5″	3.66 br s	3.72 br s	3.63 br s	3.61 br s
6″	2.59 m, 2.20 m	2.67 m, 2.22 m	2.72 m, 2.20 m	2.73 m, 2.19 m
7″	1.74 s	1.82 s	1.73 s	1.76 s
10″		13.32 s(OH)	13.06 s(OH)	13.07 s(OH)
11″	5.97 d(2.5)	5.96 d(2.0)	5.93 d(2.0)	5.97 d(2.0)
13″	6.10 dd(8.5, 2.5)	6.22 dd(2.0, 9.0)	6.35 dd(2.0, 9.0)	6.06 dd(2.0, 9.0)
14″	7.58 d(8.5)	7.46 d(9.0)	7.64 d(9.0)	7.48 d(9.0)
17″	6.16 d(2.5)	6.23 d(2.5)	6.22 d(2.5)	6.25 d(2.5)
19″	6.00 dd(8.5, 2.5)	6.11 dd(2.5, 9.0)	6.08 dd(2.5, 9.0)	6.20 dd(2.5, 9.0)
20″	6.72 d(8.5)	6.88 d(9.0)	6.85 d(9.0)	6.87 d(9.0)

Table 4-4-48: ^{1}H NMR spectroscopic data of Diels-alder adduct-type chalcones **4-4-149** and **4-4-152**~**4-4-154**.

H	4-4-149	4-4-152	4-4-153	4-4-154
2	4.99 d(11.5)			
3	4.51 d(11.5)			
5	7.73 d(9.0)	8.01 d(2.0)	8.02 d(2.0)	
6	6.63 d(9.0, 2.0)	6.97 dd(2.0, 8.5)	6.95 dd(2.0, 9.0)	6.26 br s
8	6.43 d(2.0)	7.17 d(2.0)	6.91 d(2.0)	6.63 br s
2′		8.22 d(2.0)		8.19 d(2.5)
3′	6.62 d(9.0)			
4′	7.05 dd(2.0, 9.0)			
5′		6.78 d(8.5)	6.37 d(9.0)	6.79 d(9.0)
6′	7.55 d(2.0)	7.85 dd(2.0, 8.5)	7.18 d(9.0)	7.84 dd(9.0, 2.5)
2″	5.42 s	5.40 s	5.35 s	5.40 br s
3″	4.35 br s	4.40 br s	4.53 br s	4.39 br s
4″	4.39 br s	4.64 br s	5.10 br s	4.65 m
5″	3.68 br s	3.67 br s	3.73 br s	3.62 m
6″	2.21 m, 2.64 m	2.81 m, 2.08 m	2.48 m, 2.18 m	2.52 m, 2.22 m
7″	1.77 s	1.78 s	1.68 s	1.78 s
10″	13.07 s(OH)	13.32 s(OH)	13.12 s(OH)	
11″	5.98 d(2.0)	5.93 d(2.0)	5.94 d(2.0)	5.94 d(2.5)
13″	6.08 d(2.0, 8.5)	6.06 dd(2.0, 9.0)	6.03 dd(2.0, 9.0)	6.05 dd(8.5, 2.5)

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Table 4-4-48 (continued)

H	4-4-149	4-4-152	4-4-153	4-4-154
14″	7.46 d(8.5)	7.81 d(9.0)	7.81 d(9.0)	7.76 d(8.5)
17″	6.21 d(2.0)	6.28 d(2.0)	6.21 d(2.0)	6.22 d(2.5)
19″	6.09 dd(2.0, 8.5)	6.11 dd(2.0, 9.0)	6.07 dd(2.0, 9.0)	6.09 dd(9.0, 2.5)
20″	6.88 d(8.5)	6.87 d(9.0)	6.82 d(9.0)	6.90 d(9.0)

Table 4-4-49: ^{1}H NMR spectroscopic data of Diels-alder adduct-type chalcones **4-4-155** and **4-4-156**.

H	4-4-155	4-4-156	H	4-4-155	4-4-156
6	6.28 br s	6.26 br s	7″	1.78 s	1.89 s
8	6.54 br s	6.51 br s	13″	6.07 (ov)	6.45 d(9.0)
2′		8.26 d(2.5)	14″	7.61 d(9.0)	8.01 d(9.0)
5′	6.76 d(8.5)	6.83 d(8.5)	17″	6.21 d(2.5)	6.26 d(2.5)
6′	7.81 d(8.5)	7.9 dd(8.5, 2.5)	19″	6.10 (ov)	6.13 dd(8.5, 2.5)
2″	5.40 br s	5.57 br s	20″	6.94 d(8.5)	6.86 d(8.5)
3″	4.40 br s	4.39 br s	21″	3.09 d(7.0)	3.20 d(7.0)
4″	4.59 m	4.74 m	22″	5.02 t(7.0)	5.12 t(7.0)
5″	3.70 m	3.78 m	24″	1.62 s	1.67 s
6″	2.52 m, 2.20 m	2.50 m, 2.21 m	25″	1.49 s	1.56 s

Table 4-4-50: ^{1}H NMR spectroscopic data of Diels-alder adduct-type chalcones **4-4-157**~**4-4-160**.

H	4-4-157	4-4-158	4-4-159	4-4-160
3	7.11 d(1)	7.12 d(1)	6.45 d(2)	7.05 s
4	7.42 d(8)	7.42 d(8)		7.40 d(8.4)
5	6.82 dd(2, 8)	6.82 dd(2, 8)	6.39 dd(2, 8)	6.80 d(2.4, 8.4)
6			7.42 d(8)	
7	6.99 br d(2)	6.99 d(2)		6.96 d(2.4)
α			7.39 d(16)	
β			6.89 d(16)	
2′	7.12 d(1.5)	7.12 d(1.5)	6.81 br s	7.08 d(1.8)
6′	7.14 d(1.5)	7.14 d(1.5)	6.81 br s	7.06 d(1.8)
2″	8.64 br s	8.64 br s	8.43 br s	8.39 s
6″	7.63 br s	7.63 br s	7.59 br s	7.56 s
7″	2.52 br s	2.52 br s	2.50 br s	2.48 s
13″	5.94 d(8)	5.95 d(8)	5.94 d(8)	6.10 d(8.7)
14″	6.02 d(8)	6.01 d(8)	6.01 d(8)	6.72 d(8.7)
17″	6.58 d(2)	6.57 d(2)	6.56 d(2)	6.48 d(2.4)
19″	6.59 dd(2, 8)	6.59 dd(2, 8)	6.58 dd(2, 8)	6.52 dd(2.4, 8.1)
20″	7.72 d(8)	7.72 d(8)	7.70 d(8)	7.67 d(8.1)
21″	2.73 m	3.36 br d(6.5)	2.73 m	6.46 d(9.9)
22″	1.65 m	5.22 m	1.68 m	5.50 d(9.9)
24″	1.19 s	1.75 br s	1.22 s	1.28 s
25″	1.22 s	1.54 br s	1.23 s	1.30 s

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Table 4-4-51: ^{1}H NMR spectroscopic data of Diels-alder adduct-type chalcones **4-4-161**~**4-4-164**.

H	4-4-161	4-4-162	4-4-163	4-4-164
3	7.01 br s		6.44 d(2.3)	6.40 d(2.3)
4	7.40 d(8.0)			
5	6.80 dd(8.0, 2.0)		6.38 dd(8.5, 2.3)	6.48 dd(8.7, 2.3)
6			7.38 d(8.5)	7.71 d(8.7)
7	6.99 br s			
α			6.89 d(16.5)	7.83 d(15.0)
β			7.33 d(16.5)	8.27 d(15.0)
2′	6.99 br s	6.96 d(1.5)	6.62 s	6.57 d(9.0)
6′	6.99 br s	7.02 d(1.5)	6.62 s	8.02 d(9.0)
2″	7.21 br s	6.46 br s	6.44 br d	6.5 (ov)
3″		3.40 m	3.3~3.4	3.37 br t(5.5)
4″		3.40 m	3.3~3.4	3.42 dd(12.0, 5.5)
5″		2.83-3.0	2.98 ddd(11.0, 10.0, 5.0)	2.91 ddd(12.0, 12.0, 5.5) (ov)
6″	8.05 br s	2.0~2.1	2.74 dd(17.0, 5.0)(ov)	2.72 dd(17.0, 5.5)
		2.73 dd(17.1, 5.4)		
7″	2.53 s	1.77 s	1.80 br s	1.78 br s
11″	6.70 d(2.5)			
13″	6.87 dd(8.5, 2.5)	6.27 d(8.6)	6.27 d(8.8)	6.29 d(8.3)
14″	8.13 d(8.5)	6.96 d(8.6)	7.06 d(8.8)	6.91 d(8.3)
17″		6.37 d(2.5)	6.35 d(2.5)	6.52 d(2.3)
19″		6.51 dd(8.4, 2.5)	6.49 dd(8.5, 2.5)	6.54 dd(8.3, 2.3)
20″		7.14 d(8.4)	7.13 d(8.5)	7.16 d(8.3)
21″		6.68 d(10.0)	6.68 d(8.5)	6.69 d(10.0)
22″		5.67 d(10.0)	5.65 d(10.0)	5.66 d(10.0)
24″		1.34 s	1.36 s	1.34 s
25″		1.34 s	1.36 s	1.34 s
CHO		9.84 s		
OH				14.58 s, 9.0 br s

Table 4-4-52: ^{1}H NMR spectroscopic data of Diels-alder adduct-type chalcones **4-4-165**~**4-4-167**.

H	4-4-165	4-4-166	4-4-167
3	7.02 s	6.88 s	6.43 d(2.4)
4	7.22 d(8.1)	7.33 d(8.4)	
5	6.82 d(8.1)	6.83 dd(8.4, 2.4)	6.39 dd(8.5, 2.4)
6			7.35 d(8.5)
7		6.31 d(2.4)	
α			7.30 d(16.5)
β			6.88 d(16.5)
2′	7.00 d(1.8)	6.74 d(2.4)	6.66 or 6.61 s
6′	6.97 d(1.8)	6.21 d(2.4)	6.66 or 6.61 s

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Table 4-4-52 (continued)

H	4-4-165	4-4-166	4-4-167
2″	6.43 br d(5.4)	6.52 d(5.4)	6.44 (ov)
3″	3.47 br t(5.4)	3.48 dd(12.0, 5.4)	3.52 br
4″	3.35 dd(11.7, 5.4)	3.34 t(12.0)	3.12 br dd(5.7, 10.7)
5″	3.01 m	2.90 dd(12.0, 5.7)	2.96 dt(4.6, 10.7, 10.7)
6″	2.70 dd(17.1, 5.7)	2.67 dd(17.4, 12.0)	2.70 br m
	2.00 (ov)	2.02 dd(17.4, 5.7)	2.10 (ov)
7″	1.77 s	1.82 s	1.77 br s
11″	6.40 d(2.7)		
13″	6.21 dd(8.7, 2.7)	6.09 d(8.7)	6.33 d(8.7)
14″	7.23 d(8.7)	6.93 d(8.7)	7.09 d(8.7)
17″	6.36 d(2.7)	6.31 d(2.4)	6.36 d(2.4)
19″	6.49 dd(8.4, 2.7)	6.43 dd(8.4, 2.4)	6.51 dd(8.2, 2.4)
20″	7.13 d(8.4)	7.05 d(8.4)	7.14 d(8.2)
21″	3.60 d(7.5)	6.64 d(9.9)	2.71 br m
22″	5.42 t(7.5)	5.55 d(9.9)	1.60 br m
24″	1.85 s	1.31 s	1.32 s
25″	1.64 s	1.30 s	1.32 s

Table 4-4-53: ^{1}H NMR spectroscopic data of Diels-alder adduct-type chalcones **4-4-168**~**4-4-171**.

H	4-4-168①	4-4-169①	4-4-170①	4-4-171①
3	6.28 d(9.4)	6.28 d(9.5)	6.29 d(9.5)	6.28 d(9.4)
4	7.68 d(9.4)	7.65 d(9.5)	7.69 d(9.5)	7.67 d(9.4)
5	7.30 s	7.26 s	7.35 s	7.26 s
8	6.92 s	6.90 s	6.95 s	6.94 s
11	3.45 br s	3.39 br s	3.42 br s	3.37 br s
12	5.73 br s	5.70 br s	5.78 br s	5.66 br s
14	2.28 br dd(5.4, 18.1)	2.23 br d(16.5)	2.25 br dd(5.7, 18.3)	2.20 br d(17.2)
	2.36 br dd(5.5, 18.1)	2.33 br d(16.5)	2.33 br dd(5.6, 18.3)	2.36 br d(17.2)
15	3.00 br dd(5.9, 12.1)	3.44 br d(4.0)	3.01 br dd(5.9, 12.5)	3.37 br s
16	2.80 br dd(5.9, 12.1)	2.91 br d(4.8)	2.79 br dd(5.1, 12.5)	2.89 br s
17	5.74 br d(5.7)	5.19 d(7.0)	5.68 d(5.8)	5.16 d(7.9)
18	1.73 s	1.73 s	1.78 s	1.82 s
2′	7.26 br s	3.73 s(OMe)	7.33 d(8.5)	3.70 s(OMe)
3′		6.83 br s	7.23 d(8.5)	6.84 s
5′	7.24 br d(8.0)	6.85 br d(8.8)	7.23 d(8.5)	6.85 br d(7.8)
6′	6.87 dd(1.4, 8.0)	7.22 br d(8.8)	7.33 d(8.5)	7.22 br d(7.8)
2″	3.73 s(OMe)	7.44 br s	3.72 s(OMe)	7.54 d(8.2)
3″	6.84 br s		6.86 br s	7.22 d(8.2)
5″	6.81 br d(8.1)	7.29 br d(8.0)	6.85 br d(7.7)	7.22 d(8.2)
6″	7.36 br d(8.1)	7.03 br d(8.0)	7.39 br d(7.7)	①.54(8.2)

① Recorded at 50 °C.

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Table 4-4-54: ^{1}H NMR spectroscopic data of Diels-alder adduct-type chalcones **4-4-172**~**4-4-174**.

H	4-4-172①	4-4-173	4-4-174
3	6.26 d(9.5)	6.09 d(9.7)	6.11 d(9.7)
4	7.66 d(9.5)	7.46 d(9.7)	7.50 d(9.7)
5	7.27 s		
7		4.21 s(OMe)	4.16 s(OMe)
8	6.92 s		
11	3.41 br s	4.26 br s	4.32 br s
12	5.69 br s	6.22 br s	6.33 br s
14	2.18 br d(18.1)	2.36 br dd(7.8, 17.8)	2.32 br m(7.8, 17.8)
	2.47 br d(18.1)	2.45 br dd(5.4, 17.8)	
15	3.54 br d(4.9)	3.02 br dd(8.0, 13.8)	3.59 br m(8.0, 13.8)
16	2.90 br dd(5.3, 12.2)	2.81 ddd(4.2, 6.8, 8.4)	2.98 ddd(2.8, 7.0, 10.2)
17	5.81 d(7.7)	5.06 d(4.0)	4.54 d(2.8)
18	1.80 s	1.77 s	1.78 s
2′	3.69 s(OMe)	7.29 d(2.0)	3.59 s(OMe)
3′	6.85 d(2.0)		6.91 d(2.0)
5′	6.91 dd(2.0, 8.4)	7.28 d(7.9)	6.97 dd(2.0, 8.1)
6′	7.31 d(8.4)	6.85 dd(2.0, 7.9)	7.40 d(8.1)
2″	3.71 s(OMe)	3.74 s(OMe)	6.88 d(1.9)
3″	6.87 d(2.0)	6.88 d(1.9)	
5″	6.93 dd(2.0, 8.1)	6.72 dd(1.9, 8.4)	7.20 d(7.9)
6″	7.54 d(8.1)	6.70 br s	d(1.9, 7.9)

① Recorded at 50 °C.

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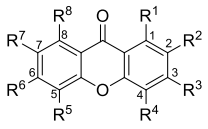
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4.5 Xanthones and aurones

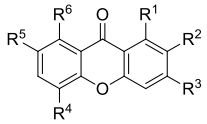
4.5.1 Xanthones

Table 4-5-1: Cos, MFs, and TSs of xanthones **4-5-1**~**4-5-19**.

No.	Compounds	MFs	Test solvents	References
4-5-1	2-carbomethoxy-6-methoxyxanthone	$C_{16}H_{12}O_5$	$CDCl_3$	[378]
4-5-2	cratoxyarborenone F	$C_{14}H_{10}O_5$	CD_3COCD_3	[379]
4-5-3	calophymembranol B	$C_{14}H_{10}O_5$	CD_3COCD_3	[380]
4-5-4	1,2,8-trimethoxyxanthone	$C_{16}H_{14}O_5$	$CDCl_3$	[381]
4-5-5	1-hydroxy-7-hydroxymethyl-6-methoxyxanthone	$C_{15}H_{12}O_5$	DMSO-d_6	[382]
4-5-6	1,4-dihydroxy-6,7-methylenedioxyxanthone	$C_{14}H_8O_6$	C_5D_5N	[383]
4-5-7	calophymembranol A	$C_{15}H_{12}O_6$	$CDCl_3$	[380]
4-5-8	7-hydroxy-1,2,8-trimethoxyxanthone	$C_{16}H_{14}O_6$	$CDCl_3$	[378]
4-5-9	1,3,7-trihydroxy-5-methoxyxanthone	$C_{14}H_{10}O_6$	C_5D_5N	[384]
4-5-10	4,5-dihydroxy-2,3-dimethoxyxanthone	$C_{15}H_{12}O_6$	C_5D_5N	[384]
4-5-11	8-carboxymethyl-1,5,6-trihydroxy-3-methoxyxanthone	$C_{16}H_{12}O_8$	CD_3OD	[385]
4-5-12	8-carboxymethyl-1,3,5,6-tetrahydroxyxanthone	$C_{15}H_{10}O_8$	CD_3OD	[385]
4-5-13	drimiopsin A	$C_{16}H_{14}O_7$	DMSO-d_6	[386]
4-5-14	drimiopsin C	$C_{15}H_{12}O_6$	DMSO-d_6	[386]
4-5-15	drimiopsin D	$C_{16}H_{14}O_7$	DMSO-d_6	[386]
4-5-16	drimiopsin E	$C_{15}H_{12}O_6$	CD_3OD	[386]
4-5-17	nidulalin A	$C_{16}H_{14}O_6$	$CDCl_3$	[387]
4-5-18	(4*R*,4a*S*,9a*R*)-1,9a-dihydronidulalin A	$C_{16}H_{16}O_6$	$CDCl_3$	[387]
4-5-19	(4*S*,4a*R*,9a*R*)-4a-carbomethoxy-1,4,4a,9a-tetrahydro-4,8-dihydroxy-6-methylxanthone	$C_{16}H_{16}O_6$	$CDCl_3$	[387]

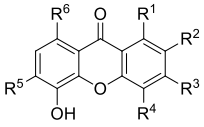


	R^1	R^2	R^3	R^4	R^5	R^6	R^7	R^8
4-5-1	H	COOMe	H	H	H	OMe	H	H
4-5-2	H	H	OH	H	OMe	H	H	OH
4-5-3	H	H	OH	OMe	H	H	OH	H
4-5-4	OMe	OMe	H	H	H	H	H	OMe
4-5-5	OH	H	H	H	H	OMe	CH_2OH	H

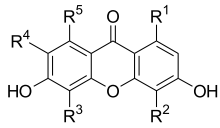


	R^1	R^2	R^3	R^4	R^5	R^6
4-5-6	H	OCH_2O		OH	H	OH
4-5-7	H	OMe	OH	H	OH	OMe
4-5-8	OMe	OMe	H	H	OH	OMe
4-5-9	OH	H	OH	OMe	OH	H

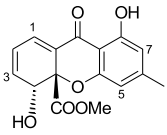
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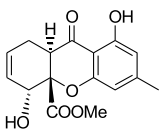
	R^1	R^2	R^3	R^4	R^5	R^6
4-5-10	H	OMe	OMe	OH	H	H
4-5-11	OH	H	OMe	H	OH	COOMe



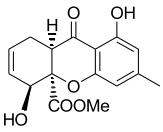
	R^1	R^2	R^3	R^4	R^5
4-5-12	OH	H	OH	H	COOMe
4-5-13	Me	H	OMe	OMe	OH
4-5-14	Me	H	H	OMe	OH
4-5-15	Me	OMe	OMe	H	OH
4-5-16	Me	H	OMe	H	OH



4-5-17



4-5-18



4-5-19

Table 4-5-2: ^{1}H NMR spectroscopic data of xanthones **4-5-1**~**4-5-5**.

H	4-5-1	4-5-2	4-5-3	4-5-4	4-5-5
1	8.98 d(2.1)	12.10 s(OH)	7.88 d(8.8)	4.00 s(OMe)	
2		6.70 d(8.6)	7.01 d(8.8)	3.97 s(OMe)	6.81 dd(8.2, 0.8)
3	7.48 d(8.8)	7.44 d(8.6)		7.25 d(9.2)	7.71 dd(8.4, 8.4)
4	6.96 dd(9, 2.5)	3.94 s(OMe)	4.00 s(OMe)	7.11 d(9.2)	7.09 dd(8.4, 0.8)
5	6.89 d(2.3)	7.62 d(2.9)	7.52 d(9.2)	6.92 dd(8.4, 1.0)	7.49 or 7.62 t(1.3)
6			7.34 dd(9.2, 3.1)	7.50 dd(8.4, 8.4)	3.91 s(OMe)
7	7.71 dd(8.6, 1.2)	7.46 dd(9.0, 2.9)		6.72 dd(8.3, 1.0)	4.63 d(1.3, CH_2)
8	8.24 d(9.0)	7.60 d(9.0)	7.61 d(3.1)	3.88 s(OMe)	7.49 or 7.62 t(1.3)
CH_2					

Table 4-5-3: ^{1}H NMR spectroscopic data of xanthones **4-5-6**~**4-5-11**.

H	4-5-6	4-5-7	4-5-8	4-5-9	4-5-10	4-5-11
1	7.97 s	7.70 s	3.99 s(OMe)	13.63 s(OH)	7.59 s	
2		4.01 s(OMe)	3.90 s(OMe)	6.69 d(2.0)	3.76 s(OMe)	6.30 d(1.5)
3			7.30 d(9.2)		3.92 s(OMe)	3.90 s(OMe)
4	6.65 s	6.96 s	7.14 d(9.2)	6.76 d(2.0)		6.57 d(1.5)
5		7.21 d(9.0)	7.10 d(9.2)	3.81 s(OMe)		
6	7.43 d(8.4)	7.40 d(9.0)	7.31 d(9.0)	7.19 d(2.4)	7.52 d(8.0)	
7	7.53 d(8.4)				7.28 dd(8.0, 8.0)	6.83 s
8		4.07 s(OMe)	4.01 s(OMe)	7.65 d(2.4)	8.15 d(8.0)	3.93 s(COOMe)
OCH_2O	6.11 s					

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Table 4-5-4: ^{1}H NMR spectroscopic data of xanthones **4-5-12**~**4-5-15**.

H	4-5-12	4-5-13	4-5-14	4-5-15
1		2.70 s(Me)	2.69 s(Me)	2.65 s(Me)
2	6.20 d(1.5)	6.62 d(2.4)	6.58 d	6.67 s
4	6.47 d(1.5)	6.67 d(2.4)	6.58 d	3.79 s(OMe)
5		3.78 s(OMe)	6.28 s	3.70 s(OMe)
7	6.82 s	3.73 s(OMe)	3.68 s(OMe)	6.39 s
8	3.93 s(COOMe)	13.23 s(OH)	13.51 s(OH)	13.45 s(OH)

Table 4-5-5: ^{1}H NMR spectroscopic data of xanthones **4-5-16**~**4-5-19**.

H	4-5-16	4-5-17	4-5-18	4-5-19
1	2.77 s(Me)	7.34 dd(4.5, 2.1)	2.64 m, 2.73 m	2.47 m
2	6.60 d(2.2)	6.40 (ov)	6.04 m	5.89 m
3		6.40 (ov)	5.86 m	5.73 m
4	6.68 d(2.2)	4.67 d(5.5)	4.66 d(5.9)	4.55 d(8.9)
5	3.86 s(OMe)	6.33 br s	6.27 s	6.42 s
6		2.28 s(Me)	2.26 s(Me)	2.29 s(Me)
7	6.16 s	6.40 (ov)	6.36 s	6.36 s
8	13.10 s(OH)	12.10 s(OH)	11.50 s(OH)	11.30 s(OH)
9a			3.62 m	3.27 dd(10.7, 7.3)
COOMe		3.62 s	3.62 s	3.71 s

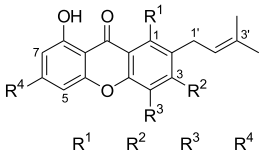
Table 4-5-6: Cos, MFs, and TSs of xanthones **4-5-20**~**4-5-57**.

No.	Compounds	MFs	Test solvents	References
4-5-20	afzeliixanthone A	$C_{19}H_{18}O_6$	CD_3COCD_3	[388]
4-5-21	globulixanthone D	$C_{19}H_{18}O_5$	$CDCl_3$	[389]
4-5-22	5-*O*-methylcelebixanthone	$C_{20}H_{20}O_6$	$CDCl_3$	[390]
4-5-23	caledonixanthone D	$C_{19}H_{18}O_6$	CD_3COCD_3	[391]
4-5-24	cudraxanthone S	$C_{18}H_{16}O_6$	CD_3COCD_3	[392]
4-5-25	1-*O*-methylglobuxanthone	$C_{19}H_{18}O_5$	–	[393]
4-5-26	nigrolineaxanthone C	$C_{19}H_{20}O_7$	$CDCl_3$	[394]
4-5-27	nigrolineaxanthone D	$C_{18}H_{18}O_6$	$CDCl_3$-CD_3OD	[394]
4-5-28	1,3,7-trihydroxy-2-(2-hydroxy-3-methyl-3-butenyl)-xanthone	$C_{18}H_{16}O_6$	CD_3COCD_3	[384]
4-5-29	afzeliixanthone B	$C_{20}H_{20}O_6$	CD_3COCD_3	[388]
4-5-30	8-deoxygartanin	$C_{23}H_{24}O_5$	CD_3COCD_3	[395]
4-5-31	1,3,5-trihydroxy-4,8-di(3-methylbut-2-enyl)xanthone	$C_{23}H_{24}O_5$	CD_3COCD_3	[395]
4-5-32	cratoxyarborenone C	$C_{25}H_{28}O_6$	$CDCl_3$	[379]
4-5-33	cratoxyarborenone E	$C_{24}H_{26}O_6$	$CDCl_3$	[379]
4-5-34	parvixanthone B	$C_{24}H_{26}O_7$	CD_3COCD_3	[396]

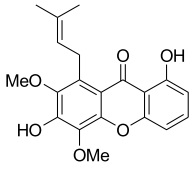
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Table 4-5-6 (continued)

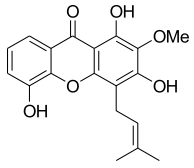
No.	Compounds	MFs	Test solvents	References
4-5-35	cowaxanthone E	$C_{25}H_{26}O_7$	$CDCl_3$	[397]
4-5-36	cudraxanthone P	$C_{23}H_{24}O_6$	CD_3COCD_3	[398]
4-5-37	2,3,6,8-tetrahydroxy-5-(3-methylbut-2-enyl)-7-(2-methylbut-3-en-2-yl)-9*H*-xanthen-9-one	$C_{23}H_{24}O_6$	$CDCl_3$	[399]
4-5-38	2,3,6,8-tetrahydroxy-1-(3-methylbut-2-enyl)-5-(2-methylbut-3-en-2-yl)-9*H*-xanthen-9-one	$C_{23}H_{24}O_6$	$CDCl_3$	[399]
4-5-39	allanxanthone A	$C_{23}H_{24}O_5$	CD_3COCD_3	[400]
4-5-40	mangostenone E	$C_{24}H_{28}O_8$	CD_3COCD_3	[401]
4-5-41	nigrolineaxanthone P	$C_{25}H_{32}O_7$	$CDCl_3$	[402]
4-5-42	smeathxanthone A	$C_{23}H_{24}O_6$	CD_3COCD_3	[403]
4-5-43	montrouxanthone	$C_{23}H_{24}O_6$	$CDCl_3$	[404]
4-5-44	fuscaxanthone F	$C_{23}H_{24}O_5$	CD_3COCD_3	[405]
4-5-45	parvixanthone C	$C_{24}H_{26}O_7$	CD_3COCD_3	[396]
4-5-46	parvixanthone D	$C_{24}H_{24}O_7$	CD_3COCD_3	[396]
4-5-47	parvixanthone F	$C_{24}H_{24}O_7$	CD_3COCD_3	[396]
4-5-48	parvixanthone H	$C_{24}H_{26}O_7$	CD_3COCD_3	[396]
4-5-49	1,2-dihydro-3,6,8-trihydroxy-1,1-bis(3-methylbut-2-enyl)-5-(1,1-dimethylprop-2-enyl)-xanthen-2,9-dione	$C_{28}H_{32}O_6$	$CDCl_3$	[406]
4-5-50	allanxanthone C	$C_{28}H_{32}O_6$	CD_3COCD_3	[407]
4-5-51	garcinianone A	$C_{28}H_{32}O_6$	$CDCl_3$	[408]
4-5-52	garcinianone B	$C_{28}H_{32}O_6$	$CDCl_3$	[408]
4-5-53	formoxanthone A	$C_{28}H_{32}O_5$	$CDCl_3$	[409]
4-5-54	cratoxyarborenone A	$C_{28}H_{32}O_6$	CD_3COCD_3	[379]
4-5-55	dulcisxanthone E	$C_{28}H_{32}O_6$	$CDCl_3$-CD_3OD	[410]
4-5-56	fuscaxanthone H	$C_{29}H_{36}O_7$	–	[405]
4-5-57	parvixanthone A	$C_{29}H_{34}O_7$	CD_3COCD_3	[396]



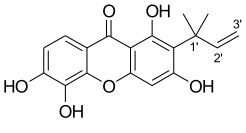
	R^1	R^2	R^3	R^4
4-5-20	OMe	H	OH	OH
4-5-21	H	OH	OMe	H



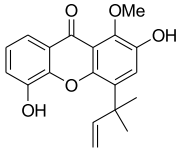
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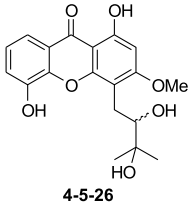
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4-5-24

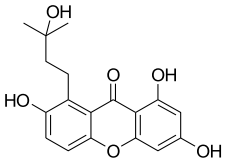


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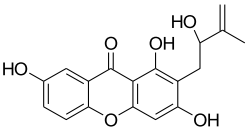


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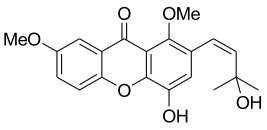
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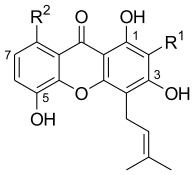
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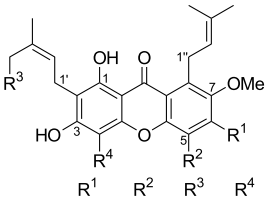
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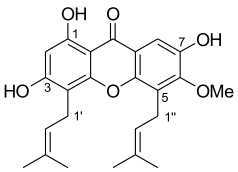
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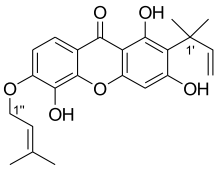
	R^1	R^2
4-5-30	Prenyl	H
4-5-31	H	Prenyl



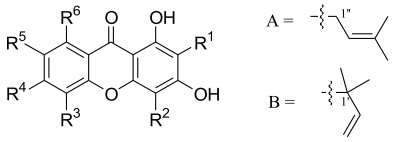
	R^1	R^2	R^3	R^4
4-5-32	H	OMe	H	H
4-5-34	OH	H	OH	H
4-5-35	OH	H	H	CHO



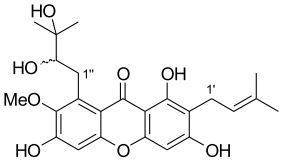
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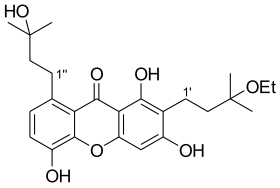
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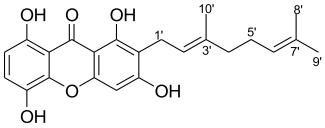
	R^1	R^2	R^3	R^4	R^5	R^6
4-5-37	B	A	H	OH	OH	H
4-5-38	H	B	H	OH	OH	A
4-5-39	A	B	OH	H	H	H



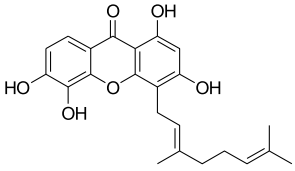
4-5-40



4-5-41

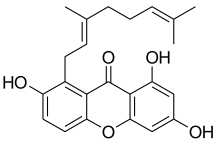


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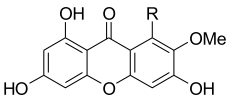


4-5-43

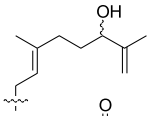
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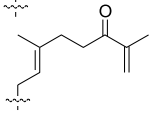
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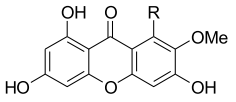


4-5-45 R =

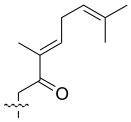


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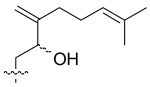


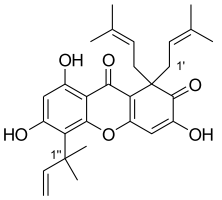


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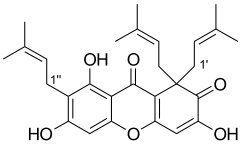


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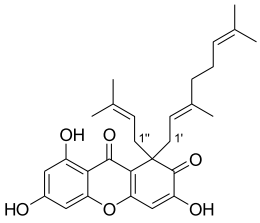




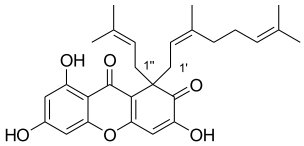
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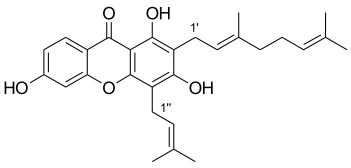
4-5-50



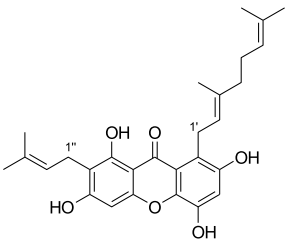
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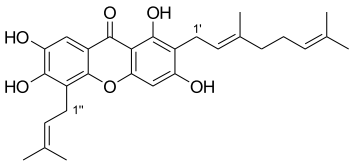
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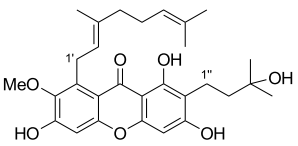
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4-5-54

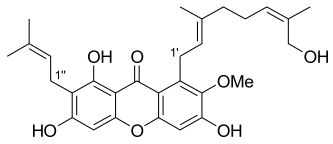


4-5-55



4-5-56

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4-5-57

Table 4-5-7: ^{1}H NMR spectroscopic data of xanthones **4-5-20**~**4-5-24**.

H	4-5-20	4-5-21	4-5-22	4-5-23	4-5-24
1	3.80 s(OMe)	7.78 s	13.10 s(OH)	13.14 s(OH)	14.23 s(OH)
2			6.78 dd(8.4, 0.9)	3.87 s(OMe)	
3	6.85 s	6.50 s(OH)	7.53 t(8.4)		
4	9.99 s(OH)	4.11 s(OMe)	6.91 dd(8.4, 0.9)		6.43 s
5	6.20 d(2.3)	6.92 dd(8.4, 1.3)	4.10 s(OMe)		
6	9.75 s(OH)	7.50 t(8.4)		7.34 d(8.0)	
7	6.32 d(2.3)	6.72 dd(8.4, 1.3)	3.82 s(OMe)	7.23 dd(8.0, 8.0)	6.93 d(9.0)
8	13.50 s(OH)	12.82 s(OH)		7.65 d(8.0)	7.61 d(9.0)
1′	3.60 d(6.3)	3.40 d(6.8)	4.04 d(6.6)	3.58 d(7.0)	
2′	5.20 t(6.2)	5.30 t(6.8)	5.21 m	5.33 t(7.0)	6.36 dd(10.0, 17.0)
3′					6.94 dd(1, 17)
					4.84 dd(1, 12)
4′	1.68 s	1.79 s	1.69 d(1.5)	1.60 s	1.61 s
5′	1.76 s	1.69 s	1.85 br s	1.81 s	1.61 s
OH					8.8~9.5 br

Table 4-5-8: ^{1}H NMR spectroscopic data of xanthones **4-5-25**~**4-5-29**.

H	4-5-25	4-5-26	4-5-27	4-5-28	4-5-29
1	3.90 s(OMe)	12.83 s(OH)	13.40 s(OH)	13.45 s(OH)	3.90 s(OMe)
2		6.42 s	6.16 d(2.0)		
3	7.40 s	3.94 s(OMe)			6.20 s
4			6.23 d(2.0)	6.41 s	9.99 s(OH)
5			7.11 d(8.5)	7.41 d(9.0)	6.88 d(8.1)
6	7.31 dd(7.8, 1.7)	7.29 dd(7.5, 1.5)	7.18 d(8.5)	7.36 dd(9.0, 2.9)	7.27 dd(8.3, 2.0)
7	7.19 t(7.8)	7.24 t(7.5)			3.75 s(OMe)
8	7.66 dd(7.8, 1.7)	7.73 dd(7.5, 1.5)		7.57 d(2.9)	7.50 d(2.0)
1′		3.30 dd(15.0, 2.0)	3.39~3.36 m	3.08 dd(14.4, 3.6)	6.50 d(10.0)
		2.83 dd(15.0, 8.0)		2.92 dd(14.4, 7.9)	
2′	6.46 dd(17.0, 10.6)	3.67 dd(8.0, 2.0)	1.85~1.82 m	4.43 dd(7.9, 3.6)	5.65 d(10.0)
3′	5.18 dd(17.0, 1.1)				
	5.05 dd(10.6, 1.1)				
4′	1.67 s	1.36 s	1.27 s	4.97 br s, 4.76 br s	1.50 s
5′	1.67 s	1.36 s	1.27 s	1.84 s	1.50 s

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Table 4-5-9: ^{1}H NMR spectroscopic data of xanthones **4-5-30**~**4-5-34**.

H	4-5-30	4-5-31	4-5-32	4-5-33	4-5-34
1	13.33 s(OH)	13.27 s(OH)	13.83 s(OH)	13.02 s(OH)	13.89 s(OH)
2		6.34 s		6.33 s	
4			6.26 s		6.37 s
5			3.95 s(OMe)		6.83 s
6	7.38 dd(7.9, 1.6)	7.27 d(7.2)	6.71 s	3.97 s(OMe)	
7	7.26 t(7.9)	7.04 d(7.2)	3.80 s(OMe)		3.85 s(OMe)
8	7.70 dd(7.9, 1.6)			7.54 s	
1′, 1″	3.46 d(7.0)	3.58 d(7.3)	3.48 d(7.1)	3.53 d(6.8)	3.43 d(7.1)
	3.69 d(7.0)				
2′, 2″	5.31 or 5.25 t (7.0, 1.3)	5.39 m	5.28 br t(7.1)	5.30 q(6.8, 1.4)	5.35 br t(7.1)
4′, 5′	1.67 or 1.66 d (1.3)	1.64 d(1.0)	1.77 s	1.67 s	4.29 s
4″, 5″	1.87 or 1.80 d(1.3)	1.84 br s	1.84 s	1.80 s	1.73 s
1″		4.00 d(7.2)	4.12 d(5.8)	3.68 d(6.8)	4.12 d(6.4)
2″		5.39 m	5.24 br t(5.8)	5.34 q(6.8, 1.4)	5.26 br t(6.4)
4″, 5″		1.71 d(1.0)	1.68 s	1.70 s	1.82 s
		1.74 br s	1.85 s	1.84 s	1.65 s

Table 4-5-10: ^{1}H NMR spectroscopic data of xanthones **4-5-35**~**4-5-39**.

H	4-5-35	4-5-36	4-5-37	4-5-38	4-5-39
1	14.52 s(OH)	14.19 s(OH)	7.51 s		13.65 s(OH)
3	13.00 s(OH)				
4	10.37 s(CHO)	6.47 s	6.41 s	6.83 s	
5	6.95 s				
6	10.37 s(OH)				7.34 dd(8.1, 1.7)
7	3.83 s(OMe)	7.15 d(9)		6.22 s	7.21 t(8.1)
8		7.68 d(9)			7.68 dd(8.1, 1.7)
1′	4.08 d(6.3)				
2′	5.23 m	6.36 dd(11, 18)	6.53 dd(17.8, 10.5)	6.45 dd(17.8, 10.5)	6.60 dd(16.0, 9.3)
3′		4.94 dd(18, 1)	5.40 d(10.5)	5.35 d(10.5)	5.30 dd(9.3, 1.1)
		4.84 dd(11, 1)	5.50 d(17.8)	5.44 d(17.8)	5.45 dd(16.0, 1.1)
4′, 5′	1.69 s, 1.84 s	1.62 s, 1.62 s	1.68 s, 1.68 s	1.68 s, 1.68 s	1.80 s, 1.80 s
1″	3.35 d(7.2)	4.78 br d(7)	3.44 d(7.0)	4.30 d(6.7)	3.35 d(6.8)
2″	5.23 m	5.50 m	5.20 m	5.30 m	5.25 t(6.8)
4″, 5″	1.81 s	1.77 br d(1)	1.70 s	1.88 s	1.65 s
	1.69 s	1.76 br d(1)	1.83 s	2.19 s	1.79 s
OH		9.51 br s, 8.45 br s			8.50 br, 8.50 br

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Table 4-5-11: ^{1}H NMR spectroscopic data of xanthones **4-5-40** and **4-5-41**.

H	4-5-40	4-5-41	H	4-5-40	4-5-41
1	13.58 s(OH)	13.43 s(OH)	2′	5.27 br t(6.6)	1.80 t(6.5)
4	6.40 s	6.41 s	3′		3.58 q(7.0, OEt) 1.31 t(7.0, OEt)
5	6.84 s		4′, 5′	1.62 s, 1.76 s	1.23 s, 1.23 s
6	9.86 br s(OH)	7.19 d(8.0)	1″	3.59 m	3.27 m
7	3.85 s(OMe)	6.98 d(8.0)	2″	3.69 m	1.76 m
1′	3.33 d(6.6)	2.77 t(6.5)	4″, 5″	1.29 s, 1.29 s	1.31 s, 1.31 s

Table 4-5-12: ^{1}H NMR spectroscopic data of xanthones **4-5-42**~**4-5-45**.

H	4-5-42	4-5-43	4-5-44	4-5-45
1		12.98 s(OH)	13.40 s(OH)	13.50 s(OH)
2		6.30 s	6.20 d(2.2)	6.18 d(1.4)
4	6.58 s		6.32 d(2.2)	6.29 d(1.4)
5	9.67 br s(OH)		7.37 d(8.8)	6.84 s
6	7.29 d(8.8)		7.25 d(8.8)	
7	6.63 d(8.8)	6.96 d(8.8)		3.80 s(OMe)
8		7.74 d(8.8)		
1′	3.38 d(7.2)	3.58 d(6.6)	4.18 d(7.0)	4.11 d(6.3)
2′	5.30 d(7.2)	5.29 m	5.30 m	5.30 br t(6.3)
4′	1.98 t(7.0)	2.09 m	1.94 m	1.97 m
5′	2.09 m	2.11 m	2.04 (ov)	1.58 m
6′	5.08 t(7.0)	5.04 m	5.03 m	3.95 br dt(6.3, 1.4)
8′	1.61 s	1.64 s	1.51 s	4.83 s 4.68 br d(1.4)
9′	1.56 s	1.58 s	1.54 s	1.63 s
10′	1.81 s	1.87 s	1.83 s	1.83 s

Table 4-5-13: ^{1}H NMR spectroscopic data of xanthones **4-5-46**~**4-5-48**.

H	4-5-46	4-5-47	4-5-48
1	13.48 s(OH)	13.17 s(OH)	13.38 s(OH)
2	6.21 d(2.0)	6.18 d(2.0)	6.22 d(1.7)
4	6.33 d(2.0)	6.34 d(2.0)	6.34 d(1.7)
5	6.86 s	6.92 s	6.88 s
7	3.79 s(OMe)	3.73 s(OMe)	3.85 s(OMe)
1′	4.13 d(6.5)	4.81 s	3.69 dd(12.5, 3.6) 3.56 dd(12.5, 9.6)
2′	5.31 dt(6.5, 1.3)		4.42 dd(9.6, 3.6)
4′	2.26 t(7.3)	5.93 br t	2.18 m
5′	2.79 t(7.3)	2.28~2.48 m	2.29 m
6′		5.17 br t	5.23 br t(7.0)
8′	5.99 s, 5.73 s	1.67 s	1.64 s
9′	1.74 s	1.60 s	1.69 s
10′	1.86 s	1.29 s	5.12 s, 4.83 s

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Table 4-5-14: ^{1}H NMR spectroscopic data of xanthones **4-5-49**~**4-5-52**.

H	4-5-49	4-5-50	4-5-51	4-5-52
1		13.50 s(OH)		
3	6.94 s(OH)	9.30 br s(OH)	7.01 s(OH)	7.00 s(OH)
4	6.42 s	6.55 s	6.48 s	6.50 s
5		6.45 s	6.35 d(2.0)	6.35 br s
6	7.04 s(OH)	9.50 br s(OH)	6.25 br s(OH)	5.98 br s(OH)
7	6.23 s		6.29 d(2.0)	6.29 br s
8	13.40 s(OH)		13.29 s(OH)	13.24 s(OH)
1′	2.78 dd(13.8, 7.9)	3.43 dd(7.6, 13.6)	2.80 m	2.82 m
	3.34 dd(13.8, 7.1)	2.73 dd(13.6, 7.6)	3.45 m	3.44 m
2′	4.58 m	4.74 t(7.6)	4.64 m	4.62 m
4′	1.42 s	1.47 s	1.82 m	1.92 m
5′	1.44 s	1.47 s	1.78 m	1.88 m
6′			4.87 t(6.8)	5.04 t(6.8)
8′			1.48 s	1.67 s
9′			1.60 s	1.59 s
10′			1.47 s	1.49 s
1″		3.35 d(7.2)	2.80 m, 3.45 m	2.82 m, 3.44 m
2″	6.38 dd(17.8, 10.6)	5.25 t(7.2)	4.64 m	4.62 m
3″	5.32 d(10.6)			
	5.40 d(17.8)			
4″, 5″	1.61 s, 1.61 s	1.80 s, 1.65 s	1.48 s, 1.48 s	1.49 s, 1.48 s

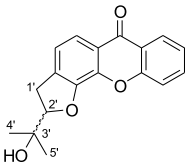
Table 4-5-15: ^{1}H NMR spectroscopic data of xanthones **4-5-53**~**4-5-57**.

H	4-5-53	4-5-54	4-5-55	4-5-56	4-5-57
1	13.18 s(OH)	13.94 s(OH)	13.19 s(OH)	13.71 s(OH)	13.80 s(OH)
3	6.59 s(OH)	6.80 s			
4			6.42 s	6.35 s	6.25 s
5	5.84 s(OH)	6.37 s		6.83 s	6.98 s
6	7.28 dd(7.8, 1.5)				
7	7.21 t(7.8)			3.80 s(OMe)	3.81 s(OMe)
8	7.75 dd(7.8, 1.5)		7.33 s		
1′	3.49 d(7.2)	4.20 d(6.8)	3.37 d(6.0)	4.10 d(6.2)	4.13 d(6.4)
2′	5.30 m	5.33 br t(6.8)	5.28 br t	5.27 m	5.29 br t(6.4)
4′	2.11 m	1.95 t(7.1)	1.99 m	2.00 m	1.96~2.09 m
5′	2.11 m	2.04 m	2.03 m	2.05 m	1.96~2.09 m
6′	5.06 m	5.04 br t(7.1)	5.02 br t	5.07 m	5.05 br tt(6.8, 1.0)
8′	1.69 s	1.55 s	1.57 s	1.55 s	4.39 d(1.0)
9′	1.85 s	1.52 s	1.80 s	1.60 s	1.56 s
10′	1.60 s	1.85 s	1.52 s	1.83 s	1.83 s
1″	3.53 d(6.9)	3.34 d(6.6)	6.30 d(6.0)	2.79 t(7.7)	3.55 d(7.6)
2″	5.25 m	5.27 br t(6.6)	5.28 br t	1.82 t(7.7)	5.36 br t(7.6)
4″, 5″	1.74 d(1.2), 1.86 s	1.64 s, 1.77 s	1.88 s, 1.69 s	1.31 s, 1.31 s	1.73 s, 1.52 s

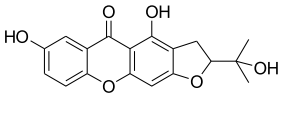
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Table 4-5-16: Cos, MFs, and TSs of xanthones **4-5-58**~**4-5-63**.

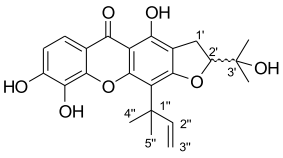
No.	Compounds	MFs	Test solvents	References
4-5-58	caledonixanthone C	$C_{18}H_{16}O_4$	$CDCl_3$	[391]
4-5-59	1,7-dihydroxy-2,3-[2″-(1-hydroxy-1-methylethyl)-dihydrofurano]-xanthone	$C_{18}H_{16}O_6$	CD_3COCD_3	[384]
4-5-60	cudraxanthone R	$C_{23}H_{24}O_7$	CD_3COCD_3	[398]
4-5-61	cratoxyarborenone D	$C_{23}H_{22}O_7$	$CDCl_3$	[379]
4-5-62	mangostenone C	$C_{24}H_{26}O_8$	$CDCl_3$	[401]
4-5-63	formoxanthone C	$C_{23}H_{24}O_6$	$CDCl_3$	[409]



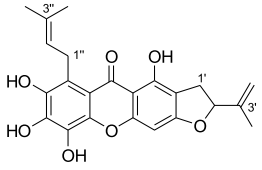
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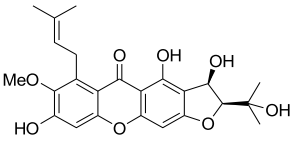
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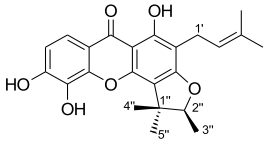
4-5-60



4-5-61



4-5-62



4-5-63

Table 4-5-17: ^{1}H NMR spectroscopic data of xanthones **4-5-58**, **4-5-59**, and **4-5-62**.

H	4-5-58	4-5-59	4-5-62
1	8.35 dd(8.0, 1.5)	13.17 s(OH)	13.92 s(OH)
2	7.39 dd(8.5, 8.0)		
3	7.73 ddd(8.5, 8.0, 1.5)		
4	7.57 d(8.0)	6.36 s	6.29 s
5		7.44 d(9.2)	6.83 s
6		7.35 dd(9.2, 2.0)	6.38 br s(OH)
7	7.19 d(8.0)		3.81 s(OMe)
8	7.86 d(8.0)	7.57 d(2.0)	

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Table 4-5-17 (continued)

H	4-5-58	4-5-59	4-5-62
1′	3.38 d(9.0)	3.19 d(14.8, 7.6) 3.17 d(14.8, 9.4)	6.10 d(6.1)
2′	4.89 t(9.0)	4.85 dd(9.4,7.6)	5.29 d(6.1)
4′, 5′	1.30 s, 1.48 s	1.30 s, 1.25 s	1.43 s, 1.40 s
1″			4.07 d(6.0)
2″			5.23 br t(6.0)
4″, 5″			1.69 s, 1.82 s

Table 4-5-18: ^{1}H NMR spectroscopic data of xanthones **4-5-60**, **4-5-61**, and **4-5-63**.

H	4-5-60	4-5-61	4-5-63
1	13.48 s(OH)	14.17 s(OH)	13.40 s(OH)
4		6.30 s	
7	6.98 d(9)		6.92 d(7.7)
8	7.59 d(9)		7.74 d(7.7)
1′	3.21 dd(8, 16) 3.09 dd(10, 16)	3.07 dd(14.4, 3.0) 2.88 dd(14.4, 8.0)	3.31 d(6.9)
2′	4.79 dd(8, 10)	4.40 br d(8.0)	5.29 m
4′	1.29 s	4.94 br s, 4.76 br s	1.69 s
5′	1.27 s	1.83 s	1.79 s
1″		4.17 d(6.1)	
2″	6.53 dd(11,18)	5.31 br t(6.1)	4.54 q(6.3)
3″	5.09 dd(1, 18) 4.92 dd(1, 11)		1.32 s
4″, 5″	1.72 s, 1.71 s	1.63 s, 1.83 s	1.58 s, 1.43 d(6.3)

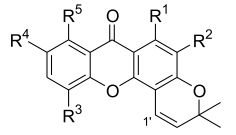
Table 4-5-19: Cos, MFs, and TSs of xanthones **4-5-64**~**4-5-86**.

No.	Compounds	MFs	Test solvents	References
4-5-64	nigrolineaxanthone F	$C_{18}H_{14}O_5$	$CDCl_3$	[394]
4-5-65	nigrolineaxanthone H	$C_{18}H_{14}O_5$	$CDCl_3$	[394]
4-5-66	brasixanthone F	$C_{19}H_{16}O_6$	–	[411]
4-5-67	caledonixanthone A	$C_{18}H_{16}O_4$	$CDCl_3$	[391]
4-5-68	1,5-dihydroxy-3-methoxy-6′,6′-dimethyl-2*H*-pyra-no(2′,3′:6,7)-4-(3-methylbut-2-enyl)-xanthone	$C_{24}H_{24}O_6$	–	[412]
4-5-69	cudraxanthone Q	$C_{23}H_{22}O_5$	CD_3COCD_3	[398]
4-5-70	nigrolineaxanthone B	$C_{24}H_{26}O_7$	$CDCl_3$	[394]
4-5-71	nigrolineaxanthone M	$C_{23}H_{24}O_6$	$CDCl_3$	[402]
4-5-72	brasixanthone C	$C_{23}H_{22}O_7$	CD_3COCD_3	[411]
4-5-73	brasixanthone D	$C_{23}H_{22}O_7$	CD_3COCD_3	[411]

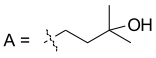
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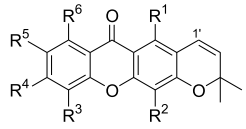
Table 4-5-19 (continued)

No.	Compounds	MFs	Test solvents	References
4-5-74	merguenone	$C_{23}H_{22}O_5$	$CDCl_3$	[395]
4-5-75	laurentixanthone A	$C_{23}H_{22}O_4$	CD_3COCD_3	[413]
4-5-76	bangangxanthone A	$C_{23}H_{22}O_6$	$CDCl_3$	[414]
4-5-77	cowaxanthone D	$C_{24}H_{24}O_6$	$CDCl_3$	[397]
4-5-78	nigrolineaxanthone Q	$C_{23}H_{24}O_5$	$CDCl_3$	[402]
4-5-79	nigrolineaxanthone L	$C_{23}H_{26}O_6$	$CDCl_3$	[402]
4-5-80	nigrolineaxanthone R	$C_{23}H_{26}O_6$	$CDCl_3$-CD_3OD	[402]
4-5-81	nigrolineaxanthone G	$C_{23}H_{22}O_6$	$CDCl_3$	[394]
4-5-82	nigrolineaxanthone I	$C_{23}H_{20}O_6$	$CDCl_3$	[394]
4-5-83	brasilixanthone A	$C_{23}H_{20}O_6$	$CDCl_3$	[415]
4-5-84	brasilixanthone B	$C_{23}H_{20}O_6$	$CDCl_3$	[415]
4-5-85	mangostenone A	$C_{28}H_{28}O_6$	$CDCl_3$	[416]
4-5-86	mangostenone B	$C_{28}H_{30}O_6$	$CDCl_3$	[416]

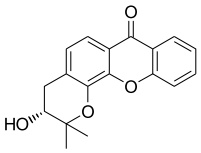


	R^1	R^2	R^3	R^4	R^5
4-5-64	OH	H	H	OH	H
4-5-65	H	OH	H	H	OH
4-5-74	OH	H	OH	H	Prenyl
4-5-75	OH	H	Prenyl	H	H

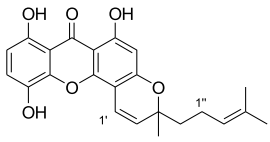
A = 
B = 
C = 



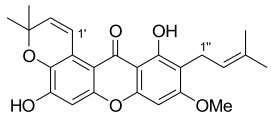
	R^1	R^2	R^3	R^4	R^5	R^6
4-5-66	OH	H	H	OH	OMe	H
4-5-68	H	OH	Prenyl	OMe	H	OH
4-5-69	OH	Prenyl	H	H	OH	H
4-5-70	H	OH	A	OMe	H	OH
4-5-71	OH	H	OH	H	H	A
4-5-72	OH	B	H	H	OH	H
4-5-73	OH	C	H	H	OH	H



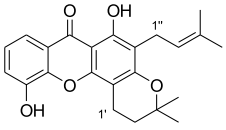
4-5-67



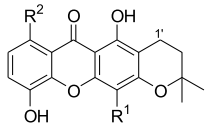
4-5-76

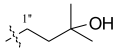
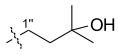


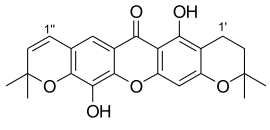
4-5-77



4-5-78

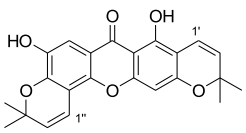


	R^1	R^2
4-5-79	H	
4-5-80		H

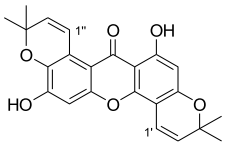


4-5-81

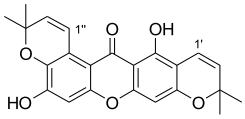
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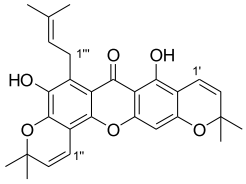
4-5-82



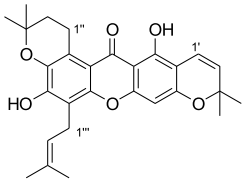
4-5-83



4-5-84



4-5-85



4-5-86

Table 4-5-20: ^{1}H NMR spectroscopic data of xanthones **4-5-64**~**4-5-67**.

H	4-5-64	4-5-65	4-5-66	4-5-67
1	12.92 s(OH)	12.85 s(OH)	13.30 s(OH)	8.34 dd(8.0, 1.5)
2	6.27 d(0.5)	6.74 dd(8.5, 1.0)		7.39 dd(8.0, 8.0)
3		7.54 t(8.5)		7.73 ddd(8.0, 8.0, 1.5)
4		6.91 dd(8.5, 1.0)	6.33 s	7.63 d(8.0)
5	7.39 d(8.5)		6.94 s	
6	7.28 dd(8.5, 3.0)		6.39 s(OH)	
7		5.52 br s(OH)	4.01 s(OMe)	7.08 d(8.0)
8	7.60 d(3.0)	7.63 s	7.58 s	7.83 d(8.0)
1′	6.83 dd(10.0, 0.5)	6.94 d(10.0)	6.73 d(10.1)	2.93 dd(18.0, 5.0)
				3.21 dd(18.0, 5.0)
2′	5.61 d(10.0)	5.78 d(10.0)	5.59 d(10.1)	3.95 t(5.0), 1.94 s(OH)
4′, 5′	1.48 s, 1.48 s	1.56 s, 1.56 s	1.48 s, 1.48 s	1.53 s, 1.46 s

Table 4-5-21: ^{1}H NMR spectroscopic data of xanthones **4-5-68**~**4-5-71**.

H	4-5-68	4-5-69	4-5-70	4-5-71
1	7.38 s	13.28 s(OH)	7.45 s	13.44 s(OH)
2				
3				
4	9.37 br s(OH)			6.33 d(0.5)
5		7.50 d(9)		
6	3.90 s(OMe)	7.36 dd(3, 9)	3.91 s(OMe)	7.22 d(8.5)
7	6.49 s		6.37 s	7.02 d(8.5)
8	13.14 br s(OH)	7.56 d(3)	12.96 s(OH)	
1′	6.57 d(10)	6.69 d(10)	6.44 d(10.0)	6.74 dd(10.0, 0.5)
2′	5.88 d(10)	5.74 d(10)	5.73 d(10.0)	5.61 d(10.0)

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Table 4-5-21 (continued)

H	4-5-68	4-5-69	4-5-70	4-5-71
4′, 5′	1.45 s, 1.45 s	1.49 s, 1.49 s	1.54 s, 1.54 s	1.48 s, 1.48 s
1″	3.46 d(7.5)	3.47 br d(8)	2.95-2.92 m	3.27 m
2″	5.20 t(7.5)	5.24 m	1.78-1.74 m	1.77 m
4″, 5″	1.79 s, 1.61 s	1.88 s, 1.65 s	1.34 s, 1.34 s	1.32 s, 1.32 s

Table 4-5-22: ^{1}H NMR spectroscopic data of xanthones **4-5-72**~**4-5-76**.

H	4-5-72	4-5-73	4-5-74	4-5-75	4-5-76
1	13.34 s(OH)	13.51 s(OH)	13.34 s(OH)	13.07 s(OH)	12.09 (OH)
2			6.25 s	5.67 s	6.25 s
5	7.50 d(9.2)	7.59 d(9.2)	5.56 br s(OH)		
6	7.37 dd(9.2, 3.1)	7.38 dd(9.2, 2.9)	7.21 d(8.3)	7.28 dd(7.8, 1.9)	7.24 d(8.8)
7	10.63 s(OH)	9.04 s(OH)	7.04 d(8.3)	7.22 t(7.8)	6.66 d(8.8)
8	7.55 d(3.1)	7.56 d(2.9)		7.75 dd(7.8, 1.9)	11.22 (OH)
1′	6.69 d(9.8)	6.70 d(9.9)	6.72 d(9.8)	6.74 d(10)	6.76 d(10.1)
2′	5.75 d(9.8)	5.78 d(9.9)	5.62 d(9.8)	5.60 d(10)	5.58 d(10.1)
4′	1.52 s	1.52 s	1.48 s	1.49 s	1.44 s
5′	1.51 s	1.52 s	1.48 s	1.49 s	1.80 m, 1.68 m
1″	2.88 (ov)	5.08 dd(7.0, 7.3)	3.97 d(7.0)	3.49 d(7.9)	2.09 m
	3.09 dd(13.4, 7.0)	4.23 d(7.0)			
2″	4.63 t(7.0)	3.68 d(7.3)	5.35 t(7.0, 1.2)	5.22 t(7.9)	5.07 t(6.8)
4″	4.71 br, 4.74 br	1.17 s	1.74 s	1.86 s	1.55 s
5″	1.87 s	1.19 s	1.74 s	1.71 s	1.64 s
OOH	9.04 br s				

Table 4-5-23: ^{1}H NMR spectroscopic data of xanthones **4-5-77**~**4-5-81**.

H	4-5-77	4-5-78	4-5-79	4-5-80	4-5-81
1	13.34 s(OH)	12.86 s(OH)	13.60 s(OH)	13.00 s(OH)	13.38 s(OH)
3	3.90 s(OMe)				
4	6.36 s		6.32 s		6.45 s
5	6.82 s	5.66 br s(OH)			
6	6.20 s(OH)	7.31 dd(8.0, 1.5)	7.20 d(8.5)	7.25 dd(8.0, 1.5)	
7		7.26 t(8.0)	7.00 d(8.5)	7.20 t(8.0)	
8		7.79 dd(8.0, 1.5)		7.72 dd(8.0, 1.5)	7.63 s
1′	8.03 d(10.2)	2.90 t(7.0)	2.72 t(6.5)	2.79 t(7.5)	2.85 t(6.5)
2′	5.82 d(10.2)	1.91 t(7.0)	1.85 t(6.5)	1.77 t(7.5)	1.87 t(6.5)
4′, 5′	1.50 s, 1.50 s	1.41 s, 1.41 s	1.38 s, 1.38 s	1.30 s, 1.30 s	1.36 s, 1.36 s
1″	3.35 d(7.2)	3.36 d(7.5)	3.28 m	3.00 m	6.95 d(10.0)
2″	5.23 m	5.27 mt(7.5)	1.76 m	1.79 m	5.79 d(10.0)
4″, 5″	1.80 s, 1.68 s	1.68 s, 1.82 s	1.31 s, 1.31 s	1.32 s, 1.32 s	1.59 s, 1.59 s

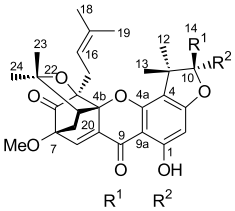
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Table 4-5-24: ^{1}H NMR spectroscopic data of xanthones **4-5-82**~**4-5-86**.

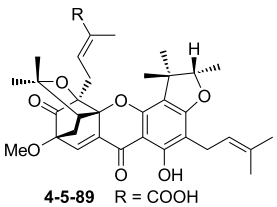
H	4-5-82	4-5-83	4-5-84	4-5-85	4-5-86
1	13.34 s(OH)	13.40 s(OH)	13.63 s(OH)	13.82 s(OH)	13.79 s(OH)
2		6.20 s			
4	6.33 s		6.26 s	6.24 s	6.28 s
5		6.83 s	6.83 s		
6		6.29 br(OH)			6.47 s(OH)
7	5.50 br s(OH)			5.52 s(OH)	
8	7.58 s				
1′	6.75 d(10.0)	6.76 d(10.0)	6.72 d(10.0)	6.72 d(10.0)	6.71 d(10.0)
2′	5.59 d(10.0)	5.57 d(10.0)	5.57 d(10.0)	5.55 d(10.0)	5.54 d(10.0)
4′, 5′	1.47 s, 1.47 s	1.47 s, 1.47 s	1.47 s, 1.47 s	1.44 s, 1.44 s	1.45 s, 1.45 s
1″	6.88 d(10.0)	7.99 d(10.2)	8.02 d(10.3)	4.10 d(6.7)	3.44 t(6.7)
2″	5.75 d(10.0)	5.82 d(10.2)	5.83 d(10.3)	5.28 br t(6.7)	1.84 t(6.7)
4″, 5″	1.55 s, 1.55 s	1.49 s, 1.49 s	1.49 s, 1.49 s	1.68 s, 1.84 s	1.36 s, 1.36 s
1‴				6.85 d(10.1)	3.54 d(7.2)
2‴				5.65 d(10.0)	5.26 m
4‴, 5‴				1.51 s, 1.51 s	1.66 s, 1.86 s

Table 4-5-25: Cos, MFs, and TSs of xanthones **4-5-87**~**4-5-96**.

No.	Compounds	MFs	Test solvents	References
4-5-87	scortechinone D	$C_{29}H_{34}O_7$	$CDCl_3$	[417]
4-5-88	scortechinone E	$C_{29}H_{34}O_7$	$CDCl_3$	[417]
4-5-89	scortechinone F	$C_{34}H_{40}O_9$	$CDCl_3$	[417]
4-5-90	scortechinone G	$C_{35}H_{42}O_9$	$CDCl_3$	[417]
4-5-91	scortechinone H	$C_{34}H_{40}O_8$	$CDCl_3$	[417]
4-5-92	scortechinone I	$C_{35}H_{44}O_{10}$	$CDCl_3$	[417]
4-5-93	scortechinone J	$C_{34}H_{42}O_7$	$CDCl_3$	[417]
4-5-94	scortechinone K	$C_{34}H_{40}O_{10}$	$CDCl_3$	[417]
4-5-95	scortechinone A	$C_{34}H_{42}O_7$	–	[417]
4-5-96	scortechinone B	$C_{34}H_{40}O_9$	–	[417]

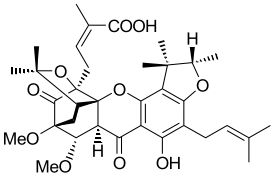


	R^1	R^2
4-5-87	Me	H
4-5-88	H	Me

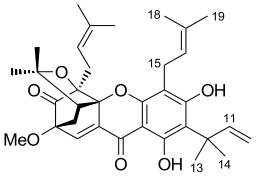


4-5-89 R = COOH
4-5-90 R = COOMe
4-5-91 R = CHO

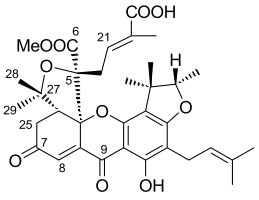
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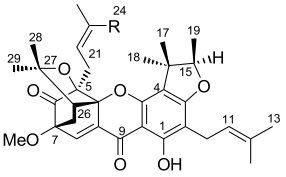
4-5-92



4-5-93



4-5-94



4-5-95 R = Me
4-5-96 R = COOH

Table 4-5-26: ^{1}H NMR spectroscopic data of xanthones **4-5-87** and **4-5-88**.

H	4-5-87	4-5-88	H	4-5-87	4-5-88
1	13.03 s(OH)	13.09 s(OH)	8	7.52 d(1.5)	7.52 d(1.0)
2	6.04 s	6.03 s	10	4.40 q(6.5)	4.55 q(6.5)
7	3.64 s(OMe)	3.64 s(OMe)	12	1.17 s	1.42 s
13	1.59 s	1.49 s	19	1.09 br s	1.07 br s
14	1.41 d(6.5)	1.30 d(6.5)	20	2.36 d(13.0)	2.36 dd(13.0, 1.0)
				1.66 dd(13.0, 9.5)	1.67 dd(13.0, 9.5)
15	2.71 md(14.5)	2.68 dd(14.5)	21	2.59 d(9.5)	2.61 d(9.5)
	2.58 dd(14.5, 10.5)	2.55 dd(14.5, 11.0)			
16	4.38 md(10.5)	4.36 md(11.0)	23	1.72 s	1.72 s
18	1.38 br s	1.38 br s	24	1.30 s	1.29 s

Table 4-5-27: ^{1}H NMR spectroscopic data of xanthones **4-5-89**~**4-5-92**.

H	4-5-89	4-5-90	4-5-91	4-5-92
1	13.10 s(OH)	13.13 s(OH)	13.08 s(OH)	12.08 s(OH)
7	3.63 s(OMe)	3.63 s(OMe)	3.63 s(OMe)	3.50 s(OMe)
8	7.61 d(1.0)	7.58 br s	7.60 br s	4.46 s
				3.36 s(OMe)
8a				3.16 s
10	3.20 d(7.0)	3.21 d(7.0)	3.20 d(6.5)	3.21 m
11	5.22 mt(7.0)	5.22 mt(7.0)	5.21 t(6.5)	5.25 mt(7.0)
13	1.67 s	1.69 s	1.69 s	1.69 s
14	1.74 s	1.75 s	1.75 s	1.76 s
15	4.54 q(6.5)	4.55 q(6.5)	4.56 q(6.5)	4.40 q(6.8)
17	1.41 s	1.41 s	1.42 s	1.43 s

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Table 4-5-27 (continued)

H	4-5-89	4-5-90	4-5-91	4-5-92
18	1.46 s	1.47 s	1.45 s	1.10 s
19	1.30 d(6.5)	1.30 d(6.5)	1.30 d(6.5)	1.34 d(6.8)
20	2.79 mdd(15.0, 5.5)	2.83 dd(15.5, 6.0)	2.89 dd(15.5, 5.5)	3.23 m
	2.56 dd(15.0, 10.0)	2.56 dd(15.5, 10.0)	2.62 dd(15.5, 8.0)	
21	6.41 ddq(10.0, 5.5, 1.5)	6.20 mdd(10.0, 6.0)	6.23 mdd(8.0, 5.5)	6.62 qt(6.8, 1.5)
23	1.38 s	1.38 s	1.36 s	1.98 d(1.5)
24		3.64 s(OMe)	9.23 s(CHO)	
25	2.33 d(13.0)	2.35 d(13.0)	2.38 d(13.0)	2.02 d(14.2)
	1.69 dd(13.0, 9.5)	1.69 dd(13.0, 9.5)	1.69 dd(13.0, 9.5)	1.63 dd(14.2, 8.8)
26	2.61 d(9.5)	2.61 d(9.5)	2.66 d(9.5)	2.70 d(8.8)
28	1.72 s	1.73 s	1.74 s	1.41 s
29	1.29 s	1.30 s	1.31 s	1.20 s

Table 4-5-28: ^{1}H NMR spectroscopic data of xanthones **4-5-93**~**4-5-96**.

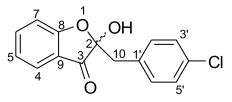
H	4-5-93	4-5-94	4-5-95	4-5-96
1	13.62 s(OH)	12.69 s(OH)	13.15 s(OH)	13.10 s(OH)
3	7.70 s(OH)			
6		3.63 s(OMe)		
7	3.63 s(OMe)		3.62 s(OMe)	3.52 s(OMe)
8	7.48 d(1.0)	6.62 s	7.49 d(1.4)	7.56 d(1.2)
10		3.22 d(7.5)	3.22 d(7.2)	3.17 mdd(14.4, 7.2)
				3.11 mdd(14.4, 7.2)
11	6.43 dd(17.5, 10.5)	5.21 mt(7.5)	5.22 ht(7.2, 1.4)	5.20 ht(7.2, 1.5)
12	5.46 d(17.5)			
	5.37 dd(10.5, 1.0)			
13	1.60 s	1.69 s	1.68 br s	1.65 q(1.5)
14	1.59 s	1.75 s	1.75 br s	1.72 s
15	3.30 d(6.5)	4.37 q(6.5)	4.37 q(6.4)	4.46 q(6.6)
16	5.14 mt(6.5)			
17		1.42 s	1.16 s	1.37 s
18	1.66 d(1.0)	1.27 s	1.58 s	1.37 s
19	1.70 s	1.41 d(6.5)	1.41 d(6.4)	1.23 d(6.6)
20	2.59 m	2.79 dd(15.0, 7.5)	2.79 ddh(14.4, 4.5, 1.5)	3.27 br dd(16.0, 9.6)
	2.54 d(10.0)	2.69 dd(15.0, 7.5)	2.55 dd(14.4, 10.5)	2.83 ddq(16.0, 4.5, 2.0)
21	4.43 mdd(10.0, 5.5)	6.67 mt(7.5)	4.39 m	5.67 ddq(9.6, 4.5, 1.5)
23	1.37 s	1.67 s	1.36 br t(1.5)	1.72 s
24	1.01 s		1.07 br t(1.4)	
25	2.33 d(13.0)	2.94 dd(16.5, 13.0)	2.33 dd(12.8, 1.4)	2.33 dd(13.2, 1.2)
	1.61 dd(13.0, 10.0)	2.62 dd(16.5, 7.0)	1.65 dd(12.8, 9.6)	1.68 dd(13.2, 9.2)
26	2.50 d(10.0)	3.17 dd(13.0, 7.0)	2.55 d(9.6)	2.60 d(9.2)
28	1.65 s	1.76 s	1.71 s	1.72 s
29	1.28 s	1.45 s	1.29 s	1.28 s

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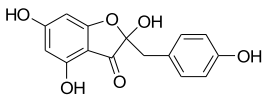
4.5.2 Aurones

Table 4-5-29: Cos, MFs, and TSs of aurones **4-5-97**~**4-5-106**.

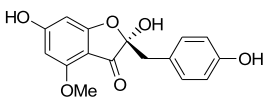
No.	Compounds	MFs	Test solvents	References
4-5-97	4′-chloro-2-hydroxyaurone	$C_{15}H_{11}ClO_3$	$CDCl_3$	[418]
4-5-98	maesopsin	$C_{15}H_{12}O_6$	CD_3OD	[419]
			C_5D_5N	[420]
			DMSO-d_6	[420]
4-5-99	carasinaurone	$C_{16}H_{14}O_6$	CD_3COCD_3	[421]
4-5-100	cephalocerone	$C_{16}H_{10}O_5$	$CDCl_3$	[422]
4-5-101	hamiltrone	$C_{18}H_{16}O_7$	$CDCl_3$-CD_3OD	[423]
4-5-102	4′-chloroaurone	$C_{15}H_9ClO_2$	$CDCl_3$	[418]
4-5-103	(*Z*)-6,2′-dihydroxyaurone	$C_{15}H_{10}O_4$	–	[424]
4-5-104	(*E*)-6,2′-dihydroxyaurone	$C_{15}H_{10}O_4$	–	[424]
4-5-105	licoagroaurone	$C_{20}H_{18}O_5$	CD_3COCD_3	[425]
4-5-106	broussoaurone A	$C_{20}H_{18}O_5$	CD_3COCD_3	[426]



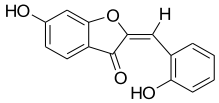
4-5-97



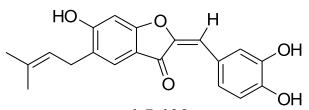
4-5-98



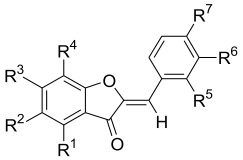
4-5-99



4-5-104



4-5-106



	R^1	R^2	R^3	R^4	R^5	R^6	R^7
4-5-100	OCH_2O		OH	H	H	H	H
4-5-101	OMe	OMe	OMe	H	H	OH	OH
4-5-102	H	H	H	H	H	H	Cl
4-5-103	H	H	OH	H	OH	H	H
4-5-105	H	H	OH	Prenyl	H	OH	OH

Table 4-5-30: ^{1}H NMR spectroscopic data of aurones **4-5-97**~**4-5-99**.

H	4-5-97	4-5-98(CD_3OD)	4-5-98(C_5D_5N)	4-5-98(DMSO-d_6)	4-5-99
4	8.15 dd(7.0, 1.0)			10.55 br s(OH)	3.74 s(OMe)
5	7.53 dt(7.0, 1.0)	5.76 d(1.5)	6.42 d(1.5)	5.77 d(1.5)	5.91 d(1.3)
6	7.39 dt(7.0, 1.0)			9.16 br s(OH)	
7	7.24 dd(7.0, 1.0)	5.73 d(1.5)	6.23 d(1.5)	5.71 d(1.5)	5.97 d(1.3)
10	4.60 s	3.06 s	3.87 d(14.0)	2.86 d(14.0)	3.01 s
			3.90 d(14.0)	2.92 d(14.0)	
2′, 6′	7.93 d(8.5)	7.00 d(8.4)	7.58 d(1.5)	6.91 d(8.0)	7.02 d(8.3)
3′, 5′	7.43 d(8.5)	6.57 d(8.4)	7.04 d(1.5)	6.54 d(8.0)	6.62 d(8.5)

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Table 4-5-31: ^{1}H NMR spectroscopic data of aurones **4-5-100**~**4-5-102**.

H	4-5-100	4-5-101	4-5-102
4		4.23 s(OMe)	8.28 dd(7.0, 1.0)
5		3.82 s(OMe)	7.69 dt(7.0, 1.1)
6		4.00 s(OMe)	7.47 dt(7.0, 1.1)
7	6.51 s	6.59 s	7.49 dd(7.0, 1.1)
10	6.77 s	6.70 s	6.91 s
2′	7.91 dd(8.0, 1.4)	7.46 d(2.0)	7.79 d(8.5)
3′	7.58		7.42 d(8.5)
4′	7.58		
5′	7.58	6.89 d(8.4)	7.42 d(8.5)
6′	7.91 dd(8.0, 1.4)	7.31 dd(2.0, 8.4)	7.79 d(8.5)
OCH_2O	5.67 s		

Table 4-5-32: ^{1}H NMR spectroscopic data of aurones **4-5-103**~**4-5-106**.

H	4-5-103	4-5-104	4-5-105	4-5-106
4	7.63 d(8.5)	7.62 d(8.5)	7.46 d(8.5)	7.44 s
5	6.81 dd(8.5, 1.5)	6.76 dd(8.5, 2)	6.83 d(8.5)	
7	6.86 d(1.5)	6.69 d(2)		6.85 s
10	7.34 s	7.34 s	6.64 s	6.60 s
2′			7.61 d(2.5)	7.56 d(2.0)
3′	7.01 dd(8, 1.5)	6.98 dd(8.0, 1.5)		
4′	7.27 br dt(7.5, 2)	7.29 br dt(7.5, 2)		
5′	6.99 br dt(7.5, 1.5)	6.92 br dt(7.5, 1.5)	6.96 d(8.5)	6.92 d(8.2)
6′	8.23 dd(8.0, 2)	8.59 dd(8, 2)	7.42 dd(8.5, 2.5)	7.31 dd(8.2, 2.0)
1″			3.56 d(7)	3.32 d(7.4)
2″			5.41 m	5.36 m
4″			1.69 s	1.75 s
5″			1.88 s	1.76 s

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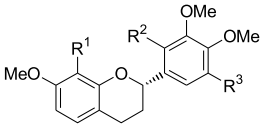
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4.6 Flavans and procyanidins

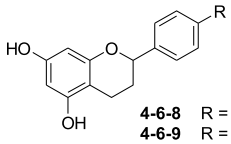
4.6.1 Flavans

Table 4-6-1: Cos, MFs, and TSs of flavans **4-6-1**~**4-6-14**.

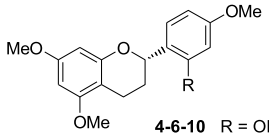
No.	Compounds	MFs	Test solvents	References
4-6-1	(2*S*)-5′-hydroxy-7,3′,4′-trimethoxyflavan	$C_{18}H_{20}O_5$	$CDCl_3$	[427]
4-6-2	(2*S*)-7,8,3′,4′,5′-pentamethoxyflavan	$C_{20}H_{24}O_6$	$CDCl_3$	[427]
4-6-3	(2*S*)-2′-hydroxy-7,8,3′,4′,5′-pentamethoxyflavan	$C_{20}H_{24}O_7$	$CDCl_3$	[427]
4-6-4	(2*S*)-5′-hydroxy-7,8,3′,4′-tetramethoxyflavan	$C_{19}H_{22}O_6$	$CDCl_3$	[427]
4-6-5	(2*S*)-8-hydroxy-7,3′,4′,5′-tetramethoxyflavan	$C_{19}H_{22}O_6$	$CDCl_3$	[427]
4-6-6	(2*S*)-8,2′-dihydroxy-7,3′,4′,5′-tetramethoxyflavan	$C_{19}H_{22}O_7$	$CDCl_3$	[427]
4-6-7	(2*S*)-8,5′-dihydroxy-7,3′,4′-trimethoxyflavan	$C_{18}H_{20}O_6$	$CDCl_3$	[427]
4-6-8	5,7,4′-trihydroxyflavan	$C_{15}H_{14}O_4$	$CDCl_3$	[428]
4-6-9	5,7-dihydroxy-4′-methoxyflavan	$C_{16}H_{16}O_4$	$CDCl_3$	[428]
4-6-10	erycibenin E	$C_{18}H_{20}O_5$	CD_3COCD_3	[429]
4-6-11	erycibenin F	$C_{19}H_{22}O_5$	CD_3COCD_3	[429]
4-6-12	(2*S*)-3′,4′-dihydroxy-7-methoxyflavan	$C_{16}H_{16}O_4$	DMSO-d_6	[430]
4-6-13	7-*O*-galloyltricetifavan	$C_{22}H_{18}O_{10}$	CD_3OD	[431]
4-6-14	7,4′-di-*O*-galloyltricetifavan	$C_{29}H_{22}O_{11}$	CD_3OD	[431]



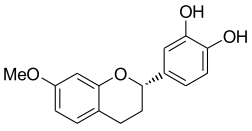
	R^1	R^2	R^3
4-6-1	H	H	OH
4-6-2	OMe	H	OMe
4-6-3	OMe	OH	OMe
4-6-4	OMe	H	OH
4-6-5	OH	H	OMe
4-6-6	OH	OH	OMe
4-6-7	OH	H	OH



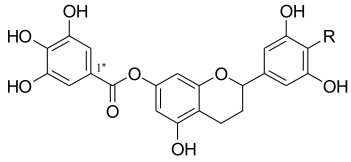
4-6-8 R = OH
4-6-9 R = OMe



4-6-10 R = OH
4-6-11 R = OMe



4-6-12



4-6-13 R = OH
4-6-14 R = $OOCC_6H_5$

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Table 4-6-2: ^{1}H NMR spectroscopic data of flavans **4-6-1**~**4-6-3**.

H	4-6-1	4-6-2	4-6-3
2	4.90 dd(10.2, 2.4)	5.05 dd(9.8, 2.3)	5.40 dd(10.1, 2.1)
3	ax 2.03 m, eq 2.15 m	ax 2.03 m, eq 2.22 m	ax 1.98 m, eq 2.29 m
4ax	2.89 ddd(16.2, 11.4, 5.9)	2.89 ddd(16.4, 10.8, 5.6)	2.96 ddd(16.5, 11.4, 5.6)
4eq	2.71 ddd(16.0, 5.1, 3.3)	2.71 ddd(16.1, 4.1, 3.8)	2.75 ddd(16.1, 4.0, 3.9)
5	6.96 d(9.1)	6.77 d(8.7)	6.78 d(7.4)
6	6.46 dd(9.0, 2.5)	6.50 d(8.5)	6.50 d(8.6)
7	3.74 s(OMe)	3.82 s(OMe)	3.86 s(OMe)
8	6.48 d(2.5)	3.89 s(OMe)	3.89 s(OMe)
2′	6.56 d(1.8)	6.68 s	5.75 s(OH)
3′	3.86 s(OMe)	3.84 s(OMe)	3.97 s(OMe)
4′	3.87 s(OMe)	3.84 s(OMe)	3.89 s(OMe)
5′	6.10 s(OH)	3.84 s(OMe)	3.79 s(OMe)
6′	6.66 d(1.7)	6.68 s	6.80 s

Table 4-6-3: ^{1}H NMR spectroscopic data of flavans **4-6-4**~**4-6-7**.

H	4-6-4	4-6-5	4-6-6	4-6-7
2	4.99 dd(9.5, 2.5)	4.96 dd(9.7, 2.6)	5.41 dd(10.0, 2.1)	4.98 dd(9.7, 2.8)
3	ax 1.99 m, eq 2.17 m	ax 2.05 m, eq 2.16 m	ax 2.02 m, eq 2.20 m	ax 2.05 m, eq 2.17 m
4ax	2.88 ddd(16.1, 9.7, 5.5)	2.91 ddd(16.6, 11.0, 6.1)	2.93 ddd(16.0, 9.8, 5.5)	2.92 ddd(16.3, 10.7, 5.7)
4eq	2.71 ddd(16.1, 4.6, 4.6)	2.75 ddd(16.3, 4.2, 3.6)	2.72 ddd(16.0, 4.6, 3.6)	2.76 ddd(16.3, 4.3, 3.8)
5	6.74 d(8.5)	6.57 d(8.5)	6.57 d(8.7)	6.58 d(8.5)
6	6.48 d(8.5)	6.48 d(8.4)	6.48 d(8.5)	6.50 d(8.5)
7	3.83 s(OMe)	3.84 s(OMe)	3.84 s(OMe)	3.86 s(OMe)
8	3.88 s(OMe)	5.46 s(OH)	5.70 s(OH)	5.49 s(OH)
2′	6.59 d(1.8)	6.65 s	6.00 s(OH)	6.56 d(2.0)
3′	3.86 s(OMe)	3.84 s(OMe)	3.92 s(OMe)	3.87 s(OMe)
4′	3.83 s(OMe)	3.84 s(OMe)	3.88 s(OMe)	3.89 s(OMe)
5′	6.19 s(OH)	3.84 s(OMe)	3.77 s(OMe)	5.88 s(OH)
6′	6.65 d(1.9)	6.65 s	6.75 s	6.66 d(1.8)

Table 4-6-4: ^{1}H NMR spectroscopic data of flavans **4-6-8**~**4-6-11**.

H	4-6-8	4-6-9	4-6-10	4-6-11
2	4.18 dd(12.5, 2.5)	4.87 dd(12.5, 2.5)	5.25 dd(2.1, 10.1)	5.22 dd(2.1, 10.1)
3	1.83 m, 2.00 m	1.96 m, 2.10 m	1.89 m, 2.18 m	1.83 m, 2.12 m
4	2.52 m	2.62 m	2.63 m	2.60 m
6	5.67 d(2.5)	5.90 d(2.5)	6.11 d(2.4)	6.11 d(2.5)

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Table 4-6-4 (continued)

H	4-6-8	4-6-9	4-6-10	4-6-11
8	5.81 d(2.5)	5.95 d(2.5)	6.05 d(2.4)	6.04 d(2.5)
2′	7.12 d(9.0)	7.26 d(9.0)		
3′	6.68 d(9.0)	6.83 d(9.0)	6.48 d(2.4)	6.59 d(2.5)
4′		3.75 s(OMe)		
5′	6.68 d(9.0)	6.83 d(9.0)	6.46 dd(2.4, 8.3)	6.55 dd(2.5, 8.6)
6′	7.12 d(9.0)	7.26 d(9.0)	7.26 d(8.3)	7.32 d(8.6)
OMe			3.74 s, 3.75 s, 3.79 s	3.74 s, 3.79 s, 3.81 s, 3.86 s

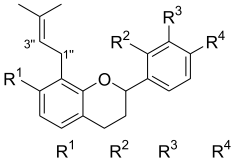
Table 4-6-5: ^{1}H NMR spectroscopic data of flavans **4-6-12**~**4-6-14**.

H	4-6-12	4-6-13	4-6-14
2	4.86 dd(10, 2.2)	4.79 dd(2.4, 9.8)	4.87 (ov)
3	1.87 m, 2.03 m	2.14 m, 1.94 m	2.21 m, 1.96 m
4	2.62 m, 2.82 m	2.70 m	2.72 m
5	6.95 d(8.3)		
6	6.41 dd(8.3, 2.4)	6.18 d(2.4)	6.18 s
7	3.66 s(OMe)		
8	6.43 d(2.4)	6.15 d(2.4)	6.18 s
2′	6.77 d(1.9)	6.40 d(2.4)	6.64 s
5′	6.70 d(8)		
6′	6.64 dd(8, 1.9)	6.40 d(2.4)	6.64 s
2″,6″		7.15 d(2.0)	7.15 s
2‴,6‴			7.22 s

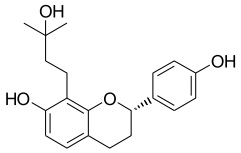
Table 4-6-6: Cos, MFs, and TSs of flavans **4-6-15**~**4-6-25**.

No.	Compounds	MFs	Test solvents	References
4-6-15	brosimine B	$C_{20}H_{22}O_3$	$CDCl_3$	[432]
4-6-16	brosimacutin L	$C_{20}H_{24}O_4$	CD_3COCD_3	[433]
4-6-17	acutifolin B	$C_{22}H_{26}O_3$	$CDCl_3$	[434]
4-6-18	–	$C_{21}H_{24}O_4$	C_5D_5N	[435]
4-6-19	–	$C_{21}H_{24}O_4$	C_5D_5N	[435]
			CD_3OD	[436]
4-6-20	(2*S*)-7,4′-dihydroxy-3′-prenylflavan	$C_{20}H_{22}O_3$	CD_3OD	[436]
4-6-21	7,3′,4′-trihydroxy-6-methoxy-8,2′-di-(3-methyl-2-butenyl)-(2*S*)-flavan	$C_{26}H_{32}O_5$	$CDCl_3$	[437]
4-6-22	brosimacutin J	$C_{17}H_{14}O_3$	CD_3COCD_3	[433]
4-6-23	brosimine A	$C_{20}H_{22}O_4$	$CDCl_3$	[432]
4-6-24	acutifolin C	$C_{21}H_{22}O_3$	$CDCl_3$	[434]
4-6-25	brosimacutin K	$C_{20}H_{22}O_5$	CD_3COCD_3	[433]

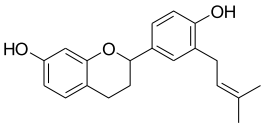
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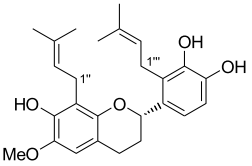
	R^1	R^2	R^3	R^4
4-6-15	OH	H	H	OH
4-6-17	OMe	H	H	OMe
4-6-18	OH	OH	H	OMe
4-6-19	OMe	OH	H	OH



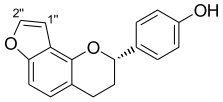
4-6-16



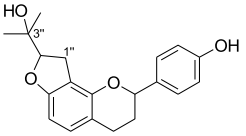
4-6-20



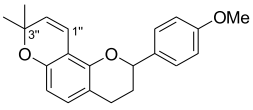
4-6-21



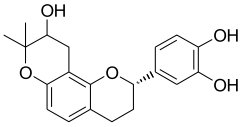
4-6-22



4-6-23



4-6-24



4-6-25

Table 4-6-7: ^{1}H NMR spectroscopic data of flavans **4-6-15**~**4-6-18**.

H	4-6-15	4-6-16	4-6-17	4-6-18
2	4.98 dd(10.1, 2.4)	4.98 dd(10.3, 2.2)	5.02 dd(10.1, 2.4)	5.80 dd(2.1, 9.5)
3	2.15 m, 1.98 m	1.90 m, 2.16 m	2.1, 2.0	2.08 m, 2.42 m
4	*α* 2.72 ddd(16.3, 5.2, 3.4)	2.67 m	2.9	2.71 m
	β 2.92 ddd(16.3, 11.0, 5.6)	2.88 m	2.7	2.94 m
5	6.82 d(8.2)	6.71 d(8.2)	6.87 d(8.4)	6.91 d(8.2)
6	6.40 d(8.2)	6.38 d(8.2)	6.46 d(8.4)	6.84 d(8.2)
7	5.20 s(OH)		3.80 s(OMe)	
2′	7.29 d(8.7)	7.33 d(8.7)	7.34 d(8.5)	
3′	6.84 d(8.7)	6.85 d(8.7)	6.90 d(8.5)	6.85 d(2.4)
4′			3.82 s(OMe)	3.69 s(OMe)
5′	6.84 d(8.7)	6.85 d(8.7)	6.90 d(8.5)	6.66 dd(8.5, 2.4)
6′	7.29 d(8.7)	7.33 d(8.7)	7.34 d(8.5)	7.70 d(8.5)
1″	3.41 d(7.2)	2.72 m	3.34 d(7.6)	3.85 dd(7.3, 13.7)
				3.91 dd(7.3, 13.7)
2″	5.27 t(7.2)	1.69 m	5.23 t(7.6)	5.80 br t(7.3)
4″, 5″	1.74 s, 1.72 s	1.17 s, 1.17 s	1.64 s, 1.64 s	1.67 br s, 1.86 br s

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Table 4-6-8: ^{1}H NMR spectroscopic data of flavans **4-6-19**~**4-6-21**.

H	4-6-19(C_5D_5N)	4-6-19(CD_3OD)	4-6-20	4-6-21
2	5.84 dd(9.5, 2.4)	5.23 dd(9.8, 1.7)	4.83 dd(9.6, 2.2)	5.03 dd(10.5, 1.9)
3	2.14 m, 2.43 m	1.84 m, 2.14 m	1.93 m, 2.04 m	1.96~2.20 m
4	2.82 m	2.62 m	2.62 m	2.94 ddd(16.1, 11.3, 5.4)
	2.99 m	2.83 m	2.80 m	2.71 ddd(16.1, 5.4, 3.1)
5	6.96 d(8.5)	6.80 d(8.4)	6.83 d(8.2)	6.45 s
6	6.57 d(8.5)	6.41 d(8.4)	6.30 dd(8.2, 2.4)	3.82 s(OMe)
7	3.74 s(OMe)	3.70 s(OMe)		5.61 s(OH)
8			6.24 d(2.3)	
2′			7.06 d(1.8)	5.47 s(OH)
3′	6.97 d(2.4)	6.34 d(2.1)		
4′				5.42 br s(OH)
5′	6.88 dd(2.4, 8.2)	6.31 dd(8.3, 2.0)	6.73 d(8.1)	6.78 d(8.4)
6′	7.67 d(8.2)	7.15 d(8.3)	7.01 dd(2.0, 8.2)	6.98 d(8.4)
1″	3.63-3.74 m	3.23 br d	3.28 d(7.3)	3.34 d(6.8)
2″	5.26 br t(7.3)	5.14 br t(7.0)	5.30 m	5.23 br t(7.0)
4″, 5″	1.63 br s, 1.80 br s	1.64 s, 1.61 s	1.68 s, 1.71 s	1.65 br s, 1.74 s
1‴				3.34 d(6.6)
2‴				5.19 br t(7.0)
4‴, 5‴				1.67 s, 1.80 s

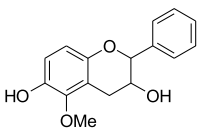
Table 4-6-9: ^{1}H NMR spectroscopic data of flavans **4-6-22**~**4-6-25**.

H	4-6-22	4-6-23	4-6-24	4-6-25
2	5.14 dd(10.0, 2.1)	5.01 dd(9.9, 1.9)	5.02 dd(10.2, 1.5)	4.96 dd(10.0, 2.3)
3	2.12 m, 2.24 m	2.01 m, 2.16 m	2.1, 2.0	1.91 m, 2.16 m
4	2.82 m	*α* 2.72 ddd(11.8, 6.4, 3.2)	2.9	2.65 ddd(15.8, 4.1, 4.1)
	3.06 ddd(16.4, 11.3, 5.5)	*β* 2.91 ddd(11.8, 8.5, 4.3)	2.7	2.90 m
5	7.03 s(ov)	6.84 d(8.1)	6.82 d(8.3)	6.79 d(8.3)
6	7.03 s(ov)	6.37 d(8.1)	6.36 d(8.3)	6.27 d(8.3)
2′	7.34 d(8.3)	7.29 d(8.5)	7.35 d(8.8)	6.97 d(1.7)
3′	6.88 d(8.3)	6.84 d(8.5)	6.92 d(8.8)	
4′			3.83 s(OMe)	
5′	6.88 d(8.3)	6.84 d(8.5)	6.92 d(8.8)	6.83 d(8.0)
6′	7.34 d(8.3)	7.29 d(8.5)	7.35 d(8.8)	6.79 dd(8.0, 1.7)
1″	6.83 d(1.9)	3.15 dd(11.8, 8.9)	6.67 d(10.1)	2.47 dd(8.2, 17.1)
		3.12 dd(11.8, 9.2)		2.92 m
2″	7.69 d(1.9)	4.63 dd(9.2, 8.9)	5.52 d(10.1)	3.75 dd(8.2, 5.6)
4″, 5″		1.20 s, 1.31 s	1.42 s, 1.42 s	1.19 s, 1.33 s

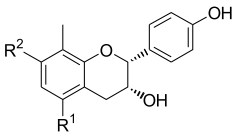
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Table 4-6-10: Cos, MFs, and TSs of flavans **4-6-26**~**4-6-32**.

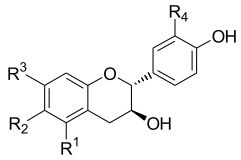
No.	Compounds	MFs	Test solvents	References
4-6-26	3,6-diol-5-methoxyflavan	$C_{16}H_{16}O_4$	CD_3OD	[438]
4-6-27	tupichinol D	$C_{16}H_{16}O_4$	CD_3COCD_3	[439]
4-6-28	tupichinol A	$C_{17}H_{18}O_4$	CD_3COCD_3	[440]
4-6-29	tupichinol B	$C_{18}H_{20}O_5$	CD_3COCD_3	[440]
4-6-30	5-*O*-methylafzelechin	$C_{16}H_{16}O_5$	CD_3OD	[441]
4-6-31	4′-hydroxy-7-methoxy-flavan-3-ol	$C_{16}H_{16}O_4$	DMSO-d_6	[430]
4-6-32	6-chlorocatechin	$C_{15}H_{13}ClO_6$	DMSO-d_6	[442]



4-6-26



	R^1	R^2
4-6-27	H	OH
4-6-28	H	OMe
4-6-29	OMe	OMe



	R^1	R^2	R^3	R^4
4-6-30	OMe	H	OH	H
4-6-31	H	H	OMe	H
4-6-32	OH	Cl	OH	OH

Table 4-6-11: ^{1}H NMR spectroscopic data of flavans **4-6-26**~**4-6-29**.

H	4-6-26	4-6-27	4-6-28	4-6-29
2	4.61 d(5.0)	5.02 s	5.03 s	4.97 s
3	3.96 ddd(10.0, 5.0, 2.5)	4.22 br s	4.23 br s	4.25 br s
		3.65 br s(OH)	3.72 br s(OH)	3.65 br s(OH)
4	2.85 dd(14.5, 2.5)	*α* 2.73 dd(16.2, 4.4)	ax 3.16 dd(16.4, 4.0)	ax 2.88 dd(16.8, 4.4)
	2.49 dd(14.5, 10.0)	*β* 3.14 dd(16.2, 4.4)	eq 2.78 dd(16.4, 3.6)	eq 2.78 ddd(16.4, 3.2, 0.8)
5	3.62 s(OMe)	6.71 d(8.2)	6.86 d(8.4)	3.81 s(OMe)
6		6.32 d(8.2)	6.51 d(8.4)	6.27 s
7	6.52 d(8.5)	8.00 br s(OH)	3.78 s(OMe)	3.82 s(OMe)
8	6.47 d(8.5)	2.01 s(Me)	2.10 s(Me)	2.02 s(Me)
2′	7.42 dd(7.3, 1.5)	7.38 d(8.8)	7.39 d(8.0)	7.38 d(8.0)
3′	7.33 dt(7.3, 1.5)	6.83 d(8.8)	6.85 d(8.0)	6.83 d(8.0)
4′	7.25 tt(7.3, 1.5)	8.35 br s(OH)	8.37 br s(OH)	8.38 br s(OH)
5′	7.33 dt(7.3, 1.5)	6.83 d(8.8)	6.85 d(8.0)	6.83 d(8.0)
6′	7.42 dd(7.3, 1.5)	7.38 d(8.8)	7.39 d(8.0)	7.38 d(8.0)

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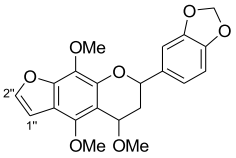
Table 4-6-12: ^{1}H NMR spectroscopic data of flavans **4-6-30**~**4-6-32**.

H	4-6-30[①]	4-6-31	4-6-32
2	4.59 d(7.8)	4.65 d(7.6)	4.75 d(6.7)
3	3.97 ddd(8.4, 7.8, 5.5)	3.92 ddd(7.6, 5.1,8.5)	4.02 ddd(7.2, 6.7, 5.2)
4	2.48 dd(16.3, 5.5)	ax 2.64 dd(15.8, 8.5)	*α* 2.76 dd(16.3, 5.2)
	2.84 dd(16.3, 8.4)	eq 2.80 dd(15.8, 5.1)	*β* 2.55 dd(16.3, 7.2)
5	3.75 s(OMe)	6.94 (8.4)	
6	6.02 d(2.0)	6.43 dd(8.4, 2.7)	
7		3.67 s(OMe)	
8	5.93 d(2.0)	6.35 d(2.7)	6.07 s
2′	7.20 d(8.5)	7.14 d(8.3)	6.81 d(1.8)
3′	6.78 d(8.5)	6.73 d(8.3)	
5′	6.78 d(8.5)	6.73 d(8.3)	6.75 d(8.1)
6′	7.20 d(8.5)	7.14 d(8.3)	6.69 dd(8.1, 1.8)

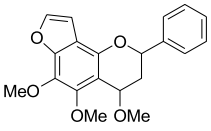
[①] Typographic errors exist in the literature.

Table 4-6-13: Cos, MFs, and TSs of flavans **4-6-33**~**4-6-39**.

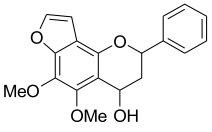
No.	Compounds	MFs	Test solvents	References
4-6-33	(2,4-*cis*)-3′,4′-methylenedioxy-4,5,8-trimethoxy-[2″,3″:7,6]-furanoflavan	$C_{21}H_{20}O_7$	$CDCl_3$	[443]
4-6-34	(2,4-*cis*)-4,5,6-trimethoxy-[2″,3″:7,8]-furanoflavan	$C_{20}H_{20}O_5$	$CDCl_3$	[443]
4-6-35	(2,4-*cis*)-4-hydroxy-5,6-dimethoxy-[2″,3″:7,8]-furanoflavan	$C_{19}H_{18}O_5$	$CDCl_3$	[443]
4-6-36	(2,4-*trans*)-4-hydroxy-5,6-dimethoxy-[2″,3″:7,8]-furanoflavan	$C_{19}H_{18}O_5$	$CDCl_3$	[443]
4-6-37	2,5-dimethoxy-4-hydroxy-[2″,3″:7,8]-furanoflavan	$C_{19}H_{18}O_5$	$CDCl_3$	[444]
4-6-38	4*β*,5-dimethoxy-6″,6″-dimethyl-2*H*-pyrano-(2″,3″:7,6)-flavan	$C_{22}H_{24}O_4$	$CDCl_3$	[445]
4-6-39	4*β*-ethoxy-5-methoxy-6″,6″-dimethyl-2*H*-pyrano-(2″,3″:7,6)-flavan	$C_{23}H_{26}O_4$	$CDCl_3$	[445]



4-6-33

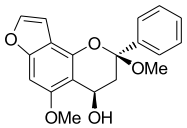


4-6-34

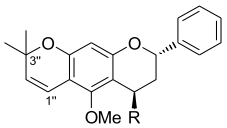


4-6-35 2,4-*cis*
4-6-36 2,4-*trans*

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4-6-37



4-6-38 R = OMe
4-6-39 R = OEt

Table 4-6-14: ^{1}H NMR spectroscopic data of flavans **4-6-33**~**4-6-36**.

H	4-6-33	4-6-34	4-6-35	4-6-36
2	5.00 dd(9.9, 3.3)	5.17 dd(9.7, 3.0)	5.23 dd(12.1, 1.6)	5.50 dd(11.7, 1.8)
3	ax 2.34 ddd(13.9, 9.9, 7.2)	ax 2.62 ddd(13.9, 9.7, 7.1)	ax 2.13 m	ax 1.97~2.07 m
	eq 2.57 ddd(13.9, 7.2, 3.3)	eq 2.40 ddd(13.9, 7.1, 3.0)	eq 2.36 dt(15.0, 1.6)	eq 2.82 dt(13.8, 2.1)
4	4.92 t(7.2)	4.84 t(7.1)	5.06 dd(3.4, 1.6)	4.97 t(2.4)
	3.38 s(OMe)	3.37 d(OMe)		
5	4.02 s(OMe)	3.99 d(OMe)		
6	4.05 s(OMe)			
8		4.07 s(OMe)		
2′	6.98 d(1.6)	7.40 m	7.35~7.53 m	7.4~7.7 m
3′		7.40 m	7.35~7.53 m	7.4~7.7 m
4′		7.40 m	7.35~7.53 m	7.4~7.7 m
5′	6.79 d(8.1)	7.40 m	7.35~7.53 m	7.4~7.7 m
6′	6.89 dd(8.1, 1.6)	7.40 m	7.35~7.53 m	7.4~7.7 m
1″	6.84 d(2.4)	6.82 d(2.1)	6.84 d(2.1)	6.80 d(2.1)
2″	7.49 d(2.4)	7.51 d(2.1)	7.35~7.53 m	7.4~7.7 m
OMe			4.08 s, 4.07 s	3.91 s, 4.05 s
OCH_2O	5.96 s			

Table 4-6-15: ^{1}H NMR spectroscopic data of flavans **4-6-37**~**4-6-39**.

H	4-6-37	4-6-38	4-6-39
2	3.13 s(OMe)	5.20 dd(12.0, 2.1)	5.26 dd(12.0, 1.6)
3	2.79 dd(14.8, 1.3)	ax 1.87 ddd(14.0, 12.0, 3.0)	ax 1.88 ddd(13.0, 12.8, 2.9)
	2.18 dd(14.8, 4.5)	eq 2.34 ddd(14.0, 2.2, 2.2)	eq 2.33 ddd(14.0, 2.1, 2.1)
4	5.00 m	4.50 dd(2.7, 2.7)	4.64 dd(2.6, 2.6)
	4.07 d(9.8, OH)	3.47 s(OMe)	
5	3.97 s(OMe)	3.87 s(OMe)	3.87 s(OMe)
6	6.81 s		
8		6.21 s	6.20 s
2′, 6′	7.72 m	7.40 m	7.40 m
3′, 5′	7.48 m	7.40 m	7.40 m

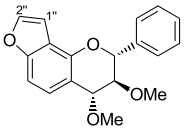
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Table 4-6-15 (continued)

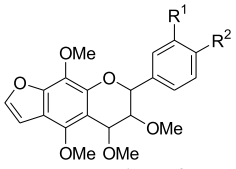
H	4-6-37	4-6-38	4-6-39
4′	7.42 m	7.40 m	7.40 m
1″	6.91 d(2.0)	6.52 d(9.9)	6.53 d(9.9)
2″	7.52 d(2.0)	5.53 d(9.9)	5.55 d(9.9)
4″, 5″		1.39 s, 1.40 s	1.39 s, 1.43 s
$\underline{OCH_2}CH_3$			3.66 dd(9.0, 7.0)
			3.78 dd(9.0, 7.0)
$OCH_2\underline{CH_3}$			1.30 t(7.0)

Table 4-6-16: Cos, MFs, and TSs of flavans **4-6-40**~**4-6-48**.

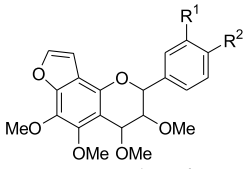
No.	Compounds	MFs	Test solvents	References
4-6-40	(2,3-*trans*-3,4-*trans*)-3,4-dimethoxy-(2″,3″:7,8)-furano-flavan	$C_{19}H_{18}O_4$	$CDCl_3$	[446]
4-6-41	(2,3-*trans*-3,4-*trans*)-3,4,5,8-tetramethoxy-[2″,3″:7,6]-furan-oflavan	$C_{21}H_{22}O_6$	$CDCl_3$	[443]
4-6-42	(2,3-*trans*-3,4-*cis*)-3′,4′-methylenedioxy-3,4,5,8-tetrameth-oxy-[2″,3″:7,6]-furanoflavan	$C_{22}H_{22}O_8$	$CDCl_3$	[443]
4-6-43	(2,3-*trans*-3,4-*cis*)-3,4,5,6-tetramethoxy-[2″,3″:7,8]-furano-flavan	$C_{21}H_{22}O_6$	$CDCl_3$	[443]
4-6-44	(2,3-*trans*-3,4-*trans*)-3′,4′-methylenedioxy-3,4,5,6-tetra-methoxy-[2″,3″:7,8]-furanoflavan	$C_{22}H_{22}O_8$	$CDCl_3$	[443]
4-6-45	3*β*,4*β*,5-trimethoxy-4′-hydroxy-(7,6:2″,3″)-6″,6″-dimethyl-pyranoflavan	$C_{23}H_{26}O_6$	$CDCl_3$	[447]
4-6-46	4*β*,5-dimethoxy-3*β*-hydroxy-(7,6:2″,3″)-6″,6″-dimethyl-pyranoflavan	$C_{22}H_{24}O_5$	$CDCl_3$	[447]
4-6-47	3*β*,4*β*-dihydroxy-5-methoxy-(7,6:2″,3″)-6″,6″-dimethyl-pyranoflavan	$C_{21}H_{22}O_5$	$CDCl_3$	[447]
4-6-48	3*β*,4*β*,5-trimethoxy-6″,6″-dimethyl-2*H*-pyrano-(2″,3″:7,6)-flavan	$C_{23}H_{26}O_5$	$CDCl_3$	[445]



4-6-40

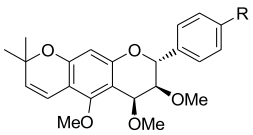


	R^1	R^2
4-6-41	H	H
4-6-42	OCH_2O	

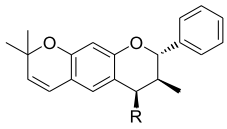


	R^1	R^2
4-6-43	H	H
4-6-44	OCH_2O	

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4-6-45 R = OH
4-6-48 R = H



4-6-46 R = OMe
4-6-47 R = OH

Table 4-6-17: ^{1}H NMR spectroscopic data of flavans **4-6-40**~**4-6-43**.

H	4-6-40	4-6-41	4-6-42	4-6-43
2	5.03 d(9.3)	5.03 d(6.6)	4.84 d(6.9)	5.15 d(6.5)
3	3.71 dd(9.3, 7.5)	3.90 dd(6.6, 4.3)	3.84 dd(6.9, 4.3)	3.91 dd(6.5, 4.7)
		3.28 s(OMe)	3.29 s(OMe)	3.28 s(OMe)
4	4.73 dd(9.3, 7.5)	4.79 d(4.3)	4.79 d(4.3)	4.66 d(4.7)
		3.35 s(OMe)	3.40 s(OMe)	3.38 s(OMe)
5	7.34 d(9)	4.06 s(OMe)	4.06 s(OMe)	
6	7.18 dd(9, 1)			
8		4.04 s(OMe)	4.02 s(OMe)	
2′	7.4~7.5 m	7.47 br d(8.0)	7.01 d(1.6)	7.39 m
3′	7.4~7.5 m	7.34 m		7.39 m
4′	7.4~7.5 m	7.34 m		7.39 m
5′	7.4~7.5 m	7.34 m	6.81 d(8.1)	7.39 m
6′	7.4~7.5 m	7.47 br d(8.0)	6.93 dd(8.1, 1.6)	7.39 m
1″	6.81 dd(2, 1)	6.86 d(2.2)	6.87 d(1.8)	6.82 d(2.2)
2″	7.56 d(2)	7.50 d(2.2)	7.51 d(1.9)	7.51 d(2.2)
OMe	3.00 s, 3.60 s			3.98 s, 4.07 s
OCH_2O			5.97 s	

Table 4-6-18: ^{1}H NMR spectroscopic data of flavans **4-6-44**~**4-6-48**.

H	4-6-44	4-6-45	4-6-46	4-6-47	4-6-48
2	4.98 d(7.2)	5.17 d(10.3)	5.05 d(10.3)	5.01 d(9.9)	5.23 d(10.3)
3	3.83 dd(7.2, 4.8)	3.51 dd(10.3, 2.9)	3.97 m	3.96 m	3.54 dd(10.3, 2.8)
	3.30 s(OMe)	3.16 s(OMe)			3.13 s(OMe)
4	4.66 d(4.8)	4.74 d(2.9)	4.60 d(3.4)	5.02 d(3.8)	4.75 d(2.8)
	3.44 s(OMe)	3.62 s(OMe)	3.60 s(OMe)		3.62 s(OMe)
5	3.99 s(OMe)	3.86 s(OMe)	3.83 s(OMe)	3.92 s(OMe)	3.87 s(OMe)
6	4.07 s(OMe)				
8		6.18 s	6.21 s	6.22 s	6.22 s
2′	6.96 d(1.6)	7.35 d(8.5)	7.49 m	7.49 m	7.40 m
3′		6.86 d(8.5)	7.49 m	7.49 m	7.40 m
4′			7.49 m	7.49 m	7.40 m

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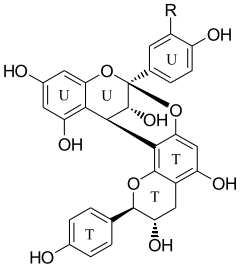
Table 4-6-18 (continued)

H	4-6-44	4-6-45	4-6-46	4-6-47	4-6-48
5′	6.80 d(8.0)	6.86 d(8.5)	7.49 m	7.49 m	7.40 m
6′	6.90 dd(8.0, 1.6)	7.35 d(8.5)	7.49 m	7.49 m	7.40 m
1″		6.52 d(10.0)	6.53 d(9.9)	6.52 d(10.0)	6.54 d(9.9)
2″	7.50 d(2.1)	5.55 d(10.0)	5.56 d(9.9)	5.57 d(10.0)	5.54 d(9.9)
3″	6.80 d(2.1)				
4″, 5″		1.43 s, 1.41 s	1.43 s, 1.43 s	1.43 s, 1.43 s	1.41 s, 1.43 s
OCH_2O	5.97 s				

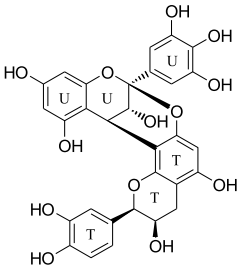
4.6.2 Procyanidins

Table 4-6-19: Cos, MFs, and TSs of procyanidins **4-6-49**~**4-6-61**.

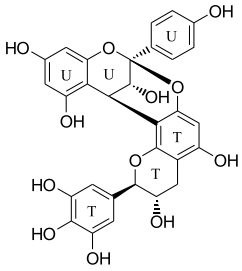
No.	Compounds	MFs	Test solvents	References
4-6-49	geranin A	$C_{30}H_{24}O_{10}$	CD_3OD	[448]
4-6-50	geranin B	$C_{30}H_{24}O_{11}$	CD_3OD	[448]
4-6-51	epigallocatechin-(2β →7,4β →8)-epicatechin	$C_{30}H_{24}O_{13}$	CD_3OD	[449]
4-6-52	geranin C	$C_{30}H_{24}O_{12}$	CD_3OD	[450]
4-6-53	proanthocyanidin A-1	$C_{30}H_{24}O_{12}$	CD_3OD	[451]
4-6-54	proanthocyanidin A-2	$C_{30}H_{24}O_{12}$	CD_3OD	[451]
4-6-55	epicatechin-(2β → *O* →7,4β →8)-*ent*-epicatechin	$C_{30}H_{24}O_{12}$	CD_3OD	[451]
4-6-56	epicatechin-(2β → *O* →7,4β →6)-catechin	$C_{30}H_{24}O_{12}$	CD_3OD	[451]
4-6-57	epicatechin-(2β → *O* →7,4β →6)-*ent*-catechin	$C_{30}H_{24}O_{12}$	CD_3OD	[451]
4-6-58	epicatechin-(4β →6,2β → *O* →7)-*ent*-epicatechin	$C_{30}H_{24}O_{12}$	CD_3OD	[451]
4-6-59	cinnamtannin B-1	$C_{45}H_{36}O_{18}$	CD_3OD	[452]
4-6-60	aesculitannin B	$C_{45}H_{36}O_{18}$	CD_3OD	[452]
4-6-61	geranin D	$C_{45}H_{34}O_{15}$	CD_3OD	[450]



4-6-49 R = H
4-6-50 R = OH

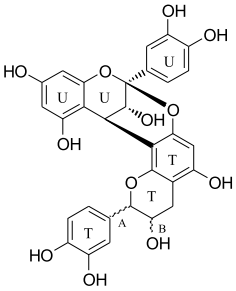


4-6-51

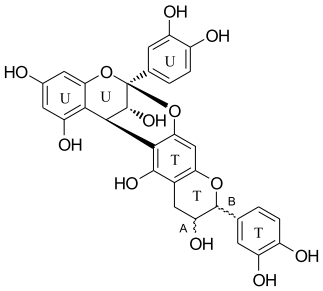


4-6-52

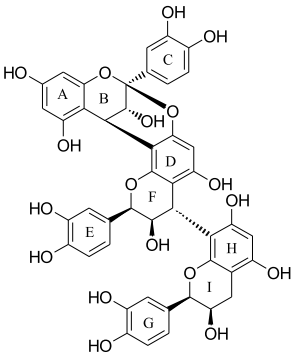
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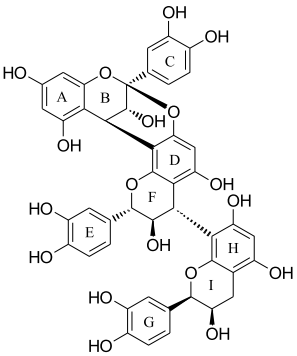
	A	B
4-6-53	β	α
4-6-54	β	β
4-6-55	α	α



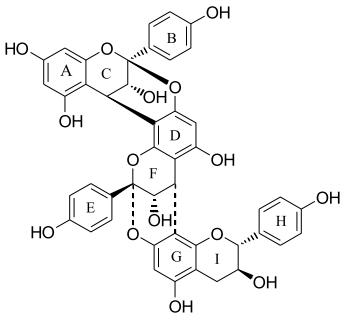
	A	B
4-6-56	β	α
4-6-57	α	β
4-6-58	β	β



4-6-59



4-6-60



4-6-61

Table 4-6-20: ^{1}H NMR spectroscopic data of procyanidins **4-6-49**~**4-6-52**.

H	4-6-49	4-6-50	4-6-51	4-6-52
U				
3	4.08 d(3.5)	4.08 d(3.5)	4.06 d(3.4)	4.06 d(3.5)
4	4.26 d(3.5)	4.25 d(3.5)	4.41 d(3.4)	4.23 d(3.5)

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Table 4-6-20 (continued)

H	4-6-49	4-6-50	4-6-51	4-6-52
6	5.96 d(2.5)	5.94 d(2.5)	6.01 d(2.4)	5.94 d(2.2)
8	6.08 d(2.5)	6.06 d(2.5)	6.08 d(2.4)	6.06 d(2.2)
2′	7.50 d(9.0)	7.12 d(1.8)	6.74 s	7.49 d(8.6)
3′	6.82 d(9.0)			6.80 d(8.6)
5′	6.82 d(9.0)	6.79 d(8.3)		6.80 d(8.6)
6′	7.50 d(9.0)	7.0 dd(8.2, 1.9)	6.74 s	7.49 d(8.6)
T				
2	4.80 d(8.0)	4.80 d(8.0)	4.93 br s	4.72 d(7.8)
3	4.17 ddd(5.5, 8.0, 8.5)	4.16 ddd(5.6, 8.0, 8.4)	4.24 m	4.15 ddd(5.7, 7.8, 8.3)
4	2.58 dd(8.5, 16.5)	2.57 dd(8.4, 16.4)	2.95 dd(17.2, 4.9)	2.57 dd(8.3, 16.4)
	2.93 dd(5.5, 16.5)	2.93 dd(16.4, 5.6)	2.76 dd(17.2, 1.9)	2.93 dd(5.7, 16.4)
6	6.10 s	6.08 s	6.11 s	6.08 s
2′	7.29 d(8.4)	7.29 d(8.4)	7.16 d(2.0)	6.90 s
3′	6.83 d(8.4)	6.81 d(8.4)		
5′	6.83 d(8.4)	6.81 d(8.4)	6.82 d(8.2)	
6′	7.29 d(8.4)	7.29 d(8.4)	6.98 dd(8.2, 2.0)	6.90 s

Table 4-6-21: ^{1}H NMR spectroscopic data of procyanidins **4-6-53**~**4-6-56**.

H	4-6-53	4-6-54	4-6-55	4-6-56
U				
3	4.07 d(3.5)	4.05 d(3.4)	4.16 d(3.5)	4.12 d(3.5)
4	4.24 d(3.5)	4.39 d(3.4)	4.41 d(3.5)	4.29 d(3.5)
6	5.90 d(2.4)	6.00 d(2.3)	5.89 d(2.4)	6.03 d(2.2)
8	6.05 d(2.4)	6.07 d(2.3)	6.07 d(2.4)	6.08 d(2.2)
2′	7.13 d(2.4)	7.14 d(2.4)	7.15 d(2.4)	7.17 d(2.4)
5′	6.79 d(8.4)	6.82 d(8.2)	6.84 d(8.4)	6.82 d(8.4)
6′	7.01 dd(8.4, 2.4)	7.07 dd(8.2, 2.4)	7.04 dd(8.4, 2.4)	7.05 dd(8.4, 2.4)
T				
2	4.74 d(7.8)	4.91 br s	5.02 br s	4.67 d(6.5)
3	4.16 m	4.23 m	4.23 m	4.05 m
4	*α* 2.58 dd(16.5,8.1)	*α* 2.74 dd(17.3, 3.2)	2.87 m	*α* 2.81 dd(16.5, 5.4)
	β 2.81 dd(16.5, 5.4)	*β* 2.95 dd(17.3, 4.6)		*β* 2.62 dd(16.5, 8.1)
6	6.08 s	6.09 s	6.08 s	
8				6.09 s
2′	6.91 d(2.0)	7.13 d(2.2)	7.14 d(2.0)	6.80 d(2.2)
5′	6.80 d(7.8)	6.81 d(8.2)	6.81 d(8.2)	6.75 d(8.4)
6′	6.80 dd(7.8, 2.0)	6.99 dd(8.2, 2.2)	6.95 dd(8.2, 2.0)	6.68 dd(8.4, 2.2)

Table 4-6-22: ^{1}H NMR spectroscopic data of procyanidins **4-6-57** and **4-6-58**.

H	4-6-57	4-6-58	H	4-6-57	4-6-58
U			T		
3	4.10 d(3.5)	4.12 d(3.2)	2	4.63 d(7.3)	4.80 br s
4	4.28 d(3.5)	4.30 d(3.2)	3	3.99 m	4.16 m

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Table 4-6-22 (continued)

H	4-6-57	4-6-58	H	4-6-57	4-6-58
6	6.03 d(2.2)	6.01 d(2.3)	4	α 2.91 dd(16.7, 5.4)	2.87 m
8	6.09 d(2.2)	6.07 d(2.3)		β 2.58 dd(16.7, 7.6)	
2′	7.16 d(2.4)	7.16 d(2.2)	8	6.07 s	6.09 s
5′	6.81 d(8.4)	6.82 d(8.1)	2′	6.79 d(2.2)	6.93 d(2.2)
6′	7.06 dd(8.4, 2.4)	7.05 dd(8.1, 2.4)	5′	6.70 d(8.4)	6.73 d(8.3)
			6′	6.68 dd(8.4, 2.2)	6.75 dd(8.3, 2.2)

Table 4-6-23: ^{1}H NMR spectroscopic data of procyanidins **4-6-59**~**4-6-61**.

H		4-6-59	4-6-60	4-6-61
C	3	3.29 d(3.5)	3.31 d(3.5)	4.08 d(3.5)
	4	4.15 d(3.5)	3.95 d(3.5)	4.29 d(3.5)
A	6	5.97 d(2.4)	5.85 d(2.3)	6.02 d(2.5)
	8	6.02 d(2.4)	6.00 d(2.3)	6.06 d(2.5)
B	2′	7.03 d(2.0)	7.02 d(2.1)	7.50 d(9.0)
	3′			6.82 d(9.0)
	5′	6.84 d(8.1)	6.83 d(8.3)	6.82 d(9.0)
	6′	6.86 dd(8.1, 2.0)	6.86 dd(8.3, 2.1)	7.50 d(9.0)
F	2	5.70 br s	4.62 d(9.3)	
	3	4.13 br d(1.4)	4.57 t(9.3)	4.06 d(3.5)
	4	4.56 br s	4.51 d(9.3)	4.28 d(3.5)
D	6	5.80 s	5.80 s	6.06 s
E	2′	7.32 s(2.0)	7.20 d(2.0)	7.48 d(9.0)
	3′			6.82 d(9.0)
	5′	6.82 d(8.2)	6.90 d(8.2)	6.82 d(9.0)
	6′	7.19 dd(8.2, 2.0)	7.15 dd(8.2, 2.0)	7.48 d(9.0)
I	2	4.38 br s	4.37 br s	4.70 d(9.0)
	3	3.85 br t(3.8)	4.07 br d(3.5)	4.26 ddd(9.0, 9.5, 6.0)
	4	2.83 m	2.87 dd(17.0, 4.8)	2.55 dd(16.5, 9.5)
			2.77 br d(17.0)	3.06 dd(16.5, 6.0)
G	6	6.10 s	6.08 s	6.25 s
H	2′	6.82 d(1.7)	6.98 d(1.8)	7.45 d(8.5)
	3′			6.89 d(8.5)
	5′	6.76 d(8.2)	6.80 d(8.3)	6.89 d(8.5)
	6′	6.72 dd(8.2, 1.7)	6.88 dd(8.3, 1.8)	7.45 d(8.5)

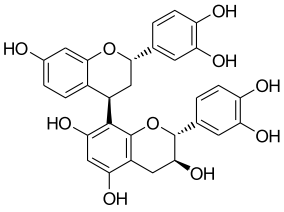
Table 4-6-24: Cos, MFs, and TSs of procyanidins **4-6-62**~**4-6-69**.

No.	Compounds	MFs	Test solvents	References
4-6-62	(2*S*)-3′,4′,7-trihydroxyflavan-(4β →8)-catechin	$C_{30}H_{26}O_{10}$	CD_3COCD_3-3 %D_2O	[453]
4-6-63	(+)-fisetinidol-(4β →8)-catechin	$C_{30}H_{26}O_{11}$	CD_3COCD_3-3 %D_2O	[453]
4-6-64	(2*R*)-4′,7-dihydroxyflavan-(4α →8)-catechin	$C_{30}H_{26}O_9$	CD_3COCD_3-3 %D_2O	[453]

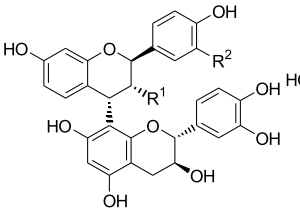
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Table 4-6-24 (continued)

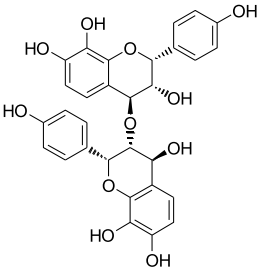
No.	Compounds	MFs	Test solvents	References
4-6-65	epioritin-(4β →3)-epioritin-4β-ol	$C_{30}H_{26}O_{11}$	CD_3COCD_3	[454]
4-6-66	proanthocyanidin I	$C_{44}H_{42}O_{17}$	CD_3OD	[455]
4-6-67	proanthocyanidin II	$C_{44}H_{42}O_{18}$	CD_3OD	[455]
4-6-68	proanthocyanidin III	$C_{45}H_{44}O_{18}$	CD_3OD	[455]
4-6-69	proanthocyanidin IV	$C_{45}H_{44}O_{19}$	CD_3OD	[455]



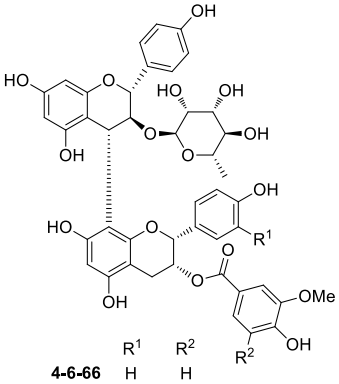
4-6-62



	R^1	R^2
4-6-63	OH	OH
4-6-64	H	H



4-6-65



	R^1	R^2
4-6-66	H	H
4-6-67	OH	H
4-6-68	H	OMe
4-6-69	OH	OMe

Table 4-6-25: ^{1}H NMR spectroscopic data of procyanidins **4-6-62**~**4-6-65**.

H	4-6-62	4-6-63	4-6-64	4-6-65
U				
2	5.24 m	5.24 s	5.29 m	5.25 d(1.0)
3	2.17 m, 2.45 br m	4.33 br m	2.20 m, 2.50 br m	3.89 dd(3.5, 1.0)
4	4.47 t(6)	4.76 br s	4.42 t(6)	4.65 d(3.5)
5	6.62~6.66 m	6.25~6.74 m	6.58~6.73 m	6.93 d(8.5)

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Table 4-6-25 (continued)

H	4-6-62	4-6-63	4-6-64	4-6-65
6	6.23~6.26 m	6.25~6.74 m	6.24 dd(8, 2)	6.50 d(8.5)
8	6.23~6.26 m	6.25~6.74 m	6.30 d(2)	
2′	6.83 d(2)	6.25~6.74 m	7.11 d(8.5)	7.41 d(8.5)
3′			6.71 d(8.5)	6.82 d(8.5)
5′	6.69 or 6.74 d(8)	6.25~6.74 m	6.71 d(8.5)	6.82 d(8.5)
6′	6.62~6.66 m	6.25~6.74 m	7.11 d(8.5)	7.41 d(8.5)
L				
2	4.42 br	4.48 br s	4.48 d(8)	5.44 d(1.0)
3	4.02 m	3.95 m	3.72 br m	5.84 dd(4.0, 1.0)
4	2.57 dd(16, 8)	2.55 dd(7.5, 16)	2.52 dd(16, 8)	5.46 d(4.0)
	2.92 dd(16, 5.5)	2.88 br d(16)	2.91 dd(16, 5.5)	
5				6.50 d(8.5)
6	6.08 s	6.01 br s	6.07 s	6.40 d(8.5)
2′	6.83 d(2)	6.25~6.74 m	6.58~6.73 m	7.40 d(8.5)
3′				6.68 d(8.5)
5′	6.69 or 6.74 d(8)	6.25~6.74 m	6.58~6.73 m	6.68 d(8.5)
6′	6.62~6.66 m	6.25~6.74 m	6.58~6.73 m	7.40 d(8.5)

Table 4-6-26: ^{1}H NMR spectroscopic data of procyanidins **4-6-66**~**4-6-69**.

H	4-6-66	4-6-67	4-6-68	4-6-69
U				
2	4.37 d(9.5)	4.36 d(9.5)	4.33 d(9.5)	4.32 d(9.5)
3	4.60 dd(9.5, 7.5)	4.62 dd(9.5, 7.5)	4.59 dd(9.5, 7.5)	4.60 dd(9.5, 7.5)
4	4.54 d(7.5)	4.53 d(7.5)	4.51 d(7.5)	4.50 d(7.5)
6	5.99 s	6.00 d(2.0)	5.94 d(2.5)	5.97 d(2.5)
8	5.99 s	5.97 d(2.0)	5.90 d(2.5)	5.89 d(2.5)
2′, 6′	6.78 m	6.80 m	6.77 m	6.78 m
3′, 5′	6.59 m	6.61 m	6.57 m	6.60 m
L				
2	5.12 s	5.02 s	5.17 s	5.08 s
3	5.40 br d(4.0)	5.39 br d(4.0)	5.42 br d(4.0)	5.41 br d(4.0)
4ax	3.04 dd(18.0, 4.0)	3.03 dd(18.0, 4.0)	3.03~3.12 m (ov)	3.03~3.11 m (ov)
4eq	2.87 br d(18.0)	2.85 br d(18.0)	2.91 br d(18.0)	2.90 br d(18.0)
6	6.11 s	6.11 s	6.12 s	6.12 s
2′	7.20 m	6.84 d(2.0)	7.25 m	6.87 d(2.0)
3′	6.74 m		6.75 m	
5′	6.74 m	6.71 d(8.0)	6.75 m	6.73 d(8.0)
6′	7.20 m	6.77 dd(8.0, 2.0)	7.25 m	6.81 dd(8.0, 2.0)
2″	7.26 d(2.0)	7.28 d(2.0)	7.02 s	7.04 s
3″	3.80 s(OMe)	3.80 s(OMe)	3.78 s(OMe)	3.79 s(OMe)
5″	6.86 d(8.0)	6.85 d(8.0)	3.78 s(OMe)	3.79 s(OMe)
6″	7.16 dd(8.0, 2.0)	7.17 dd(8.0, 2.0)	7.02 s	7.04 s

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Table 4-6-26 (continued)

H	4-6-66	4-6-67	4-6-68	4-6-69
1‴	3.47 d(1.5)	3.48 d(1.5)	3.46 d(1.5)	3.47 d(1.5)
2‴	3.36 dd(3.0, 1.5)	3.36 dd(3.0, 1.5)	3.35 dd(3.0, 1.5)	3.35 dd(3.0, 1.5)
3‴	3.50 dd(9.0, 3.0)	3.50 dd(9.0, 3.0)	3.50 dd(9.0, 3.0)	3.50 dd(9.0, 3.0)
4‴	3.08 dd(9.0, 9.0)	3.09 dd(9.0, 9.0)	3.03~3.12 m (ov)	3.03~3.11 m (ov)
5‴	3.13 dq(9.0, 6.0)	3.13 dq(9.0, 6.0)	3.03~3.12 m (ov)	3.03~3.11 m (ov)
6‴	0.72 d(6.0)	0.72 d(6.0)	0.73 d(6.0)	0.73 d(6.0)

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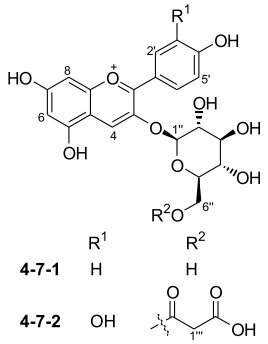
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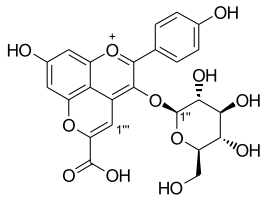
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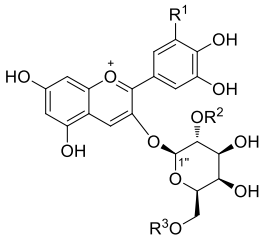
4.7 Anthocyanidins

Table 4-7-1: Cos, MFs, and TSs of anthocyanidins **4-7-1**~**4-7-8**.

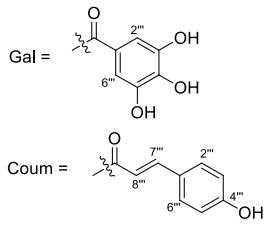
No.	Compounds	MFs	Test solvents	References
4-7-1	pelargonidin 3-*O*-*β*-glucopyranoside	$C_{21}H_{21}O_{10}$	CF_3COOD-CD_3OD (10:90)	[456]
4-7-2	cyanidin 3-*O*-(6″-*O*-malonyl-*β*-glucopyra-noside)	$C_{24}H_{23}O_{14}$	CF_3COOD-CD_3OD (5:95)	[457]
4-7-3	5-carboxypyranopelargonidin 3-*O*-*β*-gluco-pyranoside	$C_{24}H_{21}O_{12}$	CF_3COOD-CD_3OD (5:95)	[456]
4-7-4	delphinidin 3-*O*-*β*-galactopyranoside	$C_{21}H_{21}O_{12}$	CF_3COOD-CD_3OD (5:95)	[458]
4-7-5	delphinidin 3-*O*-(2″-*O*-galloyl-6″-*O*-acetyl-*β*-galactopyranoside)	$C_{30}H_{27}O_{17}$	CF_3COOD-CD_3OD (5:95)	[458]
4-7-6	cyanidin 3-*O*-*β*-galactopyranoside	$C_{21}H_{21}O_{11}$	CF_3COOD-CD_3OD (1:20)	[459]
4-7-7	cyanidin 3-*O*-(2″-*O*-galloyl-*β*-galactopyra-noside)	$C_{28}H_{25}O_{15}$	CF_3COOD-CD_3OD (1:20)	[459]
4-7-8	delphinidin 3-*O*-*β*-D-(6-(*E*)-*p*-coumaryl)-galactopyranoside	$C_{30}H_{27}O_{14}$	CF_3COOD-DMSO-d_6 (1:9)	[460]







	R1	R2	R3
4-7-4	OH	H	H
4-7-5	OH	Gal	Ac
4-7-6	H	H	H
4-7-7	H	Gal	H
4-7-8	OH	H	Coum



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Table 4-7-2: ^{1}H NMR spectroscopic data of anthocyanidins **4-7-1**~**4-7-4**.

H	4-7-1	4-7-2	4-7-3	4-7-4
4	9.10 s	9.04 d(1.0)		9.07 s
6	6.74 d(1.2)	6.76 d(1.9)	7.27 d(1.9)	6.74 d(1.9)
8	6.96 d(1.2)	6.99 dd(1.9, 1.0)	7.37 d(1.9)	6.95 br s
2′	8.61 d(9.1)	8.11 d(2.2)	8.52 d(8.9)	7.88 s
3′	7.10 d(9.1)	7.11 d(8.7)	7.10 d(8.9)	
5′	7.10 d(9.1)	8.37 dd(8.7, 2.2)	7.10 d(8.9)	
6′	8.61 d(9.1)		8.52 d(8.9)	7.88 s
1″	5.37 d(8.0)	5.36 d(7.9)	4.75 d(7.8)	5.36 d(7.8)
2″	3.76 dd(8.0, 9.1)	3.76 dd(7.9, 9.1)	3.71 dd(7.8, 9.3)	4.11 dd(7.8, 9.7)
3″	3.69 dd(9.1, 8.9)	3.63 t(9.1)	3.43 t(9.1)	3.78 dd(9.7, 3.7)
4″	3.58 dd(8.9, 9.9)	3.50 dd(9.1, 9.5)	3.31 dd(9.1, 9.3)	4.05 d(3.7)
5″	3.22 ddd(9.9, 6.0, 2.3)	3.90 ddd(9.5, 7.3, 1.9)	3.22 ddd(9.3, 7.0, 1.9)	3.85 m
6″	4.05 dd(12.3, 2.3)	4.64 dd(12.0, 1.9)	3.82 dd(11.7, 1.9)	3.86 m
	3.46 dd(12.3, 6.0)	4.37 dd(12.0, 7.3)	3.46 dd(11.7, 7.0)	3.86 m
1‴		3.44 s	8.11 s	

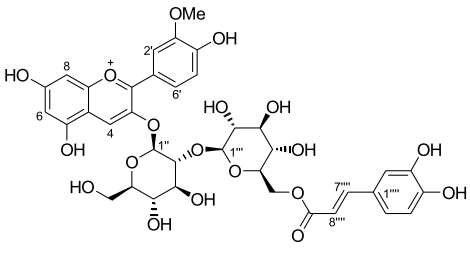
Table 4-7-3: ^{1}H NMR spectroscopic data of anthocyanidins **4-7-5**~**4-7-8**.

H	4-7-5	4-7-6	4-7-7	4-7-8
4	8.99 d(0.8)	9.11 d(0.9)	9.07 s	8.74 s
6	6.73 d(1.9)	6.74 d(2.0)	6.71 d(2.0)	6.82 br s
8	6.90 dd(0.8, 1.9)	6.98 dd(2.0, 0.9)	6.87 br s	6.63 br s
2′	7.64 s	8.17 d(2.4)	7.84 d(1.8)	7.67 s
5′		7.11 d(8.8)	6.82 d(8.8)	
6′	7.64 s	8.34 dd(8.8, 2.4)	8.02 dd(8.8, 1.8)	7.67 s
1″	5.63 d(7.9)	5.34 d(7.7)	5.64 d(8.1)	5.23 d(7.6)
2″	5.78 dd(7.9, 9.9)	4.08 m	5.76 br t	3.83 t(8.5)
3″	4.07 dd(9.9, 3.7)	3.76 dd(9.9, 3.3)	4.05 m	3.61 dd(3.1, 7.9)
4″	4.13 d(3.7)	4.04 t(3.3)	4.14 m	3.83 br d(3.1)
5″	4.27 dd(3.5, 8.8)	3.89 m	4.03 m	4.11 m
6″	4.52 dd(8.5, 11.9)	3.87 m	3.99 m	4.16 dd(2.9, 8.5)
	4.44 dd(3.4, 11.9)	3.87 m	3.94 m	4.36 dd(2.4, 9.2)
2‴, 6‴	7.06 s		7.10 s	7.35 d(8.2)
3‴, 5‴				6.76 d(8.5)
7‴				7.40 d(15.9)
8‴				6.26 d(15.9)
OAc	2.18 s			

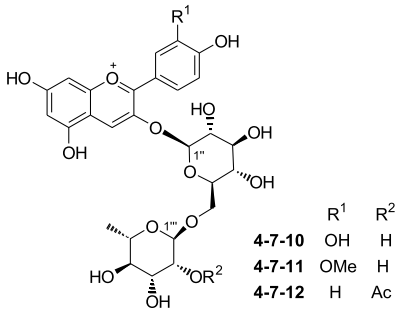
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Table 4-7-4: Cos, MFs, and TSs of anthocyanidins **4-7-9**~**4-7-29**.

No.	Compounds	MFs	Test solvents	References
4-7-9	peonidin 3-*O*-[2-*O*-(6-*O*-(*trans*-caffeoyl)-*β*-D-glucopyranosyl)-*β*-D-glucopyranoside]	$C_{37}H_{39}O_{19}$	CF_3COOD-DMSO-d_6 (1:9)	[461]
4-7-10	cyanidin 3-*O*-(6″-*O*-*α*-rhamnopyranosyl-*β*-glucopyranoside)	$C_{27}H_{31}O_{15}$	CF_3COOD-CD_3OD (5:95) CF_3COOD-CD_3OD (1:9)	[457, 462] [463]
4-7-11	peonidin 3-*O*-(6″-*O*-*α*-rhamnopyranosyl-*β*-glucopyranoside)	$C_{28}H_{33}O_{15}$	CF_3COOD-CD_3OD (5:95)	[457]
4-7-12	Pelargonidin 3-*O*-[6″-*O*-(2‴-*O*-acetyl-*α*-rha-mnopyranosyl)-*β*-glucopyranoside]	$C_{29}H_{33}O_{15}$	CF_3COOD-CD_3OD (5:95)	[462]
4-7-13	cyanidin 3-*O*-sambubioside	$C_{26}H_{29}O_{15}$	CF_3COOD-CD_3OD (5:95)	[464]
4-7-14	petunidin 3-*O*-sambubioside	$C_{27}H_{31}O_{16}$	CF_3COOD-CD_3OD (5:95)	[464]
4-7-15	malvidin 3-caffeoylrutinoside	$C_{38}H_{41}O_{19}$	DCl-DMSO-d_6 (1:9)	[465]
4-7-16	malvidin 3-*p*-coumaroylrutinoside	$C_{38}H_{41}O_{18}$	DCl-DMSO-d_6 (1:9)	[465]
4-7-17	cyanidin 3-*O*-(2″-*O*-galloyl-6″-*O*-*α*-rhamno-pyranosyl-*β*-galactopyranoside)	$C_{34}H_{35}O_{19}$	CF_3COOD-CD_3OD (1:20)	[459]
4-7-18	pelargonidin 3-*O*-[2-*O*-(*β*-D-xylopyranosyl)-6-*O*-(malonyl)-*β*-D-galactopyranoside]	$C_{29}H_{31}O_{17}$	DMSO-d_6	[466]
4-7-19	delphinidin 3-*O*-(2-*O*-*β*-D-glucopyranosyl-*α*-L-arabinopyranoside)	$C_{26}H_{29}O_{16}$	CF_3COOD-DMSO-d_6 (1:9)	[467]
4-7-20	albireodelphin C	$C_{36}H_{37}O_{19}$	CF_3COOD-CD_3OD (1:9)	[468]
4-7-21	delphinidin 3-glucoside-5-(6-malonyl)gluco-side	$C_{30}H_{33}O_{20}$	CF_3COOD-CD_3OD (1:9)	[469]
4-7-22	malonylawobanin	$C_{39}H_{39}O_{22}$	CD_3OD	[470]
4-7-23	mavidin-3-*O*-(6-*O*-(*Z*)-*p*-coumaroyl-*β*-gluco-pyranoside)-5-*O*-*β*-glucopyranoside	$C_{38}H_{41}O_{19}$	CF_3COOD-CD_3OD (5:95)	[471]
4-7-24	gentiocyanin A	$C_{36}H_{37}O_{19}$	CF_3COOD-CD_3OD (1:9)	[472]
4-7-25	petunidin 3,7-di-*O*-(*β*-D-glucopyranoside)	$C_{28}H_{33}O_{17}$	CF_3COOD-CD_3OD (1:9)	[469]
4-7-26	8-*C*-[6-*O*-(sinapoyl)-*β*-glucopyranosyl]-cyanidin 3-*O*-[6-*O*-(malonyl)-*β*-glucopyranoside]	$C_{41}H_{43}O_{23}$	CF_3COOD-DMSO-d_6 (1:9)	[473]
4-7-27	8-*C*-*β*-glucopyranosylcyanidin 3-*O*-*β*-gluco-pyranoside	$C_{27}H_{31}O_{16}$	CF_3COOD-DMSO-d_6 (1:9)	[473]
4-7-28	3,5-di-*O*-(*β*-glucopyranosyl)-pelargonidin 6″-*O*-4,6‴-*O*-1-cyclic malate	$C_{31}H_{33}O_{18}$	CF_3COOD-CD_3OD (1:9)	[474]
4-7-29	3,5-di-*O*-(*β*-glucopyranosyl)-cyanidin 6″-*O*-4,6‴-*O*-l-cyclic malate	$C_{31}H_{33}O_{19}$	CF_3COOD-CD_3OD (1:9)	[474]

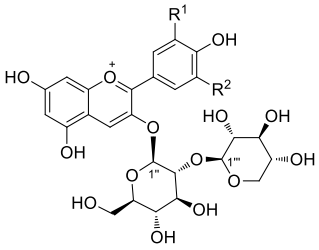


4-7-9

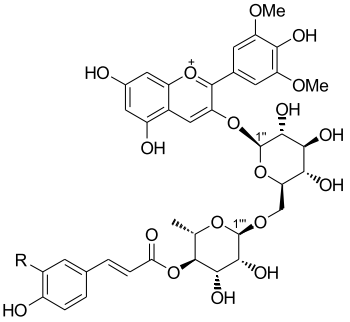


	R^1	R^2
4-7-10	OH	H
4-7-11	OMe	H
4-7-12	H	Ac

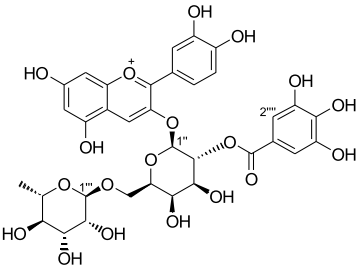
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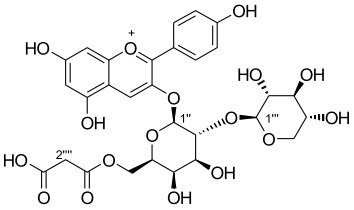
	R^1	R^2
4-7-13	OH	H
4-7-14	OMe	OH



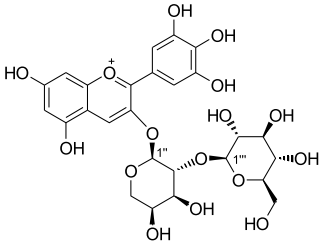
4-7-15 R = OH
4-7-16 R = H



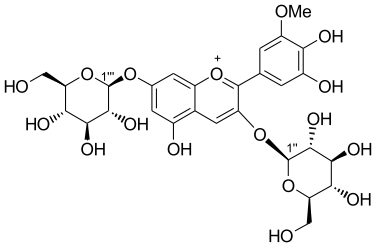
4-7-17



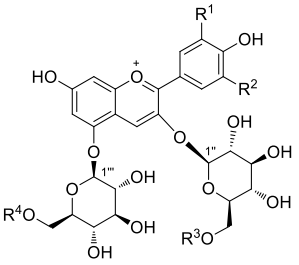
4-7-18



4-7-19



4-7-25



	R^1	R^2	R^3	R^4
4-7-20	OH	OH	H	Coum
4-7-21	OH	OH	H	Mal
4-7-22	OH	OH	Coum	Mal
4-7-23	OMe	OMe	(*Z*)-Coum	H
4-7-24	OH	H	H	Caff

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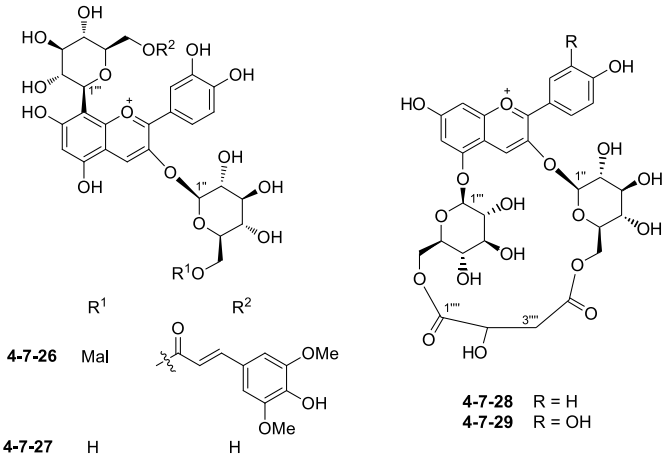


Table 4-7-5: ^{1}H NMR spectroscopic data of anthocyanidins **4-7-9** and **4-7-15**~**4-7-18**.

H	4-7-9	4-7-15	4-7-16	4-7-17	4-7-18
4	9.03 s	8.87 s	8.87 s	9.04 d(0.9)	8.87 s
6	6.71 d(1.8)	6.96 br s	6.96 br s	6.75 d(2.0)	6.89 br s
8	7.19 d(1.8)	7.09 br s	7.08 br s	6.94 dd(2.0, 0.9)	7.04 br s
2′	8.08 d(2.1)	7.91 s	7.90 s	7.90 d(2.2)	8.61 d(9.2)
3′	3.94 s(OMe)	3.89 s(OMe)	3.89 s(OMe)		7.09 d(9.2)
5′	7.09 d(8.1)	3.89 s(OMe)	3.89 s(OMe)	6.89 d(8.8)	7.09 d(9.2)
6′	8.26 dd(2.1, 8.1)	7.91 s	7.90 s	8.10 dd(8.8, 2.2)	8.61 d(9.2)
1″	5.51 d(7.3)	5.40 d(7.3)	5.41 d(7.3)	5.67 d(7.9)	5.55 d(7.6)
2″	3.82 t(8.6)	3.43 m	3.43 m	5.78 dd(9.9, 7.9)	4.10 t(8.6)
3″	3.67 t(8.9)	3.41 m	3.41 m	4.07 dd(9.9, 3.3)	3.80 dd(3.3, 10.6)
4″	3.34 t(9.2)	3.17 t(9.5)	3.18 t(8.9)	4.09 dd(3.3, 0.9)	3.81 br s
5″	3.47 m	3.70 m	3.71 m	4.23 m	4.18 m
6″	3.50 dd(6.4, 11.0)	3.43 m	3.45 m	4.00 m	4.22 m
	3.70 d(11.0)	3.89 m	3.89 m	3.84 m	4.22 m
1‴	4.76 d(7.6)	4.55 s	4.55 s	4.78 d(1.8)	4.70 d(7.6)
2‴	3.14 t(9.2)	3.66 br s	3.66 br s	3.93 dd(3.5, 1.8)	2.96 t(8.6)
3‴	3.27 t(8.9)	3.66 m	3.66 m	3.76 dd(9.4, 3.5)	3.13 t(9.0)
4‴	3.21 t(9.2)	4.78 t(7.3)	4.79 t(7.8)	3.46 t(9.4)	3.29 ddd(5.0, 9.0, 9.7)
5‴	3.50 dd(6.4, 9.2)	3.60 m	3.58 m	3.71 dd(9.4, 6.4)	3.03 t(11.0)
					3.64 dd(5.5, 11.0)
6‴	3.96 dd(6.4, 10.4)	0.92 d(6.1)	0.90 d(6.0)	1.36 d(6.4)	
	4.10 d(10.4)				
2⁗	6.89 d	6.96 d(2.0)	7.48 d(8.9)	7.08 s	3.38 d(15.6)
					3.33 d(15.6)
3⁗			6.80 d(8.9)		
5⁗	6.77 m	6.78 d(8.2)	6.80 d(8.9)		
6⁗	6.77 m	6.94 dd(2.0, 8.2)	7.48 d(8.9)	7.08 s	
7⁗	7.15 d(15.9)	7.43 d(15.9)	7.51 d(16.2)		
8⁗	5.83 d(15.9)	6.17 d(15.9)	6.24 d(16.2)		

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Table 4-7-6: ^{1}H NMR spectroscopic data of anthocyanidins **4-7-10**~**4-7-12**.

H	4-7-10 (a)①	4-7-10 (b)①	4-7-11	4-7-12
4	9.01 d(0.8)	8.91 br s	9.08 d(0.8)	9.44 s
6	6.76 d(1.9)	6.67 d(1.8)	6.78 d(1.9)	6.77 d(2.0)
8	6.97 dd(0.8, 1.9)	6.88 d(1.8)	7.03 dd(0.8, 1.9)	7.01 br s
2′	8.10 d(2.2)	8.01 d(2.4)	8.32 d(2.3)	8.68 d(9.0)
3′			4.11 s(OMe)	7.14 d(9.0)
5′	7.10 d(8.7)	7.01 d(9.0)	7.16 d(8.8)	7.14 d(9.0)
6′	8.34 dd(8.7, 2.2)	8.24 dd(3.0, 9.0)	8.37 dd(8.8, 2.3)	8.68 d(9.0)
1″	5.37 d(7.7)	5.27 d(8.4)	5.39 d(7.7)	5.39 d(7.7)
2″	3.75 dd(7.7, 9.1)	3.68 t(9.0)	3.74 dd(7.7, 9.2)	3.73 dd(9.0, 7.7)
3″	3.64 t(9.1)	3.58 t(9.0)	3.63 m	3.63 t(9.0)
4″	3.51 dd(9.1, 9.4)	3.43 t(9.6)	3.49 dd(9.2, 9.4)	3.49 t(9.5)
5″	3.81 m	3.73 m	3.81 m	3.81 m
6″	4.16 dd(11.3, 1.6)	3.59 dd(6.6, 11.4)	4.14 dd(11.3, 1.5)	4.13 dd(11.4, 1.5)
	3.69 dd(11.3, 5.0)	4.07 m	3.69 m	3.70 m
1‴	4.75 d(1.6)	4.65 br s	4.73 d(1.6)	4.73 br s
2‴	3.89 dd(1.6, 3.1)	3.78 m	3.88 dd(1.6, 3.3)	5.04 dd(3.6, 1.5)
3‴	3.71 m	3.60 dd(3.6, 10.2)	3.69 m	3.88 dd(9.7, 3.6)
4‴	3.41 m	3.30 t(9.0)	3.40 m	3.38 m
5‴	3.65 m	3.53 m	3.63 m	3.68 m
6‴	1.25 d(6.3)	1.15 d(6.0)	1.24 d(6.3)	1.26 d(6.5)
OAc				2.08 s

① Solvents: (a), CF_3COOD-CD_3OD(5:95); (b), CF_3COOD-CD_3OD(1:9).

Table 4-7-7: ^{1}H NMR spectroscopic data of anthocyanidins **4-7-13**, **4-7-14**, and **4-7-19**.

H	4-7-13	4-7-14	4-7-19
4	9.05 s	9.01 s	8.67 s
6	6.75 d(2.0)	6.72 d(1.8)	6.71 br s
8	6.99 d(1.5)	6.96 d(1.8)	6.82 br s
2′	8.14 d(2.4)	7.83 d(2.0)	7.79 s
3′		4.08 s(OMe)	
5′	7.11 d(8.7)		
6′	8.37 dd(2.3, 8.6)	7.92 d(2.0)	7.79 s
1″	5.54 d(7.6)	5.56 d(7.6)	5.59 d(4.2)
2″	4.05 dd(7.7, 9.0)	4.09 dd(7.7, 9.4)	4.18 t(5.4)
3″	3.86 t(9.2)	3.87 t(9.0)	3.85 m
4″	3.58 dd(9.5, 9.4)	3.57 dd(9.6, 9.5)	3.85 m
5″	3.67 ddd(9.5, 5.9, 2.0)	3.67 m	3.75 dd(5.6, 11.0)
			3.59 dd(2.2, 11.0)
6″	4.00 dd(2.2, 12.3)	3.99 dd(2.2, 12.3)	
	3.81 dd(5.9, 12.3)	3.81 dd(6.1, 12.3)	
1‴	4.84 d(7.6)	4.78 d(7.5)	4.42 d(7.8)
2‴	3.26 dd(7.7, 9.0)	3.24 dd(7.7, 9.0)	2.93 t(8.5)
3‴	3.38 m	3.36 t(9.0)	3.09 t(9.0)
4‴	3.48 ddd(9.0, 10.5, 5.5)	3.42 ddd(9.0, 10.5, 5.3)	3.01 t(8.8)

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Table 4-7-7 (continued)

H	4-7-13	4-7-14	4-7-19
5‴	3.76 dd(5.5, 11.6) 3.14 dd(10.6, 11.4)	3.68 ddd(9.7, 6.1, 2.2) 3.06 dd(10.3, 11.6)	2.83 m
6‴			3.20 dd(4.4, 11.5) 3.15 dd(2.2, 11.5)

Table 4-7-8: ^{1}H NMR spectroscopic data of anthocyanidins **4-7-20** and **4-7-22**~**4-7-24**.

H	4-7-20	4-7-22	4-7-23	4-7-24
4	9.03 s	8.85 s	8.81 d(0.7)	9.07 s
6	7.02 d(1.7)	6.98 br s	7.07 d(2.0)	7.01 d(2.0)
8	6.97 d(1.7)	6.90 br s	7.00 dd(2.0, 0.7)	7.00 d(2.0)
2′	7.77 s	7.74 s	8.03 s	8.02 d(2.3)
3′			4.12 s(OMe)	
5′			4.12 s(OMe)	7.01 d(8.7)
6′	7.77 s	7.74 s	8.03 s	8.26 dd(8.7, 2.3)
1″	5.32 d(7.8)	5.18 d(7.8)	5.54 d(7.8)	5.30 d(7.8)
2″	3.75 m	3.76 m	3.82 dd(7.8, 9.1)	3.71 dd(9.2, 7.8)
3″	3.65 m	3.55 m	3.67 t(9.1)	3.55 dd(9.2, 9.0)
4″	3.57 m	3.44 m	3.53 dd(9.1, 9.7)	3.41 dd(9.7, 9.0)
5″	3.75 m	3.80 m	4.03 m	3.65 ddd(9.7, 6.8, 2.3)
6″	3.98 m	4.53 m	4.71 dd(12.0, 9.0)	3.73 dd(12, 6.8)
	4.04 m	4.20 m	4.46 dd(12.0, 2.6)	3.98 dd(12, 2.3)
1‴	5.21 d(7.8)	5.45 d(7.8)	5.28 d(7.7)	5.21 d(7.6)
2‴	3.75 m	3.78 m	3.86 dd(7.7, 9.1)	3.74 dd(8.8, 7.6)
3‴	3.65 m	3.61 m	3.67 t(9.1)	3.61 dd(8.8, 8.8)
4‴	3.54 m	3.48 m	3.57 dd(5.7, 9.6)	3.53 dd(9.9, 8.8)
5‴	3.83 m	3.96 m	3.71 ddd(2.1, 6.0, 9.6)	3.85 ddd(9.9, 7.1, 2.3)
6‴	4.35 m	4.51 m	4.14 dd(12.0, 2.1)	4.34 dd(12, 7.1)
	4.56 m	4.43 m	3.91 dd(12.0, 6.0)	4.58 dd(12, 2.3)
2⁗	7.40 d(7.9)	7.22 d(8.6)	7.30 d(8.7)	6.98 d(2.0)
3⁗	6.79 d(7.9)	6.70 d(8.6)	6.47 d(8.7)	
5⁗	6.79 d(7.9)	6.70 d(8.6)	6.47 d(8.7)	6.74 d(8.3)
6⁗	7.40 d(7.9)	7.22 d(8.6)	7.30 d(8.7)	6.88 dd(8.3, 2.0)
7⁗	7.55 d(16)	7.36 d(15.9)	6.62 d(12.7)	7.46 d(16)
8⁗	6.31 d(16)	6.25 d (15.9)	5.83 d(12.7)	6.23 d(16)
Mal		3.38 s		

Table 4-7-9: ^{1}H NMR spectroscopic data of anthocyanidins **4-7-21**, **4-7-25**, and **4-7-27**.

H	4-7-21	4-7-25	4-7-27
4	9.07 br s	8.97 br s	8.97 s
6	7.00 d(1.8)	6.85 d(1.8)	6.90 s
8	7.06 d(1.8)	7.28 d(1.8)	

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Table 4-7-9 (continued)

H	4-7-21	4-7-25	4-7-27
2′	7.83 br s	8.00 br s	8.24 br d(2.1)
3′		3.98 br s(OMe)	
5′			7.08 d(8.6)
6′	7.83 br s	7.86 d(2.4)	8.28 dd(2.1, 8.6)
1″	5.31 d(7.8)	5.40 d(7.8)	5.37 d(8.0)
2″	3.71 t(9.6)	3.71 t(9.0)	3.58 t(8.3)
3″	3.54 t(9.6)	3.59 t(9.0)	3.41 t(9.5)
4″	3.39 t(9.0)	3.47 t(9.6)	3.31 t(9.5)
5″	3.64 m	3.60 m	3.55 m
6″	3.95 m, 3.70 dd(6.4, 12.7)	3.95 m, 3.72 m	3.70~3.90
1‴	5.16 d(7.8)	5.20 d(7.8)	4.83 d(9.5)
2‴	3.70 t(9.0)	3.56 t(9.0)	3.83 m
3‴	3.57 t(9.6)	3.54 t(9.0)	3.41 m
4‴	3.47 t(9.6)	3.41 t(9.0)	3.50~3.70
5‴	3.80 m	3.63 m	3.50~3.70
6‴	4.55 dd(6.6, 12.6)	3.98 m	3.50~3.90
	4.34 dd(6.6, 12.6)	3.73 m	3.70~3.90
Mal	3.39~3.36		

Table 4-7-10: ^{1}H NMR spectroscopic data of anthocyanidins **4-7-26**, **4-7-28,** and **4-7-29**.

H	4-7-26	4-7-28	4-7-29
4	8.91 s	8.83 s	8.77 s
6	6.92 s	6.91 d(2)	6.89 d(2)
8		7.04 d(2)	6.99 d(2)
2′	8.19 br d(2.2)	8.54 d(9)	7.96 d(2)
3′		7.02 d(9)	
5′	7.15 d(8.6)	7.02 d(9)	6.96 d(9)
6′	8.27 dd(2.2, 8.6)	8.54 d(9)	8.18 dd(2, 9)
1″	5.40 d(9.0)	5.62 d(7.6)	5.63 d(7.7)
2″	3.61 t(8.5)	3.70 t(10)	3.75 t(9)
3″	3.41~3.46	3.60 t(9)	3.63 t(9)
4″	3.32 t(9.5)	3.36 t(9)	3.37 t(9)
5″	3.81 m	3.93 ddd(3, 9, 10)	3.93 ddd(3, 9, 10)
6″	4.18 dd(7.5, 10.7)	4.31 dd(10, 12)	4.30 dd(10, 12)
	4.52 br d(10.7)	4.32 dd(3, 12)	4.32 dd(3, 12)
1‴	4.89 d(10.1)	5.36 d(7.6)	5.37 d(7.6)
2‴	3.93 t(9.5)	3.69 t(10)	3.69 dd(8, 10)
3‴	3.41~3.46	3.60 t(9)	3.61 t(9)
4‴	3.41~3.46	3.78 t(9)	3.78 t(9)
5‴	3.70 m	3.76 dd(3, 9)	3.75 br t(9)
6‴	4.33 dd(5.3, 12.0)	4.27 d(12)	4.27 d(12)
	4.63 br d(12.0)	5.03 dd(3, 12)	5.05 dd(3, 12)

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Table 4-7-10 (continued)

H	4-7-26	4-7-28	4-7-29
2′′′′	6.90 s	4.42 dd(3, 11)	4.42 dd(3, 11)
3′′′′		2.80 dd(11, 17)	2.80 dd(11, 17)
		2.50 dd(3, 17)	2.50 dd(3, 17)
6′′′′	6.90 s		
7′′′′	7.54 d(15.6)		
8′′′′	6.47 d(15.6)		
Mal	3.41~3.46		

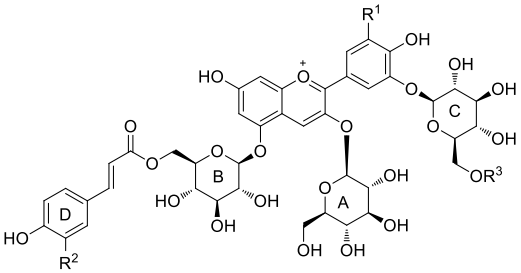
Table 4-7-11: Cos, MFs, and TSs of anthocyanidins **4-7-30**~**4-7-51**.

No.	Compounds	MFs	Test solvents	References
4-7-30	albireodelphin A	$C_{42}H_{47}O_{25}$	CD_3OD-CF_3COOD (9:1)	[468]
4-7-31	albireodelphin B	$C_{42}H_{47}O_{24}$	CD_3OD-CF_3COOD (9:1)	[468]
4-7-32	albireodelphin D	$C_{51}H_{53}O_{27}$	CD_3OD-CF_3COOD (9:1)	[468]
4-7-33	gentiocyanin B	$C_{51}H_{53}O_{27}$	CD_3OD-CF_3COOD (9:1)	[472]
4-7-34	pelargonidin 3-*O*-[2-*O*-(6-*O*-(*trans*-3-*O*-(*β*-glucopyranosyl)caffeoyl)-*β*-glucopyranosyl)-*β*-glucopyranoside]	$C_{42}H_{47}O_{23}$	DMSO-d_6-CF_3COOD (9:1)	[475]
4-7-35	malvidin 3-*O*-[6-*O*-(4-*O*-(4-*O*-*trans*-(6-*O*-(*trans*-caffeoyl)-*β*-D-glucopyranosyl)-*p*-coumaroyl)-*α*-L-rhamnopyranosyl)-*β*-D-glucopyranoside]	$C_{53}H_{57}O_{26}$	DMSO-d_6-DCl (9:1)	[465]
4-7-36	3-*O*-(2-*O*-D-*β*-xylopyranosyl)-*β*-D-glucopyranosyl-7-*O*-*β*-D-glucopyranosylcyanidin	$C_{32}H_{39}O_{20}$	CF_3COOD-CD_3OD (5:95)	[476]
4-7-37	cyanidin 3-*O*-*β*-rutinoside-7-*O*-*β*-D-gluco-side	$C_{33}H_{41}O_{20}$	CD_3OD-CF_3COOD (9:1)	[463]
4-7-38	cyanidin 3-*O*-(2-*O*-(6-*O*-(*E*)-*p*-coumaroyl-*β*-D-glucopyranosyl)-*β*-D-glucopyranoside)-5-*O*-*β*-D-glucopyranoside	$C_{42}H_{47}O_{23}$	DMSO-d_6-CF_3COOD (9:1)	[477]
4-7-39	peonidin 3-*O*-[2-*O*-(6-*O*-(*trans*-caffeoyl)-*β*-D-glucopyranosyl)-*β*-D-glucopyranoside]-5-*O*-*β*-D-glucopyranoside	$C_{43}H_{49}O_{24}$	DMSO-d_6-CF_3COOD (9:1)	[461]
4-7-40	3-*O*-(6-*O*-(*E*)-*p*-coumaroyl-2-*O*-*β*-D-glucopyranosyl-*β*-D-glucopyranosyl)-5-*O*-(6-*O*-malonyl-*β*-D-glucopyranosyl) pelargonidin	$C_{45}H_{49}O_{25}$	CD_3OD-CF_3COOD (95:5)	[478]
4-7-41	3-*O*-(6-*O*-(*E*)-feruloyl-2-*O*-*β*-D-glucopyranosyl-*β*-D-glucopyranosyl)-5-*O*-(6-*O*-malonyl-*β*-D-glucopyranosyl)pelargonidin	$C_{46}H_{51}O_{26}$	CD_3OD-CF_3COOD (95:5)	[478]

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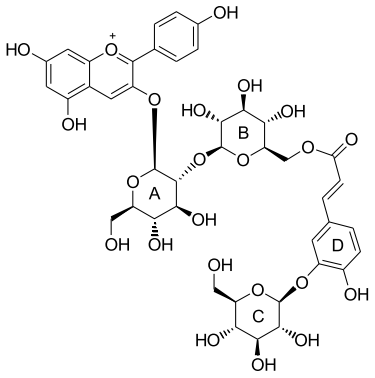
Table 4-7-11 (continued)

No.	Compounds	MFs	Test solvents	References
4-7-42	3-*O*-{2-*O*-(6-*O*-*E*-feruloyl-*β*-D-glucopyranosyl)-(6-*O*-*E*-*p*-coumaroyl-*β*-D-glucopyranosyl)}-5-*O*-(6-*O*-malonyl-*β*-D-glucopyranosyl)-delphinidin	$C_{55}H_{57}O_{30}$	DMSO-d_6-CF_3COOD (9:1)	[479]
4-7-43	3-*O*-{2-*O*-(6-*O*-*E*-feruloyl-*β*-D-glucopyranosyl)-(6-*O*-*E*-feruloyl-*β*-D-glucopyranosyl)}-5-*O*-(6-*O*-malonyl-*β*-D-glucopyranosyl)delphinidin	$C_{56}H_{59}O_{31}$	DMSO-d_6-CF_3COOD (9:1)	[479]
4-7-44	malvidin-3-*O*-(6-*O*-*α*-rhamnopyranosyl-*β*-glucopyranoside)-5-*O*-*β*-glucopyranoside	$C_{35}H_{45}O_{21}$	CD_3OD-CF_3COOD (95:5)	[471]
4-7-45	malvidin-3-*O*-(6-*O*-(4-*O*-malonyl-*α*-rhamnopyranosyl)-*β*-glucopyranoside)-5-*O*-*β*-glucopyran-oside	$C_{38}H_{47}O_{24}$	CD_3OD-CF_3COOD (95:5)	[471]
4-7-46	malvidin-3-*O*-(6-*O*-*α*-rhamnopyranosyl-*β*-glucopyranoside)-5-*O*-(6-*O*-malonyl-*β*-glucopyranoside)	$C_{38}H_{47}O_{24}$	CD_3OD-CF_3COOD (95:5)	[471]
4-7-47	cyanidin-3-*O*-[2-*O*-(*β*-D-xylopyranosyl)-6-*O*-(*trans*-*p*-coumaroyl)-*β*-D-glucopyranoside]-5-*O*-[*β*-D-glucopyranoside]	$C_{41}H_{45}O_{22}$	DMSO-d_6-CF_3COOD (9:1)	[480]
4-7-48	cyanidin-3-*O*-[2-*O*-(*β*-D-xylopyranosyl)-6-*O*-(*cis*-*p*-coumaroyl)-*β*-D-glucopyranoside]-5-*O*-[6-*O*-(malonyl)-*β*-D-glucopyranoside]	$C_{44}H_{47}O_{25}$	DMSO-d_6-CF_3COOD (9:1)	[480]
4-7-49	cyanidin-3-*O*-[2-*O*-(*β*-D-xylopyranosyl)-6-*O*-(*trans*-feruloyl)-*β*-D-glucopyranoside]-5-*O*-[6-*O*-(malonyl)-*β*-D-glucopyranoside]	$C_{45}H_{49}O_{26}$	DMSO-d_6-CF_3COOD (9:1)	[480]
4-7-50	cyanidin-3-*O*-[2-*O*-(2-*O*-(*trans*-caffeoyl)-*β*-D-xylopyranosyl)-6-*O*-(*trans*-*p*-coumaroyl)-*β*-D-glucopyranoside]-5-*O*-(*β*-D-glucopyranoside)	$C_{50}H_{51}O_{25}$	DMSO-d_6-CF_3COOD (9:1)	[480]
4-7-51	cyanidin-3-*O*-[2-*O*-(2-*O*-(*trans*-feruloyl)-*β*-D-xylopyranosyl)-6-*O*-(*trans*-*p*-coumaroyl)-*β*-D-glucopyranoside]-5-*O*-(*β*-D-glucopyranoside)	$C_{51}H_{53}O_{25}$	DMSO-d_6-CF_3COOD (9:1)	[480]

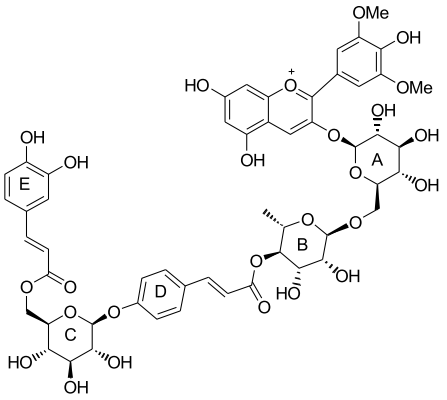


	R^1	R^2	R^3
4-7-30	OH	OH	H
4-7-31	OH	H	H
4-7-32	OH	OH	Coum (*E*)
4-7-33	H	OH	Caff (*E*)

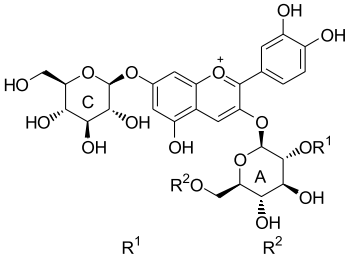
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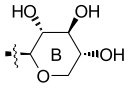
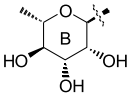


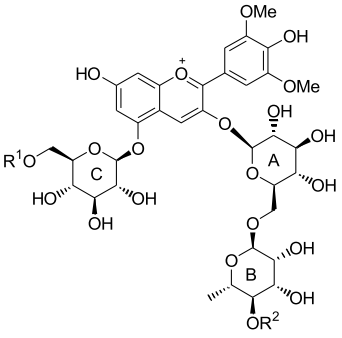
4-7-34



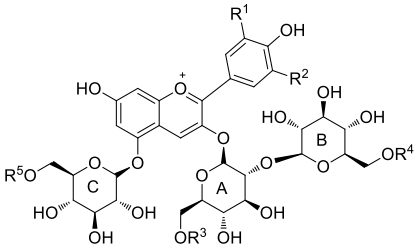
4-7-35



	R^1	R^2
4-7-36		H
4-7-37	H	

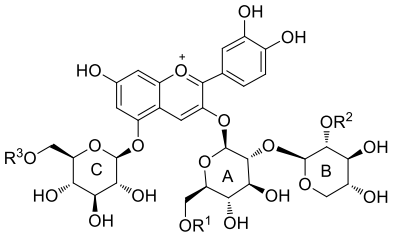


	R^1	R^2
4-7-44	H	H
4-7-45	H	Mal
4-7-46	Mal	H



	R^1	R^2	R^3	R^4	R^5
4-7-38	OH	H	H	*trans*-Coum	H
4-7-39	OMe	H	H	*trans*-Caff	H
4-7-40	H	H	*trans*-Coum	H	Mal
4-7-41	H	H	*trans*-Fer	H	Mal
4-7-42	OH	OH	*trans*-Coum	*trans*-Fer	Mal
4-7-43	OH	OH	*trans*-Fer	*trans*-Fer	Mal

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	R^1	R^2	R^3
4-7-47	*trans*-Coum	H	H
4-7-48	*cis*-Coum	H	Mal
4-7-49	*trans*-Fer	H	Mal
4-7-50	*trans*-Coum	*trans*-Caff	H
4-7-51	*trans*-Coum	*trans*-Fer	H

Table 4-7-12: ^{1}H NMR spectroscopic data of anthocyanidins **4-7-30**, **4-7-31**, and **4-7-34**.

H	4-7-30	4-7-31	4-7-34
Aglycons			
4	9.10 br s	9.12 s	9.03 s
6	7.02 br s	7.04 d(1.9)	6.71 d(2.1)
8	7.09 br s	7.10 d(1.9)	6.90 d(2.1)
2′	8.05 br s	8.05 d(2.3)	8.59 d(9.2)
3′			7.10 d(9.2)
5′			7.10 d(9.2)
6′	8.01 br s	7.99 d(2.3)	8.59 d(9.2)
Sugar A			
1	5.29 br d(7.8)	5.31 d(7.9)	5.46 d(7.6)
2	3.72~3.77 m	3.72 dd(9.2, 7.9)	3.88 t(8.5)
3	3.62~3.66 m	3.53 dd(9.7, 9.3)	3.65 t(8.9)
4	3.43 br dd(9.8, 9.5)	3.42 dd(9.7, 9.3)	3.35 m
5	3.50~3.60 m	3.65 ddd(9.7, 6.8, 2.1)	3.50 m
6	3.72~3.77 m	3.72~3.73 m	3.52 dd(11.3, 6.1)
	3.98 br dd(12.0, 4.6)	3.99 dd(12.0, 2.1)	3.71 br d(11.3)
Sugar B			
1	5.23 br d(7.0)	5.23 d(7.5)	4.85 d(7.9)
2	3.73~3.78 m	3.74 dd(8.8, 7.5)	3.12 t(8.0)
3	3.62~3.66 m	3.61 dd(9.0, 8.0)	3.30 m
4	3.58~3.64 m	3.53 dd(9.7, 9.0)	3.39 m
5	3.85 br dd(8.1, 6.7)	3.86 ddd(9.7, 7.2, 2.3)	3.34 m
6	4.35 br dd(12.0, 7.0)	4.33 dd(12.0, 7.2)	4.06 dd(11.6, 4.6)
	4.58 br d(12.0)	4.59 dd(12.0, 2.3)	4.14 br d(11.6)
Sugar C			
1	5.03 br d(6.4)	5.02 d(7.6)	4.83 d(7.3)
2	3.50~3.60 m	3.57 m	3.36 m
3	3.50~3.60 m	3.55 m	3.34 m
4	3.41 br dd(9.2, 8.0)	3.39~3.43 m	3.21 t(9.6)
5	3.74~3.77 m	3.58~3.64 m	3.43 ddd(9.6, 5.2, 1.8)
6	3.73~3.78 m	3.77 dd(12.0, 6.4)	3.49 dd(11.6, 5.2)
	3.98 br dd(12.0, 4.6)	3.99 dd(12.0, 2.1)	3.76 dd(11.6, 1.8)

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Table 4-7-12 (continued)

H	4-7-30	4-7-31	4-7-34
Acid D			
2″	6.95 br s	7.39 d(8.7)	7.35 d(1.8)
3″		6.79 d(8.7)	
5″	6.73 br d(8.0)	6.79 d(8.7)	6.82 d(8.6)
6″	6.85 br d(8.0)	7.39 d(8.7)	7.01 dd(1.8, 8.6)
7″	7.42 br d(16)	7.53 d(16)	7.27 d(15.9)
8″	6.17 br d(16)	6.29 d(16)	6.11 d(15.9)

Table 4-7-13: ^{1}H NMR spectroscopic data of anthocyanidins **4-7-32**, **4-7-33**, and **4-7-35**.

H	4-7-32	4-7-33	4-7-35
Aglycons			
4	8.80 s	8.78 s	8.87 s
6	6.97 d(1.5)	6.96 d(1.9)	6.94 br s
8	6.80 d(1.5)	6.85 d(1.8)	7.08 br s
2′	7.83 s	8.02 d(1.9)	7.89 s
3′			3.88 s(OMe)
5′		7.19 d(8.9)	3.88 s(OMe)
6′	7.83 s	8.45 dd(8.1, 1.8)	7.89 s
Sugar A			
1	5.03 d(7.8)	5.01 d(7.8)	5.42 d(7.0)
2	3.73 m	3.68 dd(9.2, 7.8)	3.44 t(8.8)
3	3.57 m	3.57 dd(9.2, 9.1)	3.42 t(8.8)
4	3.46 m	3.43 dd(9.7, 9.1)	3.20 t(9.2)
5	3.66 m	3.62~3.68 m	3.73 m
6	3.82 m	3.79 dd(12, 7.3)	3.45 m
	4.04 dd(12, 1.7)	4.06 dd(12, 2.3)	3.87 m
Sugar B			
1	5.21 d(7.4)	5.22 d(7.2)	4.56 s
2	3.77 m	3.79 dd(8.4, 7.2)	3.66 br s
3	3.64 m	3.61~3.64 m	3.67 m
4	3.57 m	3.60 dd(9.7, 8.9)	4.83 t(9.7)
5	3.87 m	3.87 ddd(9.7, 6.7, 2.2)	3.61 dd(6.2, 9.7)
6	4.41 dd(12, 6.4)	4.37 dd(12, 6.7)	0.90 d(6.0)
	4.66 dd(12, 2.1)	4.64 dd(12, 2.2)	
Sugar C			
1	5.21 d(7.1)	5.23~5.24 m	5.00 d(7.7)
2	3.65 m	3.63~3.67 m	3.27 t(8.4)
3	3.65 m	3.63~3.67 m	3.33 t(8.8)
4	3.38 m	3.37~5.41 m	3.24 t(9.2)
5	3.83 m	3.87 ddd(9.5, 9.5, 2.1)	3.70 m
6	4.26 dd(12, 9.3)	4.35 dd(12, 9.5)	4.17 dd(6.2, 10.9)
	4.75 dd(12, 2.2)	4.70 dd(12, 2.1)	4.36 br d(10.9)
Acid D			
2″	6.97 d(2.0)	6.94 d(2.0)	7.54 d(8.4)
3″			7.02 d(8.4)
5″	6.73 d(8.3)	6.70 d(8.2)	7.02 d(8.4)

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Table 4-7-13 (continued)

H	4-7-32	4-7-33	4-7-35
6″	6.86 dd(8.3, 2.0)	6.84 dd(8.1, 2.0)	7.54 d(8.4)
7″	7.46 d(16)	7.43 d(16)	7.50 d(16.1)
8″	6.24 d(16)	6.20 d(16)	6.28 d(16.1)
Acid E			
2″	6.84 d(8.5)	6.30 d(2.2)	7.05 d(1.8)
3″	6.53 d(8.5)		
5″	6.53 d(8.5)	6.53 d(8.7)	6.75 d(8.4)
6″	6.84 d(8.5)	6.30 dd(7.9, 2.1)	6.92 dd(1.8, 8.4)
7″	7.17 d(16)	7.02 d(16)	7.41 d(16.1)
8″	5.96 d(16)	5.87 d(16)	6.21 d(16.1)

Table 4-7-14: ^{1}H NMR spectroscopic data of anthocyanidins **4-7-36** and **4-7-37**.

H	4-7-36	4-7-37	H	4-7-36	4-7-37
Aglycons			Sugar B		
4	8.93 br s	8.87 br s	1	4.75 d(7.5)	4.66 br s
6	6.84 br s	6.87 d(2.2)	2	3.14 dd(9.0, 7.5)	3.78 m
8	7.26 d(2.3)	7.21 d(2.2)	3	3.29 t(9.0)	3.61 dd(3.6, 10.2)
2′	8.09 d(2.3)	8.02 d(2.2)	4	3.38 ddd(11.0, 9.0, 5.0)	3.30 t(9.0)
5′	7.02 d(8.6)	6.97 d(8.8)	5	3.04 br t(11.0)	3.53 m
				3.66 dd(11.0, 5.0)	
6′	8.38 dd(8.6, 2.3)	8.30 dd(3.0, 9.0)	6		1.15 d(6.6)
Sugar A			Sugar C		
1	5.50 d(7.5)	5.34 d(8.0)	1	5.19 d(7.5)	5.22 d(7.3)
2	3.97 dd(9.0, 7.5)	3.70 t(9.0)	2	3.55 dd(9.0, 7.5)	3.60 t(9.6)
3	3.78 t(9.0)	3.59 t(8.4)	3	3.53 t(9.0)	3.57 t(9.0)
4	3.48 t(9.0)	3.43 t(8.4)	4	3.40 t(9.0)	3.44 t(8.4)
5	3.60 ddd(9.0, 3.0, 2.0)	3.60 m	5	3.61 ddd(9.0, 5.0, 1.5)	3.66 m
6	3.7 dd(12.0, 3.0)	3.75 m	6	3.71 dd(12.0, 5.0)	3.76 dd(4.8, 12.0)
	3.91 dd(12.0, 2.0)	4.07 m		3.94 dd(12.0, 1.5)	4.00 m

Table 4-7-15: ^{1}H NMR spectroscopic data of anthocyanidins **4-7-38**~**4-7-41**.

H	4-7-38	4-7-39	4-7-40	4-7-41
Aglycons				
4	8.94 s	9.03 s	8.97 s	8.99 s
6	7.04 d(1.9)	7.00 d(1.8)	6.97 d(2.0)	6.98 d(2.0)
8	6.98 d(1.9)	7.19 d(1.8)	6.98 d(2.0)	6.95 d(2.0)
2′	8.06 d(2.2)	8.03 d(2.1)	8.57 d(9.0)	8.58 d(9.0)
3′		3.95 s(OMe)	7.08 d(9.0)	7.08 d(9.0)
5′	7.13 d(8.8)	7.15 d(8.5)	7.08 d(9.0)	7.08 d(9.0)
6′	8.32 dd(2.2, 8.8)	8.45 dd(2.1, 8.5)	8.57 d(9.0)	8.58 d(9.0)
Sugar A				
1	5.57 d(7.3)	5.56 d(7.3)	5.60 d(7.5)	5.59 d(7.5)
2	4.01 t(8.2)	3.92 t(8.6)	4.10 dd(9.0, 7.5)	4.11 dd(9.0, 7.5)

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Table 4-7-15 (continued)

H	4-7-38	4-7-39	4-7-40	4-7-41
3	3.93 t(8.8)	3.69 t(8.9)	3.83 t(9.0)	3.83 t(9.0)
4	3.39 t(8.8)	3.56~3.51	3.60 t(9.0)	3.64 t(9.0)
5	3.57 m	3.56~3.51	3.93 ddd(9.0, 8.0, 2.0)	3.94 ddd(9.0, 7.5, 2.5)
6	3.75 m	3.60 m	4.43 dd(12.0, 8.0)	4.37 dd(12.0, 7.5)
	3.75 br d(12.0)	3.74 m	4.52 dd(12.0, 2.0)	4.59 dd(12.0, 2.5)
Sugar B				
1	4.85 d(7.7)	4.84 d(7.9)	4.76 d(7.5)	4.76 d(7.5)
2	3.13 t(8.4)	3.32 t(9.4)	3.29 dd(8.5, 7.5)	3.21 dd(9.0, 7.5)
3	3.28 t(8.1)	3.12 t(7.9)	3.22 t(8.5)	3.31 t(9.0)
4	3.26 t(8.8)	3.27 m	3.21 t(8.5)	3.23 t(9.0)
5	3.18 m	3.27 m	2.99 ddd(8.5, 5.5, 2.0)	3.01 ddd(9.0, 6.0, 3.0)
6	3.98 m	4.04 dd(4.0, 11.0)	3.46 dd(12.0, 5.5)	3.46 dd(12.5, 6.0)
		4.11 d(11.0)	3.54 dd(12.0, 2.0)	3.56 dd(12.5, 3.0)
Sugar C				
1	5.10 d(7.7)	5.16 d(7.6)	5.20 d(7.5)	5.18 d(7.5)
2	3.52 t(8.4)	3.52 m	3.78 dd(9.0, 7.5)	3.77 dd(9.0, 7.5)
3	3.42 t(9.2)	3.43 t(8.9)	3.57 t(9.0)	3.55 t(9.0)
4	3.32 t(9.2)	3.53 m	3.46 t(9.0)	3.43 t(9.0)
5	3.49 m	3.49~3.56	3.81 ddd(9.0, 6.0, 2.0)	3.76 ddd(9.0, 6.0, 2.0)
6	3.60 dd(5.9, 10.3)	3.57 m	4.25 dd(12.0, 6.0)	4.12 dd(12.0, 6.0)
	3.79 br d(10.3)	3.79 d(10.1)	4.54 dd(12.0, 2.0)	4.54 dd(12.0, 2.0)
Acid D				
2	7.35 d(8.8)	6.92 d(2.1)	7.20 d(8.5)	6.87 d(2.0)
3	6.80 d(8.8)		6.71 d(8.5)	3.79 s(OMe)
5	6.80 d(8.8)	6.77 d(8.2)	6.71 d(8.5)	6.73 d(8.0)
6	7.35 d(8.8)	6.82 dd(2.1, 8.2)	7.20 d(8.5)	6.83 dd(8.0, 2.0)
7	7.28 d(15.8)	7.23 d(15.9)	7.33 d(16.0)	7.35 d(16.0)
8	6.06 d(15.8)	5.96 d(15.9)	6.18 d(16.0)	6.18 d(16.0)

Table 4-7-16: ^{1}H NMR spectroscopic data of anthocyanidins **4-7-42**, **4-7-43**, **4-7-50**, and **4-7-51**.

H	4-7-42	4-7-43	4-7-50	4-7-51
Aglycons				
4	8.71 s	8.74 s	8.70 s	8.73 s
6	6.93 s	6.92 s	6.97 d(1.8)	6.99 d(1.5)
8	6.92 s	6.91 s	6.99 d(1.8)	6.99 d(1.5)
2′	7.79 s	7.79 s	8.00 d(2.5)	8.02 d(2.4)
5′			7.06 d(8.9)	7.08 d(8.9)
6′	7.79 s	7.79 s	8.48 dd(2.5, 8.9)	8.48 dd(2.4, 8.9)
Sugar A				
1	5.76 d(7)	5.76 d(7)	5.69 d(8.0)	5.71 d(7.6)
2	4.15 t(8)	4.15 t(7)	4.01 t(8.3)	4.04 t(8.2)
3	3.76 t(9)	3.75 t(8)	3.60 t(8.6)	3.64 t(8.8)
4	3.48 t(9)	3.51 t(8)	3.41 m	3.41 t(9.2)
5	4.10 m	3.98 m	3.94 m	3.96 m
6	4.29 m	4.46 m	4.31 m	4.30 dd(7.1, 11.0)
	4.43 br d(10)	4.27 br d(11)	4.31 m	4.35 d(11.0)

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Table 4-7-16 (continued)

H	4-7-42	4-7-43	4-7-50	4-7-51
Sugar B				
1	4.78 d(8)	4.78 d(8)	5.13 d(8.0)	5.15 d(8.3)
2	3.12 t(8)	3.12 t(8)	4.64 t(8.9)	4.68 t(8.6)
3	3.22 m	2.93 m	3.39 m	3.45 m
4	2.99 m	2.89 m	3.26 t(9.2)	3.29 t(8.9)
5	3.22 m	2.98 m	3.89 m, 3.21 t(9.8)	3.92 m, 3.22 m
6	3.63 br d(10)	3.63 m		
	3.81 br d(10)	3.87 m		
Sugar C				
1	5.04 d(8)	5.03 d(8)	5.08 d(7.4)	5.09 d(7.6)
2	3.56 t(8)	3.54 t(8)	3.52 m	3.55 m
3	3.39 t(9)	3.38 t(9)	3.36~3.54	3.35~3.55
4	3.28 t(9)	3.27 t(9)	3.36~3.54	3.35~3.55
5	3.73 m	3.70 m	3.36~3.54	3.35~3.55
6	4.10 dd(6, 11)	3.98 m	3.36~3.54	3.35~3.55
	4.42 br d(10)	4.41 br d(11)	3.89 m	3.82 m
Acid D				
2	7.31 d(8)	7.14 s	7.39 d(8.9)	7.39 d(8.9)
3	6.72 d(8)	3.81 s(OMe)	6.78 d(8.9)	6.79 d(8.9)
5	6.72 d(8)	6.74 d(9)	6.78 d(8.9)	6.79 d(8.9)
6	7.31 d(8)	6.95 d(9)	7.39 d(8.9)	7.39 d(8.9)
7	7.16 d(16)	7.16 d(16)	7.51 d(15.9)	7.60 d(15.9)
8	6.13 d(16)	6.14 d(16)	6.36 d(15.9)	6.52 d(15.9)
Acid E				
2	7.13 s	7.06 s	7.11 d(1.8)	7.32 d(1.6)
3	3.81 s(OMe)	3.75 s(OMe)		3.87 s(OMe)
5	6.91 d(8)	6.68 d(9)	6.82 d(8.3)	6.86 d(8.2)
6	6.79 d(8)	6.92 d(9)	7.03 dd(1.8, 8.3)	7.16 dd(1.6, 8.2)
7	7.35 d(16)	7.40 d(16)	7.35 d(15.9)	7.35 d(15.9)
8	6.13 d(16)	6.31 d(16)	6.27 d(15.9)	6.27 d(15.9)
Malonyl	3.38 s	3.39 s		

Table 4-7-17: ^{1}H NMR spectroscopic data of anthocyanidins **4-7-44**~**4-7-46**.

H	4-7-44	4-7-45	4-7-46
Aglycons			
4	8.96 s	9.05 s	9.11 d(0.8)
6	7.08 d(1.9)	7.11 d(1.8)	7.11 d(2.0)
8	7.13 d(1.9)	7.21 d(1.8)	7.25 dd(2.0, 0.2)
2′	7.96 s	8.07 s	8.13 s
3′	4.05 s(OMe)	4.09 s(OMe)	4.11 s(OMe)
5′	4.05 s(OMe)	4.09 s(OMe)	4.11 s(OMe)
6′	7.96 s	8.07 s	8.13 s
Sugar A			
1	5.60 d(7.7)	5.60 d(7.9)	5.52 d(7.7)
2	3.77 m	3.78 dd(7.9, 9.2)	3.76 dd(7.7, 9.2)
3	3.69 m	3.68 t(9.2)	3.66 t(9.2)

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Table 4-7-17 (continued)

H	4-7-44	4-7-45	4-7-46
4	3.52 t(9.4)	3.53 dd(9.2, 8.8)	3.53 dd(9.2, 9.8)
5	3.90 ddd(2.1, 6.5, 9.0)	3.90 ddd(2.2, 6.6, 8.8)	3.85 ddd(1.8, 5.7, 9.8)
6	4.12 dd(12.0, 2.1)	4.10 dd(11.9, 2.2)	4.09 dd(11.4, 1.8)
	3.77 m	3.76 m	3.76 m
Sugar B			
1	4.74 d(1.5)	4.76 d(1.5)	4.74 d(1.5)
2	3.79 m	3.84 dd(3.5, 1.5)	3.81 dd(3.4, 1.5)
3	3.67 dd(3.5, 9.5)	3.86 dd(3.5, 9.7)	3.67 dd(3.4, 9.6)
4	3.36 t(9.5)	4.93 t(9.7)	3.36 t(9.6)
5	3.60 dd(9.5, 6.3)	3.76 m	3.60 dd(9.6, 6.4)
6	1.22 d(6.3)	1.12 d(6.4)	1.19 d(6.4)
Sugar C			
1	5.30 d(7.7)	5.29 d(7.9)	5.31 d(7.7)
2	3.79 m	3.77 m	3.79 dd(7.7, 9.0)
3	3.68 m	3.66 m	3.68 t(9.0)
4	3.68 m	3.65 m	3.63 dd(9.0, 9.5)
5	3.71 m	3.70 ddd(2.0, 5.3, ov)	3.93 ddd(2.1, 7.0, 9.5)
6	4.06 dd(2.1)	4.05 dd(2.0, 12.1)	4.66 dd(2.1, 12.2)
	3.95 dd(12.3, 5.0)	3.92 dd(12.1, 5.3)	4.51 dd(7.0, 12.2)
Mal		3.44 s	3.44 s

Table 4-7-18: ^{1}H NMR spectroscopic data of anthocyanidins **4-7-47**~**4-7-49**.

H	4-7-47	4-7-48	4-7-49
Aglycons			
4	8.70 s	8.59 s	8.79 s
6	6.93 d(1.6)	6.90 br s	6.97 br s
8	7.00 br s	6.90 br s	7.05 br s
2′	7.99 d(2.2)	8.02 d(2.5)	8.04 d(2.2)
5′	7.01 d(8.9)	7.07 d(8.9)	7.07 d(8.9)
6′	8.32 dd(2.2, 8.9)	8.32 dd(2.5, 8.9)	8.39 dd(2.2, 8.9)
Sugar A			
1	5.66 d(7.7)	5.71 d(7.6)	5.70 d(7.6)
2	3.96 t(8.3)	4.04 m	4.02 m
3	3.71 t(8.9)	3.75 m	3.76 m
4	3.42 t(9.2)	3.36 m	3.49 t(9.2)
5	3.95 m	3.97 m	4.02 m
6	4.28 dd(6.1, 10.4)	4.36 m	4.25 dd(6.9, 11.6)
	4.36 d(10.4)	4.49 m	4.47 d(11.6)
Sugar B			
1	4.68 d(8.0)	4.73 d(7.0)	4.74 d(7.7)
2	2.98 t(8.6)	3.01 m	3.03 t(8.3)
3	3.12 t(8.6)	3.16 m	3.17 t(8.9)
4	3.23 m	3.26 m	3.27 m
5	3.51 m, 2.93 t(11.3)	3.54 m, 2.96 m	3.54 m, 2.99 t(11.0)

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Table 4-7-18 (continued)

H	4-7-47	4-7-48	4-7-49
Sugar C			
1	5.30 d(7.7)	5.22 d(7.6)	5.17 d(7.6)
2	3.49 m	3.55 m	3.55 m
3	3.36 t(8.6)	3.30~3.80	3.42 t(8.9)
4	3.23 m	3.30~3.80	3.27 m
5	3.51 m	3.30~3.80	3.79 m
6	3.51 m	3.97 m	3.95 dd(7.3, 11.6)
	3.76 d(10.4)	4.42 m	4.41 d(11.6)
Acid D			
2	7.15 d(8.2)	7.31 d(8.9)	7.06 br s
3	6.73 d(8.5)	6.51 d(8.9)	3.75 s(OMe)
5	6.73 d(8.5)	6.51 d(8.9)	6.75 d(8.3)
6	7.15 d(8.2)	7.31 d(8.9)	6.96 dd(1.3, 8.3)
7	7.32 d(15.9)	6.50 d(15.9)	7.41 d(15.9)
8	6.23 d(15.9)	5.72 d(15.9)	6.32 d(15.9)
Mal		3.53 s	3.40 s

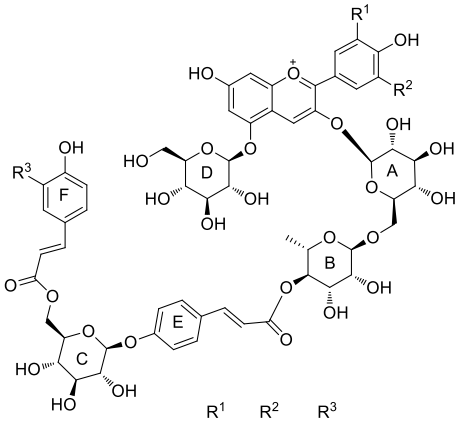
Table 4-7-19: Cos, MFs, and TSs of anthocyanidins **4-7-52**~**4-7-61**.

No.	Compounds	MFs	Test solvents	References
4-7-52	delphinidin 3-*O*-[6-*O*-(4-*O*-(4-*O*-*trans*-(6-*O*-(*trans*-caffeoyl)-*β*-D-glucopyranosyl)-*p*-coumaroyl)-*α*-L-rhamnopyranosyl)-*β*-D-glucopyranoside]-5-*O*-[*β*-D-glucopyranoside]	$C_{57}H_{63}O_{31}$	DMSO-d_6-DCl (9:1)	[481]
4-7-53	malvidin 3-*O*-(6-*O*-(4-*O*-(4-*O*-(6-*O*-caffeoyl-*β*-D-glucopyranosyl)-*p*-coumaroyl)-*α*-L-rhamnosyl)-*β*-D-glucopyranoside)-5-*O*-*β*-D-glucopyranoside	$C_{59}H_{67}O_{31}$	CD_3OD-CF_3COOD (9:1)	[482]
4-7-54	malvidin 3-*O*-(6-*O*-(4-*O*-(4-*O*-(6-*O*-feruloyl-*β*-D-glucopyranosyl)-*E*-*p*-coumaroyl)-*α*-rhamnosyl)-*β*-D-glucopyranoside)-5-*O*-*β*-D-glucopyranoside	$C_{60}H_{69}O_{31}$	CD_3OD-CF_3COOD (9:1)	[483]
4-7-55	malvidin 3-*O*-(6-*O*-(4-*O*-(4-*O*-(6-*O*-*E*-*p*-coumaroyl-*β*-D-glucopyranosyl)-*E*-*p*-coumaroyl)-*α*-rhamnosyl)-*β*-D-glucopyranoside)-5-*O*-*β*-D-glucopyranoside	$C_{59}H_{67}O_{30}$	CD_3OD-CF_3COOD (9:1)	[483]
4-7-56	peonidin 3-caffeoylglucosyl-*p*-coumaroylrutinoside-5-glucoside	$C_{58}H_{65}O_{30}$	DMSO-d_6-DCl (9:1)	[484]
4-7-57	3-*O*-(6-*O*-(*E*)-feruloyl-2-*O*-*β*-D-glucopyranosyl-*β*-D-glucopyranosyl)-5-*O*-(4-*O*-*β*-D-glucopyranosyl-6-*O*-malonyl-*β*-D-glucopyranosyl)pelargonidin	$C_{56}H_{63}O_{32}$	CD_3OD-CF_3COOD (95:5)	[478]
4-7-58	3-*O*-(6-*O*-(*E*)-feruloyl-2-*O*-(6-*O*-(*E*)-feruloyl-*β*-D-glucopyranosyl)-*β*-D-glucopyranosyl)-5-*O*-(4-*O*-*β*-D-glucopyranosyl-*β*-D-glucopyranosyl)pelargonidin	$C_{59}H_{67}O_{31}$	CD_3OD-CF_3COOD (95:5)	[478]

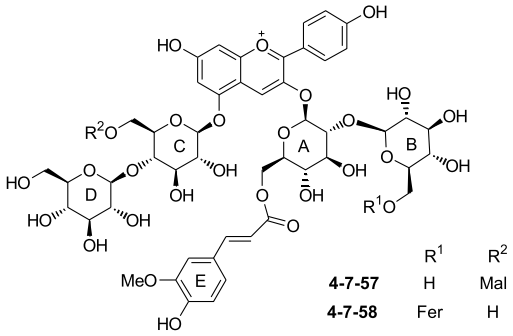
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Table 4-7-19 (continued)

No.	Compounds	MFs	Test solvents	References
4-7-59	cyanidin 3-*O*-[6-*O*-(malonyl)-*β*-D-glucopyranos-ide]-7-*O*-[6-*O*-(*p*-hydroxybenzoyl)-*β*-D-glucopyranoside]-3′-*O*-[6-*O*-(4-(*β*-D-glucopyranosyl)-*p*-hydroxybenzoyl)-*β*-D-glucopyranoside]	$C_{56}H_{61}O_{33}$	DMSO-d_6-CF_3COOD (9:1)	[485]
4-7-60	cyanidin 3-*O*-[2-*O*-(2-*O*-(*trans*-caffeoyl)-*β*-D-gluco-pyranosyl)-*β*-D-galactopyranoside]-7-*O*-[6-*O*-(*trans*-caffeoyl)-*β*-D-glucopyranoside]-3′-*O*-*β*-D-glucurono-pyranoside	$C_{57}H_{61}O_{33}$	DMSO-d_6-CF_3COOD (9:1)	[486]
4-7-61	ternatin B4	$C_{60}H_{65}O_{34}$	DMSO-d_6-CF_3COOD (9:1)	[487]

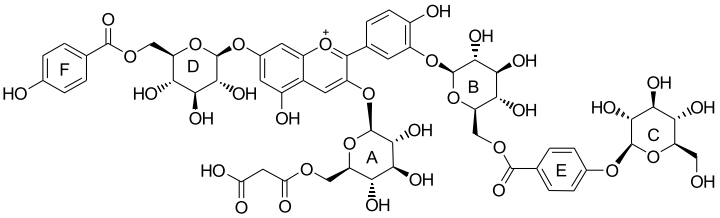


	R^1	R^2	R^3
4-7-52	OH	OH	OH
4-7-53	OMe	OMe	OH
4-7-54	OMe	OMe	OMe
4-7-55	OMe	OMe	H
4-7-56	OMe	H	OH

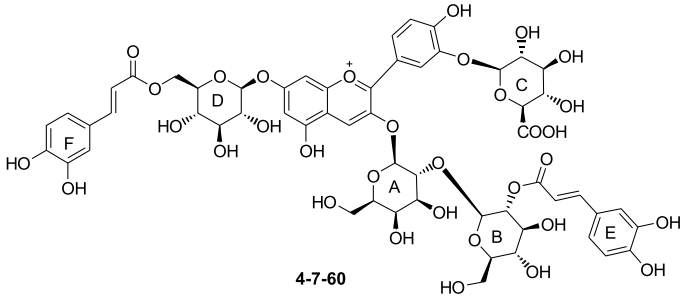


	R^1	R^2
4-7-57	H	Mal
4-7-58	Fer	H

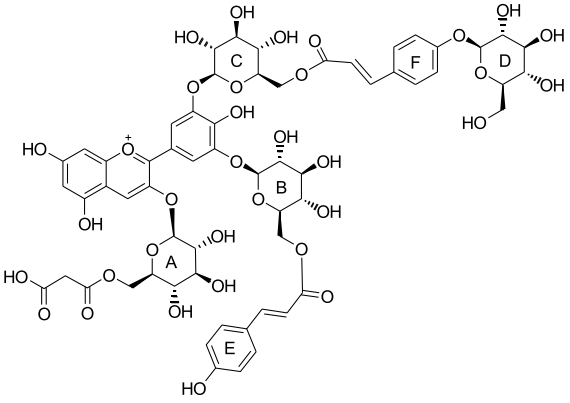
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4-7-59



4-7-60



4-7-61

Table 4-7-20: ^{1}H NMR spectroscopic data of anthocyanidins **4-7-52**~**4-7-56**.

H	4-7-52	4-7-53	4-7-54	4-7-55	4-7-56
Aglycons					
4	8.84 s	8.92 s	8.92 s	8.94 s	9.08 s
6	7.02 br s	7.00 d(2)	7.02 d(2)	7.02 m	7.13 br s
8	7.19 br s	6.96 d(2)	6.98 d(2)	7.02 m	7.35 br s
2′	7.83 s	7.86 s	7.85 s	7.89 s	8.14 br s
3′		3.93 s(OMe)	3.94 s(OMe)	3.93 s(OMe)	3.92 s(OMe)

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Table 4-7-20 (continued)

H	4-7-52	4-7-53	4-7-54	4-7-55	4-7-56
5′		3.93 s(OMe)	3.94 s(OMe)	3.93 s(OMe)	7.25 d(8.8)
6′	7.83 s	7.86 s	7.85 s	7.89 s	8.28 br d(9.1)
Sugar A					
1	5.59 d(7.9)	5.52 d(7.5)	5.57 d(7.7)	5.52 d(7.7)	5.78 d(7.8)
2	3.66 t(8.5)	3.74 t(8)	3.74 t(8)	3.72 t(8)	3.53 t(8.4)
3	3.20~3.60	3.60 t(8)	3.64 t(8)	3.64 t(8)	3.34 t(8.4)
4	3.20~3.60	3.68 t(8)	3.67 t(8)	3.72 t(8)	3.30 t(9.1)
5	3.20~3.60	3.85 m	3.86 m	3.83 m	3.44 t(8.9)
6	3.62 br d(8.9)	4.11 dd(12, 2)	4.11 dd(12, 2)	4.10 dd(12)	3.66 m
	3.84 br d(10.9)	3.85 m	3.84 m	3.86 m	3.83 br d(11.0)
Sugar B					
1	4.61 s	4.78 d(1.3)	4.79 d(1.4)	4.79 d(1.3)	4.63 s
2	3.66 m	3.85 m	3.89 m	3.95 m	3.69 m
3	3.68 m	3.86 m	3.90 m	3.87 m	3.67 m
4	4.81 t(9.6)	4.88 t(9.6)	4.89 t(9.5)	4.91 t(9.4)	4.79 t(9.4)
5	3.63 m	3.83 m	3.85 m	3.92 m	3.62 m
6	0.91 d(6.0)	0.98 d(6)	0.98 d(6.2)	0.98 d(6.0)	0.84 d(5.6)
Sugar C					
1	4.95 d(8.3)	4.91 d(7.5)	4.92 d(7.5)	4.98 d(7.6)	5.07 d(7.6)
2	3.71 t(8.4)	3.52 m	3.53 m	3.56 t(8)	3.33 t(8.3)
3	3.50 m	3.52 m	3.53 m	3.53 m	3.33 t(8.3)
4	3.30 m	3.40 t(9)	3.40 t(8.9)	3.40 t(8.8)	3.42 t(8.9)
5	3.73 m	3.85 t(9)	3.79 t(8.9)	3.80 m	3.79 m
6	4.21 m	4.54 dd(12, 2)	4.55 dd(12, 2)	4.55 dd(11, 1.8)	4.23 dd(11.0, 5.6)
	4.40 br d(11.0)	4.39 dd(12, 9)	4.38 dd(12, 2)	4.32 dd(11)	4.40 br d(11.0)
Sugar D					
1	5.04 d(7.3)	5.20 d(7.5)	5.21 d(7.7)	5.23 d(7.7)	5.15 d(7.5)
2	3.32 t(8.5)	3.68 t(8)	3.68 t(8)	3.70 t(8)	3.50 t(8.3)
3	3.20~3.86	3.60 t(8)	3.60 t(8)	3.60 t(8)	3.44 t(8.9)
4	3.20~3.86	3.53 t(8)	3.55 t(8)	3.55 t(8)	3.32 t(8.6)
5	3.20~3.86	3.61 m	3.63 m	3.62 m	3.40 t(8.9)
6	3.20~3.86	3.98 dd(12, 2)	3.97 dd(12, 2)	3.95 dd(12)	3.55 m
	3.20~3.86	3.81 dd(12, 5)	3.78 m	3.85 m	3.75 br d(11.0)
Acid E					
2, 6	7.58 d(8.5)	7.23 d(9)	7.23 d(9)	7.26 d(9)	7.59 d(8.4)
3, 5	7.06 d(8.5)	7.00 d(9)	7.03 d(9)	7.02 d(9)	7.07 d(8.4)
7	7.51 d(15.8)	7.33 d(16)	7.33 d(16)	7.37 d(16)	7.45 d(15.7)
8	6.34 d(15.8)	5.88 d(16)	5.85 d(16)	5.96 d(16)	6.26 d(15.7)
Acid F					
2	7.10 br s	6.76 d(2)	6.89 d(1.8)	7.19 d(8.6)	7.12 br s
3			3.69 s(OMe)	6.64 d(8.6)	
5	6.80 d(8.0)	6.53 d(8)	6.58 d(8)	6.64 d(8.6)	6.82 d(8.0)
6	6.98 br d(8.0)	6.68 dd(8, 2)	6.78 dd(8, 1.8)	7.19 d(8.6)	6.97 d(8.0)
7	7.46 d(15.8)	7.40 d(16)	7.48 d(16)	7.44 d(16)	7.48 d(15.6)
8	6.26 d(15.8)	6.12 d(16)	6.21 d(16)	6.17 d(16)	6.25 d(15.6)

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Table 4-7-21: ^{1}H NMR spectroscopic data of anthocyanidins **4-7-57**~**4-7-61**.

H	4-7-57	4-7-58	4-7-59	4-7-60	4-7-61
Aglycons					
4	8.97 s	8.92 s	8.83 s	9.03 s	8.44 s
6	6.95 d(1.5)	6.82 d(2.0)	6.70 br s	6.84 br s	6.89 s
8	6.86 d(1.5)	6.65 d(2.0)	7.71 br s	7.03 d(1.8)	6.64 s
2′	8.57 d(9.0)	8.46 d(9.0)	8.15 d(2.2)	8.07 d(1.8)	8.02 s
3′	7.08 d(9.0)	6.97 d(9.0)			
5′	7.08 d(9.0)	6.97 d(9.0)	7.18 d(9.0)	7.23 d(8.9)	
6′	8.57 d(9.0)	8.46 d(9.0)	8.93 dd(2.2, 9.0)	8.70 dd(1.8, 8.9)	7.99 s
Sugar A					
1	5.61 d(7.5)	5.29 d(7.5)	5.74 d(7.7)	5.46 d(7.9)	4.94 d(8)
2	4.11 dd(9.5, 7.5)	3.93 dd(9.5, 7.5)	3.78 m	4.24 t(7.9)	3.58 d(7)
3	3.85 t(9.5)	3.74 t(9.5)	3.46 m	3.68 m	3.50 t(7)
4	3.63 t(9.5)	3.59 t(9.5)	3.33 m	3.74 br s	3.35 t(8)
5	3.95 ddd(9.5, 6.0, 2.0)	3.63 ddd(9.5, 6.5, 2.5)	3.87 m	3.79 m	3.80~3.90 m
6	4.39 dd(11.5, 6.0)	4.34 dd(12.0, 6.5)	4.21 m	3.68 m	4.15~4.22 m
	4.58 dd(11.5, 2.0)	4.41 dd(12.0, 2.5)	4.60 d(11.6)	3.56 m	4.58~4.64 m
Sugar B					
1	4.76 d(7.5)	4.75 d(7.5)	4.19 d(7.6)	5.21 d(8.4)	5.32 d(7)
2	3.32 dd(9.5, 7.5)	3.40 m	3.26 m	4.65 t(8.4)	3.56 d(7)
3	3.24 t(9.5)	3.44 m	3.05 t(8.9)	3.43 m	3.49 m
4	3.22 t(9.5)	3.44 m	3.31 m	3.48 m	3.27 m
5	3.01 ddd(9.5, 6.5, 2.5)	3.53 m	3.36 m	3.35~3.49	3.80~3.90 m
6	3.47 dd(12.0, 6.5)	4.27 dd(12.0, 5.5)	3.98 m	3.35~3.49	4.15~4.22 m
	3.56 dd(12.0, 2.5)	4.31 dd(12.0, 2.0)	4.54 d(9.8)		4.58~4.64 m
Sugar C					
1	5.23 d(7.5)	5.09 d(7.5)	4.21 d(7.6)	5.18 d(8.2)	5.30 d(8)
2	3.85 dd(9.5, 7.5)	3.75 dd(9.5, 7.5)	3.29 m	3.49 t(8.2)	3.48 d(8)
3	3.74 t(9.5)	3.70 t(9.0)	3.20~3.90	3.39~3.45	3.49 m
4	3.67 t(9.5)	3.68 t(9.0)	3.20~3.90	3.59 t(9.5)	3.27 m
5	3.99 ddd(9.5, 6.0, 1.5)	3.63 ddd(9.0, 6.0, 2.0)	3.20~3.90	4.10 d(9.5)	3.80~3.90 m
6	4.41 dd(11.5, 6.0)	3.91 dd(12.0, 4.0)	3.20~3.90		4.15~4.22 m
	4.60 dd(11.5, 1.5)	3.96 dd(12.0, 2.0)			4.58~4.64 m
Sugar D					
1	4.39 d(7.5)	4.46 d(8.0)	5.41 d(7.6)	5.36 d(6.7)	4.95 d(8)
2	3.25 dd(9.0, 7.5)	3.28 dd(9.5, 8.0)	3.49 m	3.43 m	3.32 d(7)
3	3.41 t(9.0)	3.41 m	3.44 m	3.41 m	3.30 d(9)
4	3.33 t(9.0)	3.34 m	3.40 m	3.39 m	3.23 t(9)
5	3.47 ddd(9.0, 5.5, 2.5)	3.41 m	4.01 m	3.91 m	3.53 m
6	3.69 dd(12.0, 5.5)	3.70 m	4.21 m	4.26 m	3.70~3.80 m
	3.93 dd(12.0, 2.5)	3.92 m	4.90 d(10.4)	4.56 br d(10.7)	
Acid E					
2	6.96 d(1.5)	6.90 d(2.0)	7.45 d(8.9)	6.88 d(1.4)	6.98 d(8)
3	3.80 s(OMe)	3.84 s(OMe)	6.58 d(8.9)		6.57 d(8)
5	6.73 d(8.0)	6.78 d(8.5)	6.58 d(8.9)	6.63 d(8.2)	6.57 d(8)

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Table 4-7-21 (continued)

H	4-7-57	4-7-58	4-7-59	4-7-60	4-7-61
6	6.83 dd(8.0, 1.5)	6.82 dd(8.5, 2.0)	7.45 d(8.9)	6.79 m	6.98 d(8)
7	7.33 d(16.0)	7.23 d(16.0)		6.25 d(15.9)	6.00 d(16)
8	6.17 d(16.0)	5.95 d(16.0)		7.45 d(15.9)	7.17 d(16)
Acid F					
2		6.66 d(2.0)	7.90 d(8.8)	7.03 d(1.8)	7.12 d(9)
3		3.71 s(OMe)	6.81 d(8.8)		6.85 d(8)
5		6.62 d(8.5)	6.81 d(8.8)	6.79 d(8.2)	6.85 d(8)
6		6.57 dd(8.5, 2.0)	7.90 d(8.8)	6.96 br d(8.2)	7.12 d(9)
7		7.01 d(16.0)		7.45 d(15.9)	6.12 d(16)
8		5.82 d(16.0)		6.25 d(15.9)	7.29 d(16)
Mal	–		3.38~3.43		3.30 s

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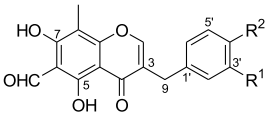
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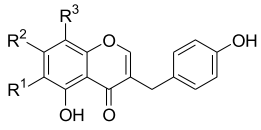
4.8 Homoisoflavonoids

Table 4-8-1: Cos, MFs, and TSs of homoisoflavonoids **4-8-1**~**4-8-17**.

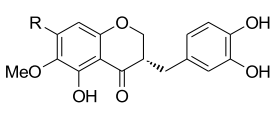
No.	Compounds	MFs	Test solvents	References
4-8-1	6-aldehydo-isoophiopogonone A	$C_{19}H_{14}O_7$	$CDCl_3$	[488]
4-8-2	6-aldehydroisoophiopogonone B	$C_{19}H_{16}O_6$	$CDCl_3$	[488]
4-8-3	7-*O*-methyl-3,9-dihydropunctatin	$C_{18}H_{18}O_6$	DMSO-d_6	[489]
4-8-4	8-*O*-demethyl-7-*O*-methyl-3,9-dihydropunctatin	$C_{17}H_{16}O_6$	DMSO-d_6	[489]
4-8-5	3,9-dihydroeucomnalin	$C_{17}H_{16}O_6$	DMSO-d_6	[489]
4-8-6	scillavone B	$C_{18}H_{18}O_7$	DMSO-d_6	[490]
4-8-7	3-(3,4-dihydroxybenzyl)-5,7-dihydroxy-6-methoxy-chroman-4-one	$C_{16}H_{16}O_7$	DMSO-d_6	[490]
4-8-8	5,7-dihydroxy-8-methoxy-6-methyl-3-(2′-hydroxy-4′-methoxybenzyl)chroman-4-one	$C_{19}H_{20}O_7$	$CDCl_3$	[491]
4-8-9	7-hydroxy-5,8-dimethoxy-6-methyl-3-(2′-hydroxy-4′-methoxybenzyl)-chroman-4-one	$C_{20}H_{22}O_7$	$CDCl_3$	[491]
4-8-10	5,7-dihydroxy-6,8-dimethyl-3-(4′-hydroxy-3′-methoxy-benzyl)chroman-4-one	$C_{19}H_{20}O_6$	$CDCl_3$	[491]
4-8-11	(±)-5,7-dihydroxy-6,8-dimethyl-3-(2′-hydroxy-4′-methoxybenzyl)-chroman-4-one	$C_{19}H_{20}O_6$	CD_3OD	[492]
4-8-12	(*E*)-5,7-dihydroxy-6,8-dimethyl-3-(4′-hydroxybenzylidene)-chroman-4-one	$C_{18}H_{16}O_5$	DMSO-d_6	[492]
4-8-13	3-(4-hydroxybenzylidene)-5,7-dihydroxychroman-4-one	$C_{16}H_{12}O_5$	DMSO-d_6	[490]
4-8-14	scillavone A	$C_{18}H_{16}O_7$	DMSO-d_6	[490]
4-8-15	5,7,3′-trihydroxy-4′-methoxyspiro{2*H*-1-benzopyran-7′-bicyclo[4.2.0]octa[1.3.5]trien}-4-one	$C_{17}H_{14}O_6$	DMSO-d_6	[490]
4-8-16	scillascillin	$C_{17}H_{12}O_6$	CD_3OD	[493]
			DMSO-d_6	[493]
4-8-17	–	$C_{18}H_{16}O_6$	CD_3OD	[493]
			$CDCl_3$	[493]



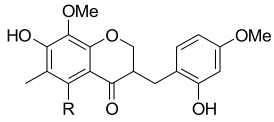
	R^1	R^2
4-8-1	OCH_2O	
4-8-2	H	OMe



	R^1	R^2	R^3
4-8-3	H	OMe	OMe
4-8-4	H	OMe	OH
4-8-5	OMe	OH	H

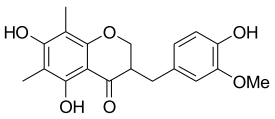


4-8-6 R = OMe
4-8-7 R = OH

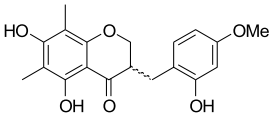


4-8-8 R = OH
4-8-9 R = OMe

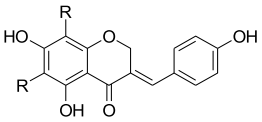
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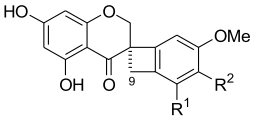
4-8-10



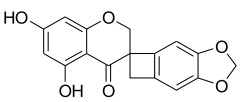
4-8-11



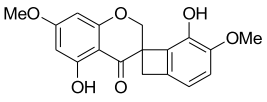
4-8-12 R = Me
4-8-13 R = H



4-8-14 R^1 = OH; R^2 = OMe
4-8-15 R^1 = H; R^2 = OH



4-8-16



4-8-17

Table 4-8-2: ^{1}H NMR spectroscopic data of homoisoflavonoids **4-8-1**~**4-8-5**.

H	4-8-1	4-8-2	4-8-3	4-8-4	4-8-5
2	7.55 s	7.52 s	4.16 m, 4.34 m	4.12 m, 4.20 m	4.06 m, 4.23 m
			3.0 m	3.0 m	3.0 m
5	13.75 s(OH)	13.76 s(OH)	12.06 s(OH)	11.83 s(OH)	12.24 s(OH)
6	10.19 s(CHO)	10.20 s(CHO)	6.22 s	6.19 s	3.69 s(OMe)
7	12.95 s(OH)	12.95 s(OH)	3.87 s(OMe)	3.84 s(OMe)	10.84 s(OH)
8	2.09 s(Me)	2.08 s(Me)	3.61 s(OMe)	8.16 s(OH)	5.97 s
9	3.71 s	3.72 s	2.63 m, 3.0 m	2.63 m, 3.0 m	2.60 m, 3.0 m
2′	6.72 s	7.17 d(8.5)	7.04 d(8.5)	7.05 d(8.5)	7.04 d(8.5)
3′		6.85 d(8.5)	6.70 d(8.5)	6.72 d(8.5)	6.72 d(8.5)
4′		3.78 s(OMe)	9.26 s(OH)	9.26 s(OH)	9.26 s(OH)
5′	6.72 s	6.85 d(8.5)	6.70 d(8.5)	6.72 d(8.5)	6.72 d(8.5)
6′	6.72 s	7.17 d(8.5)	7.04 d(8.5)	7.05 d(8.5)	7.04 d(8.5)
OCH_2O	5.92 s				

Table 4-8-3: ^{1}H NMR spectroscopic data of homoisoflavonoids **4-8-6**~**4-8-10**.

H	4-8-6	4-8-7	4-8-8	4-8-9	4-8-10
2	4.29 dd(4.5, 11.5)	4.23 dd(4.5, 11.0)	4.55 dd(11.1, 5.0)	4.61 dd(11.1, 3.8)	4.29 dd(11.1, 3.8)
	4.11 dd(8.0, 11.5)	4.05 dd(7.5, 11.0)	4.22 dd(11.1, 10.8)	4.21 dd(12.0, 11.1)	4.12 dd(11.1, 6.9)
3	*ca*. 2.95	2.90 m	3.10 m	3.05 m	2.79 m
5	11.98 s(OH)	12.24 s(OH)	11.91 s(OH)	3.76 s(OMe)	12.38 s(OH)

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Table 4-8-3 (continued)

H	4-8-6	4-8-7	4-8-8	4-8-9	4-8-10
6			2.04 s(Me)	2.09 s(Me)	2.03 s(Me)
7			6.62 s(OH)	–	5.43 br s(OH)
8	6.22 s	5.95 s	3.85 s(OMe)	3.87 s(OMe)	2.07 s(Me)
9	*ca*. 2.95	2.94 dd(5.0, 13.5)	2.99 dd(14.7, 5.3)	2.91 d(5.0)	3.16 dd(13.5, 3.8)
	ca. 2.51	2.53 dd(9.0, 13.5)	2.89 dd(14.7, 5.9)	2.91 d(5.0)	2.69 dd(13.5, 10.3)
2′	6.62 d(2.0)	6.62 d(2.0)			6.74 d(1.8)
3′			6.46 d(2.6)	6.49 d(2.6)	
5′	6.66 d(8.0)	6.67 d(8.0)	6.42 dd(8.2, 2.6)	6.39 dd(8.3, 2.6)	6.86 d(7.9)
6′	6.48 dd(2.0, 8.0)	6.48 dd(2.0, 8.0)	6.93 d(8.2)	6.90 d(8.3)	6.72 dd(7.9, 1.8)
OMe	3.84 s, 3.64 s	3.67 s	3.76 s	3.75 s	3.88 s
OH	8.83 br s, 8.78 br s				

Table 4-8-4: ^{1}H NMR spectroscopic data of homoisoflavonoids **4-8-11**~**4-8-15**.

H	4-8-11	4-8-12	4-8-13	4-8-14	4-8-15
2	4.24 dd(4.4, 11.3)	5.34 d(1.6)	5.34 d-like(2.0)	4.59 d(11.5)	4.95 d(11.0)
	4.09 dd(7.6, 11.3)		5.34 d-like(2.0)	4.56 d(11.5)	4.54 d(11.0)
3	2.93 m				
5		13.07 s(OH)	12.90 s(OH)	12.09 s(OH)	12.31 br s(OH)
6	1.98 s(Me)	1.97 s(Me)	5.90 d(2.0)	5.95 d(2.0)	5.96 d(2.0)
7		10.13 br s(OH)			
8	1.96 s(Me)	1.94 s(Me)	5.86 d(2.0)	5.91 d(2.0)	5.92 d(2.0)
9	3.16 dd(4.9, 13.6)	7.67 br s	7.67 s	3.35 d(13.0)	3.38 d(13.5)
	2.59 dd(9.8, 13.6)			2.93 d(13.0)	3.00 d(13.5)
2′		7.33 d(8.6)	7.32 d(8.5)		6.70 or 6.66 s
3′	6.38 d(2.5)	6.88 d(8.6)	6.88 d(8.5)		
4′	3.72 s(OMe)	9.67 br s(OH)			
5′	6.35 dd(2.5, 8.2)	6.88 d(8.6)	6.88 d(8.5)	6.27 s	6.70 or 6.66 s
6′	6.96 d(8.2)	7.33 d(8.6)	7.32 d(8.5)		
OMe				3.67 s, 3.62 s	3.69 s
OH				10.91 br s	
				9.55 s	

Table 4-8-5: ^{1}H NMR spectroscopic data of homoisoflavonoids **4-8-16** and **4-8-17**.

H	4-8-16(CD_3OD)	4-8-16(DMSO-d_6)	4-8-17(CD_3OD)	4-8-17($CDCl_3$)
2	4.50, 4.53 ABq(11.8)	4.56, 4.57 ABq(11.6)	4.46, 4.76 ABq(11.6)	4.52, 4.77 ABq(12.6)
5		12.10 s(OH)		12.10 s(OH)

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Table 4-8-5 (continued)

H	4-8-16(CD_3OD)	4-8-16(DMSO-d_6)	4-8-17(CD_3OD)	4-8-17($CDCl_3$)
6	5.90 d(2.1)	5.94 d(2.3)	6.04 s	6.06 d(2.8)
7			3.81 s(OMe)	3.84 s(OMe)
8	5.92 d(2.1)	5.98 d(2.3)	6.04 s	6.19 d(2.8)
9	2.97, 3.45 ABq(13.7)	3.06, 3.35 ABq(13.4)	3.16, 3.30 ABq(13.4)	3.16, 3.51 ABq(13.7)
2′	6.56 s	6.75 s	6.62 d(7.9)	6.70 d(7.7)
3′			6.88 d(7.9)	6.84 d(7.7)
4′			3.80 s(OMe)	3.85 s(OMe)
5′	6.73 s	6.92 s		5.60 s(OH)
OCH_2O	5.87 s	5.98 s		

Bibliography

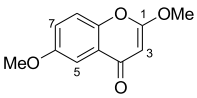
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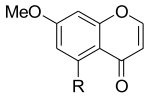
4.9 Chromones

Table 4-9-1: Cos, MFs, and TSs of chromones **4-9-1**~**4-9-9**.

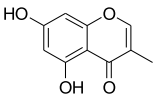
No.	Compounds	MFs	Test solvents	References
4-9-1	dennettine	$C_{11}H_{10}O_4$	$CDCl_3$	[494]
4-9-2	5-hydroxy-7-methoxychromone	$C_{10}H_8O_4$	$CDCl_3$	[495]
4-9-3	5,7-dimethoxychromone	$C_{11}H_{10}O_4$	$CDCl_3$	[495]
4-9-4	5,7-dihydroxy-3-methoxychromone	$C_{10}H_8O_4$	CD_3COCD_3	[496]
4-9-5	maritimin	$C_{11}H_{10}O_4$	$CDCl_3$	[497]
4-9-6	granulosin	$C_{13}H_{12}O_4$	DMSO-d_6	[498]
4-9-7	leucasone	$C_{15}H_{16}O_2$	$CDCl_3$	[499]
4-9-8	(2′*S*)-7-hydroxy-5-hydroxymethyl-2-(2′-hydroxypropyl)chromone	$C_{13}H_{14}O_5$	CD_3OD	[500]
4-9-9	cnidimol C	$C_{10}H_8O_5$	DMSO-d_6	[501]



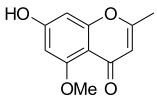
4-9-1



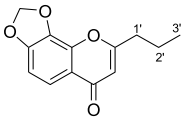
4-9-2 R = OH
4-9-3 R = OMe



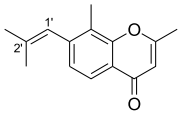
4-9-4



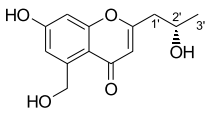
4-9-5



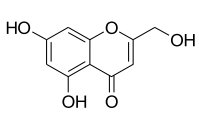
4-9-6



4-9-7



4-9-8



4-9-9

Table 4-9-2: ^{1}H NMR spectroscopic data of chromones **4-9-1**~**4-9-5**.

H	4-9-1	4-9-2	4-9-3	4-9-4	4-9-5
2		7.75 d(6.0)	7.63 d(9.5)	7.92 d(1.1)	2.37 br s(Me)
3	7.39 s	6.22 d(6.0)	6.30 d(9.5)	1.90 d(1.1, Me)	5.98 d(0.8)
5	7.59 d(1.8)	12.58 s(OH)	3.93 s(OMe)	12.85 s(OH)	3.81 s(OMe)
6		6.37 d(2.3)	6.85 d(2.7)	6.22 d(2.0)	6.33 d(2.3)
7	7.73 dd(8.4, 1.8)	3.86 s(OMe)	3.96 s(OMe)	9.51 br s(OH)	
8	6.97 d(8.4)	6.39 d(2.3)	6.86 d(2.7)	6.31 d(2.0)	6.35 d(2.3)
OMe	3.95 s, 3.96 s				

Table 4-9-3: ^{1}H NMR spectroscopic data of chromones **4-9-6**~**4-9-9**.

H	4-9-6	4-9-7	4-9-8	4-9-9
2		2.61 s(Me)		4.39 d(6.1, CH_2) 5.80 t(6.1, OH)

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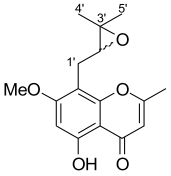
Table 4-9-3 (continued)

H	4-9-6	4-9-7	4-9-8	4-9-9
3	6.07 s	7.29 br s	6.13 s	6.23 s
5	7.74 d(8.5)	7.10 ddd(8.0, 1.5, 0.6)	5.00 s(CH_2)	12.78 s(OH)
6	6.90 d(8.5)	7.49 d(8.0)	6.75 or 7.06d(2.2)	6.19 d(2.0)
7				10.84 s(OH)
8		2.49 s(Me)	6.75 or 7.06d(2.2)	6.33 d(2.0)
1′	2.58 t(7.3)	6.94 m	2.57 dd(14.4, 7.8) 2.73 dd(14.4, 5.1)	
2′	1.77 m		4.19 m	
3′	1.01 t(7.3)	2.05 d(1.5)	1.27 d(6.2)	
4′		2.30 d(1.1)		
OCH_2O	6.16 s			

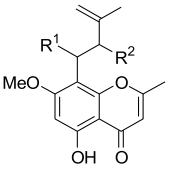
Table 4-9-4: Cos, MFs, and TSs of chromones **4-9-10**~**4-9-32**.

No.	Compounds	MFs	Test solvents	References
4-9-10	perforamone A	$C_{16}H_{18}O_5$	–	[502]
4-9-11	perforamone B	$C_{16}H_{18}O_5$	–	[502]
4-9-12	perforamone C	$C_{16}H_{18}O_5$	–	[502]
4-9-13	cnidimol A	$C_{15}H_{16}O_5$	DMSO-d_6	[501]
4-9-14	cnidimol D	$C_{15}H_{16}O_6$	DMSO-d_6	[501]
4-9-15	cnidimol E	$C_{15}H_{16}O_6$	DMSO-d_6	[501]
4-9-16	5,7-dihydroxy-6-[3-formylbutyl]-2-methyl-4*H*-[1]benz-opyran-4-one	$C_{15}H_{16}O_5$	$CDCl_3$	[503]
4-9-17	eriosematin A	$C_{14}H_{14}O_4$	–	[504]
4-9-18	eriosematin B	$C_{19}H_{24}O_5$	–	[504]
4-9-19	eriosematin C	$C_{19}H_{22}O_4$	–	[504]
4-9-20	cnidimol F	$C_{15}H_{14}O_6$	DMSO-d_6	[501]
4-9-21	karenin	$C_{15}H_{14}O_5$	DMSO-d_6	[501]
4-9-22	cnidimol B	$C_{15}H_{16}O_6$	DMSO-d_6	[501]
4-9-23	*dl*-2,3-dihydro-4-hydroxy-7-methyl-2-isopropenyl-5*H*-furo[3,2*g*][1]benzopyran-5-one	$C_{15}H_{14}O_4$	$CDCl_3$	[503]
4-9-24	chrysograyanon	$C_{19}H_{18}O_{11}$	DMSO-d_6	[505]
4-9-25	2,8-dimethyl-5-hydroxy-2-hydroxymethyl-3,4-dihydro-2*H*,3*H*-benzo[1,2-*b*:5,4-*b*′]dipyran-6-one	$C_{15}H_{16}O_5$	$CDCl_3$	[503]
4-9-26	perforamone D	$C_{15}H_{14}O_5$	–	[502]
4-9-27	greveichromenol	$C_{15}H_{14}O_5$	–	[502]
4-9-28	aspergione A	$C_{16}H_{18}O_4$	$CDCl_3$	[506]
4-9-29	aspergione C	$C_{16}H_{16}O_4$	$CDCl_3$	[506]
4-9-30	aspergione D	$C_{15}H_{12}O_4$	$CDCl_3$	[506]
4-9-31	aspergione E	$C_{16}H_{18}O_4$	CD_3OD	[506]
4-9-32	*iso*-eriosematin	$C_{19}H_{20}O_4$	–	[504]

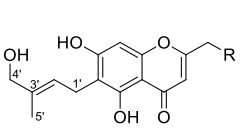
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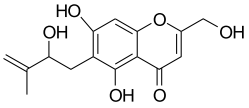
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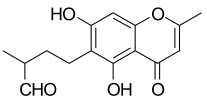
	R^1	R^2
4-9-11	OH	H
4-9-12	H	OH



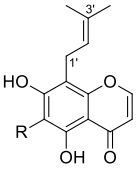
4-9-13 R = H
4-9-14 R = OH



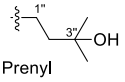
4-9-15



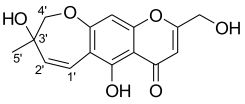
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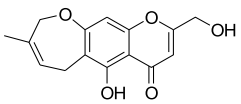
4-9-17 R = H

4-9-18 R = 

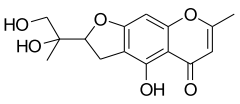
4-9-19 R = Prenyl



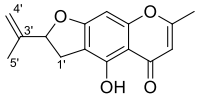
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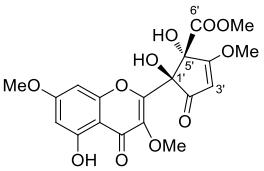
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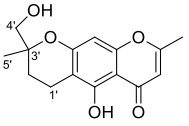
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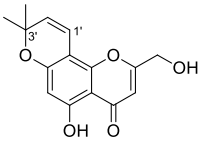
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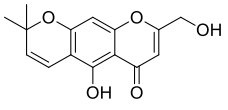
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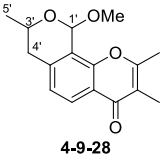
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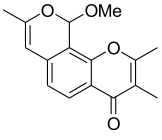
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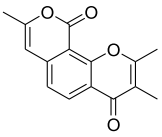
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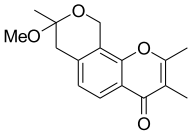
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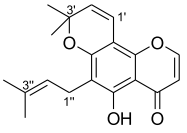
4-9-29



4-9-30



4-9-31



4-9-32

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Table 4-9-5: ^{1}H NMR spectroscopic data of chromones **4-9-10**~**4-9-14**.

H	4-9-10	4-9-11	4-9-12	4-9-13	4-9-14
2	2.39 s(Me)	2.38 s(Me)	2.39 s(Me)	2.34 s(Me)	4.38 d(6.0) 5.78 t(6.0)
3	6.05 br s	6.05 br s	6.05 br s	6.15 s	6.22 s
5				13.09 s(OH)	13.05 s(OH)
6	6.42 s	6.41 s	6.42 s		
7	3.91 s(OMe)	3.93 s(OMe)	3.92 s(OMe)	10.79 s(OH)	10.86 s(OH)
8				6.39 s	6.41 s
1′	2.87 dd(7.2, 13.2) 3.10 dd(4.2, 13.2)	4.56 dd(6.0, 7.5)	2.99 dd(7.8, 13.7) 3.09 dd(5.3, 13.7)	3.24 d(7.5)	3.24 d(7.6)
2′	2.95 dd(4.2, 7.2)	2.97 dd(6.0, 13.8) 3.08 dd(7.5, 13.8)	4.31 dd(5.3, 7.8)	5.17 t(7.5)	5.20 t(7.6)
4′	1.30 s	4.88 br s 4.96 br s	4.82 br s 4.89 br s	4.10 br s 4.52 br	4.12 br s 4.52 br
5′	1.44 s	1.87 s	1.87 s	1.65 s	1.65 s
OH	12.90 s	12.85 s	12.82 s		

Table 4-9-6: ^{1}H NMR spectroscopic data of chromones **4-9-15**~**4-9-17**, **4-9-20**, and **4-9-21**.

H	4-9-15	4-9-16	4-9-17	4-9-20	4-9-21
2	4.38 d(6.2) 5.78 t(6.2)	2.24 s(Me)	7.80 d(6)	4.43 d(6.1) 5.87 t(6.1)	4.43 d(6.0) 5.85 t(6.0)
3	6.22 s	5.90 s	6.22 d(6)	6.33 s	6.32 s
5	13.08 s(OH)	13.00 br s(OH)	12.51 s(OH)	13.72 s(OH)	13.18 s(OH)
6			6.32 s		
7	10.40 s(OH)		6.54 br s(OH)		
8	6.38 s	6.32 s		6.64 s	6.69 s
1′	2.74 m	2.63 t(7.7)	3.45 d(8)	6.56 d(12.0)	3.38 d(6.1)
2′	4.30 br 5.00 br s(OH)	1.55 m 1.91 m	5.21 t(8)	5.93 d(12.0)	5.67 t(6.1)
3′		2.26 m		5.24 s(OH)	
4′	4.59 br s	1.08 d(7.1)	1.73 s	3.93 d(11.5) 4.06 d(11.5)	4.54 s
5′	1.73 s	9.59 d(1.8, CHO)	1.81 s	1.26 s	1.57 s

Table 4-9-7: ^{1}H NMR spectroscopic data of chromones **4-9-18**, **4-9-19**, and **4-9-32**.

H	4-9-18	4-9-19	4-9-32	H	4-9-18	4-9-19	4-9-32
2	7.77 d(6)	7.77 d(6)	7.74 d(6)	4′, 5′	1.68 s, 1.69 s	1.82 s, 1.80 s	1.45 s, 1.45 s
3	6.18 d(6)	6.20 d(6)	6.18 d(6)	1″	2.77 t(6)	3.41 t(6)	3.32 d(6)
5	12.80 s(OH)	12.90 s(OH)	12.86 s(OH)	2″	1.78 t(6)	4.94 t(6)	5.21 t(6)
7	8.30 br s(OH)			4″	1.29 s	1.75 s	1.79 d(2)
1′	3.44 d(6)	3.39 d(6)	6.65 d(10)	5″	1.29 s	1.72 s	1.67 d(2)
2′	5.20 t(6)	5.20 t(6)	5.57 t(10)				

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Table 4-9-8: ^{1}H NMR spectroscopic data of chromones **4-9-22**~**4-9-25**.

H	4-9-22	4-9-23	4-9-24	4-9-25
2	2.36 s(Me)	2.33 s(Me)		2.31 s(Me)
3	6.18 s	6.02 s	3.61 s(OMe)	5.98 s
5	13.05 s(OH)	13.00 br s(OH)	12.44 s(OH)	13.00 br s(OH)
6			6.37 d	
7			3.87 s(OMe)	
8	6.41 s	6.33 s	6.56 d	6.28 s
1′	3.03 dd(15.5, 9.5)	3.00 dd(15.7, 7.6)	6.99 s(OH)	2.63 m
	3.10 dd(15.5, 8.5)	3.35 dd(15.7, 9.6)		2.78 m
2′	4.93 dd(9.5, 8.5)	5.32 dd(9.6, 7.6)		1.78 m, 1.97 m
3′	4.61 s(OH)		5.38 s	
4′	3.28 dd(10.5, 5.1)	4.94 m	3.71 s(OMe)	3.65 d(4.2)
	3.54 dd(10.5, 5.9)	5.09 m		
	4.78 dd(5.9, 5.1, OH)			
5′	1.07 s	1.77 s	6.78 s(OH)	1.28 s
6′			3.91 s(OMe)	

Table 4-9-9: ^{1}H NMR spectroscopic data of chromones **4-9-26**~**4-9-31**.

H	4-9-26	4-9-27	4-9-28	4-9-29	4-9-30	4-9-31
2	4.58 s(CH_2)	4.49 s(CH_2)	2.10 s(Me)	2.10 s(Me)	2.25 s(Me)	2.17 s(Me)
3	6.34 br s	6.32 br s	2.35 s(Me)	2.34 s(Me)	2.40 s(Me)	2.39 s(Me)
6	6.26 s		7.59 d(7.9)	7.63 d(7.8)	7.94 d(8.0)	7.55 d(8.0)
7			6.85 d(7.9)	6.77 d(7.8)	7.02 d(8.0)	6.99 d(8.0)
8		6.30 s				
1′	6.63 d(10.0)	6.69 d(10.0)	5.70 br s	6.33 s		5.05 br d(16.0)
			3.62 s(OMe)	3.58 s(OMe)		4.94 br d(16.0)
2′	5.57 d(10.0)	5.62 d(10.0)				
3′			4.32 ddq (10.4, 6.2, 3.8)			3.35 s(OMe)
4′	1.47 s	1.45 s	2.75 dd(17.2, 3.8)	5.86 br s	6.31 d(0.8)	3.07 br d(17.3)
			2.69 dd(17.2, 10.4)			2.97 br d(17.3)
5′	1.47 s	1.45 s	1.38 d(6.2)	2.08 s	2.32 d(0.8)	1.58 s
OH	12.66 s	12.85 s				

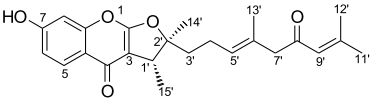
Table 4-9-10: Cos, MFs, and TSs of chromones **4-9-33**~**4-9-44**.

No.	Compounds	MFs	Test solvents	References
4-9-33	fukanefurochromone A	$C_{24}H_{28}O_5$	$CDCl_3$	[507]
4-9-34	fukanefurochromone B	$C_{24}H_{28}O_5$	$CDCl_3$	[507]
4-9-35	fukanefurochromone C	$C_{24}H_{28}O_5$	$CDCl_3$	[507]

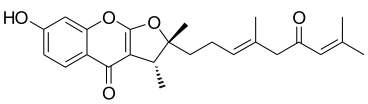
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Table 4-9-10 (continued)

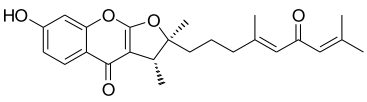
No.	Compounds	MFs	Test solvents	References
4-9-36	fukanefurochromone D	$C_{24}H_{28}O_5$	$CDCl_3$	[507]
4-9-37	fukanefurochromone E	$C_{24}H_{28}O_5$	$CDCl_3$	[507]
4-9-38	pallidone I	$C_{25}H_{32}O_5$	$CDCl_3$	[508]
4-9-39	pallidone J	$C_{25}H_{32}O_5$	$CDCl_3$	[508]
4-9-40	2,3-dihydro-7-hydroxy-2*S**,3*R**-dimethyl-2-[4,8-dimethyl-3(*E*),7-nonadienyl]-furo[2,3-*b*]chromone	$C_{24}H_{30}O_4$	$CDCl_3$	[509]
4-9-41	2,3-dihydro-7-hydroxy-2*S**,3*R**-dimethyl-2-[4-methyl-5-(4-methyl-2-furyl)-3(*E*),7-pentenyl]-furo[2,3-*b*]chromone	$C_{24}H_{26}O_5$	$CDCl_3$	[509]
4-9-42	2,3-dihydro-7-hydroxy-2*R**,3*R**-dimethyl-2-[4-methyl-5-(4-methyl-2-furyl)-3(*E*),7-pentenyl]-furo[2,3-*b*]chromone	$C_{24}H_{26}O_5$	$CDCl_3$	[509]
4-9-43	peperovulcanone A	$C_{28}H_{42}O_3$	$CDCl_3$	[510]
4-9-44	peperovulcanone B	$C_{28}H_{34}O_5$	$CDCl_3$	[510]



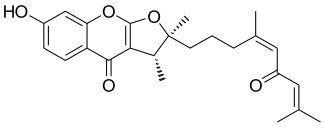
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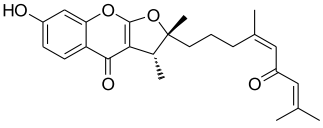
4-9-34



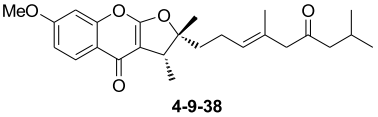
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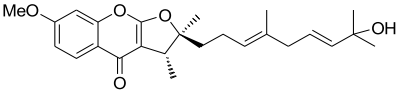
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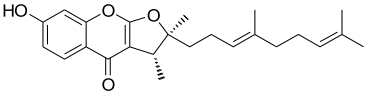
4-9-37



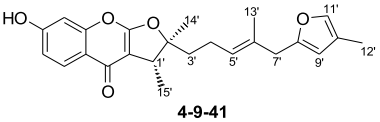
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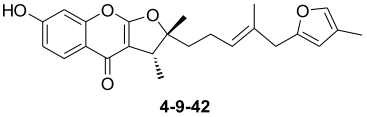
4-9-39



4-9-40

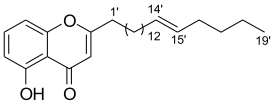


4-9-41

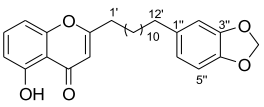


4-9-42

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4-9-43



4-9-44

Table 4-9-11: ^{1}H NMR spectroscopic data of chromones **4-9-33**~**4-9-37**.

H	4-9-33	4-9-34	4-9-35	4-9-36	4-9-37
5	8.01 d(8.8)	8.03 d(8.8)	8.02 d(8.8)	8.00 d(8.4)	8.04 d(8.5)
6	6.99 dd(2.2, 8.8)	7.00 dd(2.1, 8.8)	7.01 dd(2.3, 8.5)	6.97 dd(2.2, 8.8)	7.00 dd(2.1, 8.5)
8	6.91 d(2.2)	6.91 d(2.1)	6.91 d(2.3)	6.88 d(2.2)	6.88 d(2.1)
1′	3.38 q(7.0)	3.30 q(7.0)	3.35 q(6.7)	3.37 q(7.0)	3.27 q(7.0)
3′	1.85 m	1.93 m	1.78 m	1.82 m	1.74, 1.94 m
4′	2.19 m	2.26 m	1.64 m	1.63 m	1.72 m
5′	5.20 t(7.5)	5.27 t(6.9)	2.16 m	2.63 t(7.4)	2.65, 2.73 m
7′	3.03 s	3.07 s	6.00 br s	6.02 m(ov)	6.08 br s
9′	6.08 br s	6.11 br s	6.04 m	6.02 m(ov)	6.05 br s
11′	1.87 s	1.89 s	1.88 s	1.87 s	1.88 s
12′	2.13 s	2.15 s	2.15 s	2.13 s	2.15 s
13′	1.60 s	1.66 s	2.13 s	1.86 s	1.91 s
14′	1.46 s	1.46 s	1.45 s	1.43 s	1.47 s
15′	1.35 d(6.6)	1.31 d(6.7)	1.35 d(6.7)	1.34 d(7.0)	1.30 d(7.0)

Table 4-9-12: ^{1}H NMR spectroscopic data of chromones **4-9-38**~**4-9-42**.

H	4-9-38	4-9-39	4-9-40	4-9-41	4-9-42
5	8.12 d(8.9)	8.11 d(8.8)	8.07 d(9)	8.04 d(9)	8.07 d(9)
6	6.97 dd(8.9, 2.2)	6.96 dd(8.8, 2.0)	6.92 dd(2, 9)	6.93 dd(2, 9)	6.93 dd(2, 9)
7	3.89 s(OMe)	3.88 s(OMe)			
8	6.84 d(2.2)	6.84 d(2.0)	6.86 d(2)	6.89 d(2)	6.86 d(2)
1′	3.31 q(6.9)	3.41 q(6.9)	3.40 q(7)	3.39 q(7)	3.30 q(7)
3′	1.83~1.97 m	1.84 m	1.82 m	1.83 m	1.94 m
4′	2.27 m, 1.70 m	2.15 m	2.12 m	2.16 m	2.23 m
5′	5.29 t(6.9)	5.13 t(6.7)	5.09 (ov)	5.18 t(7)	5.24 t(7)
7′	3.05 s	2.66 d(5.9)	1.96 m	3.21 s	3.24 s
8′		5.57 dt(15.6, 5.9)	2.04 m		
9′	2.31 d(6.9)	5.64 d(15.6)	5.07 (ov)	5.86 s	5.89 s
10′	2.14 m				
11′	0.91 d(6.6)	1.31 s	1.67 s	7.50 s	7.07 s
12′	0.91 d(6.6)	1.31 s	1.59 s	1.59 s	1.64 s
13′	1.67 s	1.57 s	1.59 s	1.97 s	1.98 s
14′	1.52 s	1.46 s	1.46 s	1.46 s	1.50 s
15′	1.33 d(6.9)	1.36 d(6.9)	1.36 q(7)	1.35 q(7)	1.32 q(7)

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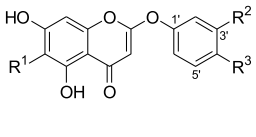
Table 4-9-13: ^{1}H NMR spectroscopic data of chromones **4-9-43** and **4-9-44**.

H	4-9-43	4-9-44	H	4-9-43	4-9-44
3	6.09 s	6.10 s	13′	2.01 t(5.6)	
5	12.56 (OH)	12.56(OH)	14′	5.34 dt(11.2, 5.6)	
6	6.85 dd(8.3, 0.9)	6.85 dd(8.3, 0.9)	15′	5.30 dt(11.2, 5.6)	
7	7.48 t(8.3)	7.49 t(8.3)	16′	2.01 t(5.6)	
8	6.76 dd(8.3, 0.9)	6.76 dd(8.3, 0.9)	17′	1.38 m	
1′	2.60 t(7.7)	2.60 t(7.8)	18′	1.35~1.26 m	
2′	1.72 quint(7.4)	1.71 m	19′	0.88 t(7.9)	
3′	1.35~1.26 m	1.38~1.25 m	2″		6.67 d(1.6)
4′ ~ 10′	1.35~1.26 m	–	5″		6.72 d(7.9)
11′	1.35~1.26 m	1.56 m	6″		6.61 dd(7.9, 1.6)
12′	1.38 m	2.53 t(7.5)	OCH_2O		5.90 s

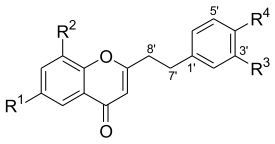
Table 4-9-14: Cos, MFs, and TSs of chromones **4-9-45**~**4-9-58**.

No.	Compounds	MFs	Test solvents	References
4-9-45	tenuiflorin A	$C_{17}H_{14}O_8$	$CDCl_3$	[511]
4-9-46	tenuiflorin B	$C_{17}H_{14}O_8$	$CDCl_3$-DMSO-d_6 (2:1)	[511]
4-9-47	tenuiflorin C	$C_{16}H_{12}O_7$	$CDCl_3$-DMSO-d_6 (3:2)	[511]
4-9-48	6-methoxy-2-[2-(3-methoxy-4-hydroxyphenyl)ethyl]-chromone	$C_{19}H_{18}O_5$	$CDCl_3$	[512]
4-9-49	6,8-dihydroxy-2-(2-phenylethyl)chromone	$C_{17}H_{14}O_4$	C_5D_5N	[512]
4-9-50	6-hydroxy-2-[2-(4-hydroxyphenyl)ethyl]chromone	$C_{17}H_{14}O_4$	C_5D_5N	[512]
4-9-51	6-hydroxy-2-[2-(2-hydroxyphenyl)ethyl]chromone	$C_{17}H_{14}O_4$	C_5D_5N	[512]
4-9-52	7-hydroxy-2-(2-phenylethyl)chromone	$C_{17}H_{14}O_3$	$CDCl_3$	[512]
4-9-53	7-hydroxy-8-methoxy-2-(2-phenylethyl)chromone	$C_{18}H_{16}O_4$	C_5D_5N	[512]
4-9-54	5α,6β,7β-trihydroxy-8α-methoxy-2-(2-phenylethyl)-chromone	$C_{18}H_{20}O_6$	DMSO-d_6	[513]
4-9-55	5α,6β,7β,8α-tetrahydroxy-2-[2-(2-hydroxyphenyl)-ethyl]5,6,7,8-tetrahydrochromone	$C_{17}H_{18}O_7$	DMSO-d_6	[513]
4-9-56	oxidoagarochromone A	$C_{17}H_{14}O_4$	$CDCl_3$	[514]
4-9-57	oxidoagarochromone B	$C_{18}H_{16}O_5$	$CDCl_3$	[514]
4-9-58	oxidoagarochromone C	$C_{18}H_{16}O_6$	$CDCl_3$	[514]
			CD_3COCD_3	[514]

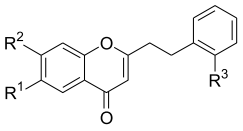
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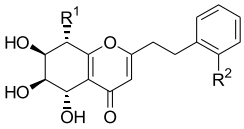
	R^1	R^2	R^3
4-9-45	OMe	OH	OMe
4-9-46	OMe	OMe	OH
4-9-47	H	OH	OMe



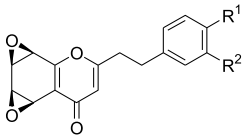
	R^1	R^2	R^3	R^4
4-9-48	OMe	H	OMe	OH
4-9-49	OH	OH	H	H
4-9-50	OH	H	H	OH



	R^1	R^2	R^3
4-9-51	OH	H	OH
4-9-52	H	OH	H
4-9-53	OH	OMe	H



	R^1	R^2
4-9-54	OMe	H
4-9-55	OH	OH



	R^1	R^2
4-9-56	H	H
4-9-57	OMe	H
4-9-58	OMe	OH

Table 4-9-15: ^{1}H NMR spectroscopic data of chromones **4-9-45**~**4-9-49**.

H	4-9-45	4-9-46	4-9-47	4-9-48	4-9-49
2	5.28 s	5.15 s	5.12 s		
3				6.16 s	6.35 s
5	12.8 br(OH)	12.92 s(OH)	12.62 br(OH)	7.55 d(3.0)	7.73 d(2.8)
6	4.02 s(OMe)	3.85 s(OMe)	6.20 d(2)		
7	6.44 br(OH)	10.65 s(OH)	10.36 br(OH)	7.25 dd(3.0, 9.0)	7.35 d(2.8)
8	6.49 s	6.44 s	6.32 d(2)	7.38 d(9.0)	
2′	6.77 d(3)	6.75 d(2.7)	6.73 d(3)	6.67 d(2.0)	7.1~7.3 m
3′	5.83 br(OH)	3.86 s(OMe)			7.1~7.3 m
4′	3.93 s(OMe)	9.27 s(OH)	3.88 s(OMe)		7.1~7.3 m
5′	6.89 d(9)	6.91 d(8.7)	6.92 d(8.7)	6.84 d(8.0)	7.1~7.3 m
6′	6.67 dd(9, 3)	6.65 dd(8.7, 2.7)	6.65 dd(8.7, 3)	6.70 dd(2.0, 8.0)	7.1~7.3 m
7′				2.97 m	2.94 m
8′				2.90 m	2.81 m
OH				5.61 br s	12.3 br s
					12.7 br s
OMe				3.82 s, 3.89 s	

Table 4-9-16: ^{1}H NMR spectroscopic data of chromones **4-9-50**~**4-9-53**.

H	4-9-50	4-9-51	4-9-52	4-9-53
3	6.35 s	6.42 s	6.12 s	6.32 s
5	8.06 dd(0.3, 2.5)	8.06 dd(0.3, 2.5)	8.06 d(8.6)	8.12 s
6			6.95 dd(2.2, 8.6)	11.9 br s(OH)

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Table 4-9-16 (continued)

H	4-9-50	4-9-51	4-9-52	4-9-53
7	7.50 dd(2.5, 9.0)	7.46 dd(2.5, 9.0)		3.98 s(OMe)
8	7.54 dd(0.3, 9.0)	7.49 dd(0.3, 9.0)	6.89 d(2.2)	7.14 s
2′ ~ 6′	7.15 d(8.5)	6.92 ddd(1.5, 7.5, 7.5)	7.17~7.32 m	7.22~7.36 m
	7.22 d(8.5)	7.15 dd(1.5, 7.5)		
		7.22 ddd(1.5, 7.5, 7.5)		
		7.29 dd(1.5, 7.5)		
7′	2.97 m	3.29 m	3.03 m	3.01 m
8′	2.88 m	3.08 m	2.91 m	2.88 m

Table 4-9-17: ^{1}H NMR spectroscopic data of chromones **4-9-54** and **4-9-55**.

H	4-9-54	4-9-55	H	4-9-54	4-9-55
3	6.10 s	6.09 s	3′	7.26 m	6.80 dd(7.5, 1.5)
5	4.32 dd(8.1, 6.6)	4.31 d(7.3)	4′	7.24 m	6.71 dt(7.5, 1.5)
	5.83 d(6.6, OH)				
6	3.74 ddd(8.1, 5.9, 2.1)	3.84 dd(7.3, 2.0)	5′	7.26 m	7.02 dt(7.5, 1.5)
	5.18 d(5.9, OH)				
7	3.93 ddd(3.8, 3.7, 2.1)	3.75 dd(3.8, 2.0)	6′	7.26 m	7.08 dd(7.5, 1.5)
	5.09 d(3.8, OH)				
8	4.16 d(3.7)	4.49 d(3.8)	7′	2.87 m	2.81 m
	3.36 s(OMe)				
2′	7.26 m		8′	2.96 m	2.88 m

Table 4-9-18: ^{1}H NMR spectroscopic data of chromones **4-9-56**~**4-9-58**.

H	4-9-56	4-9-57	4-9-58($CDCl_3$)	4-9-58(CD_3COCD_3)
3	6.18 s	6.16 s	6.15 s	6.15 s
5	4.35 d(3.3)	4.35 d(3.4)	4.34 d(3.3)	4.11 d(3.7)
6	3.84 t(3.3)	3.84 t(3.4)	3.84 t(3.3)	3.87 dd(3.7, 2.8)
7	3.98 t(3.3)	3.98 t(3.4)	3.98 t(3.3)	4.06 dd(3.7, 2.8)
8	3.82 d(3.3)	3.83 d(3.4)	3.84 d(3.3)	3.92 d(3.7)
2′	7.19 d(8.3)	7.09 d(8.8)	6.76 d(2.2)	6.76 d(2.1)
3′	7.31 m	6.84 d(8.8)	5.65 s(OH)	
4′	7.24 t(7.3)	3.79 s(OMe)	3.87 s(OMe)	3.80 s(OMe)
5′	7.31 m	6.84 d(8.8)	6.77 d(8.3)	6.83 d(8.2)
6′	7.19 d(8.3)	7.09 d(8.8)	6.63 dd(8.3, 2.2)	6.66 dd(8.2, 2.1)
7′	2.99 m	2.94 m	2.90 m	2.91 m
8′	2.87 t(7.6)	2.83 m	2.83 m	2.91 m

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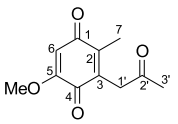
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5 Quinones

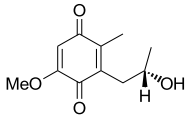
5.1 Benzoquinone-type quinones

Table 5-1-1: Cos, MFs, and TSs of benzoquinone-type quinones **5-1-1**~**5-1-21**.

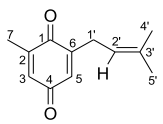
No.	Compounds	MFs	Test solvents	References
5-1-1	anserinone A	$C_{11}H_{12}O_4$	$CDCl_3$	[1]
5-1-2	anserinone B	$C_{11}H_{14}O_4$	$CDCl_3$	[1]
5-1-3	2-methyl-6-(3-methyl-2-butenyl)benzo-1,4-quinone	$C_{12}H_{14}O_2$	–	[2]
5-1-4	3-hydroxy-2-methyl-5-(3-methyl-2-butenyl)benzo-1,4-quinone	$C_{12}H_{14}O_3$	–	[2]
5-1-5	2-methoxy-5-(1-hydroxypentyl)-1,4-benzoquinone	$C_{12}H_{16}O_4$	$CDCl_3$	[3]
5-1-6	2-methoxy-6-benzyl-1,4-benzoquinone	$C_{14}H_{12}O_3$	$CDCl_3$	[3]
5-1-7	heliotropinone A	$C_{18}H_{22}O_4$	$CDCl_3$	[4]
5-1-8	heliotropinone B	$C_{18}H_{22}O_4$	$CDCl_3$	[4]
5-1-9	(1a*S**,1b*S**,7a*S**,8a*S**)-4,5-dimethoxy-1a,7a-dimethyl-1,1a,1b,2,7,7a,8,8a-octahydrocyclopropa[3,4]cyclopenta[1,2-*b*]-naphthalene-3,6-dione	$C_{18}H_{22}O_4$	$CDCl_3$	[5]
5-1-10	atrovirinone	$C_{25}H_{28}O_8$	$CDCl_3$	[6]
5-1-11	chabrolobenzoquinone E	$C_{27}H_{38}O_3$	$CDCl_3$	[7]
5-1-12	chabrolobenzoquinone F	$C_{29}H_{40}O_4$	$CDCl_3$	[7]
5-1-13	chabrolobenzoquinone G	$C_{27}H_{38}O_3$	$CDCl_3$	[7]
5-1-14	chabrolobenzoquinone H	$C_{29}H_{42}O_5$	$CDCl_3$	[7]
5-1-15	2-methoxy-6-nonadecyl-1,4-benzoquinone	$C_{26}H_{44}O_3$	$CDCl_3$	[3]
5-1-16	(–)-*α*-tocospirone	$C_{29}H_{50}O_4$	$CDCl_3$	[8]
5-1-17	2,5-dihydroxy-3-(nonadec-14-enyl)-1,4-benzoquinone	$C_{25}H_{40}O_4$	$CDCl_3$	[9]
5-1-18	maesaquinone	$C_{26}H_{42}O_4$	$CDCl_3$	[9]
5-1-19	methylvilangin	$C_{36}H_{54}O_8$	$CDCl_3$	[9]
5-1-20	methylanhydrovilangin	$C_{36}H_{52}O_7$	$CDCl_3$	[9]
5-1-21	lanciaquinone	$C_{27}H_{36}O_7$	$CDCl_3$	[9]



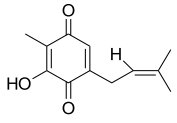
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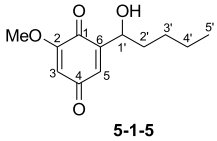
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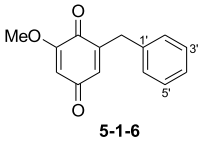
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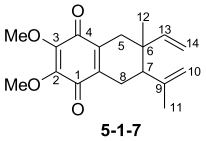
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5-1-5



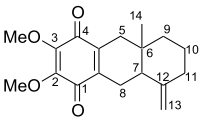
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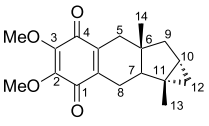
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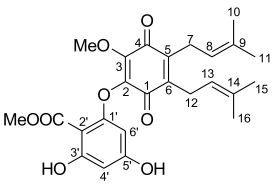
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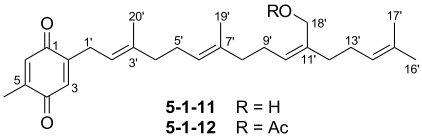
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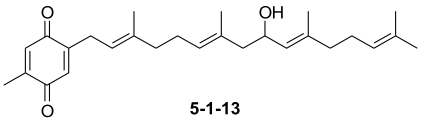
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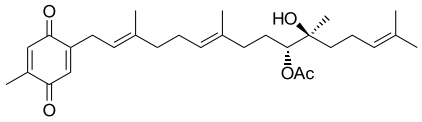
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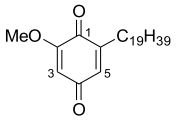
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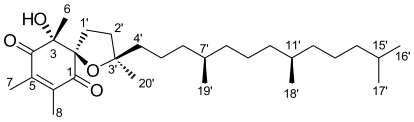
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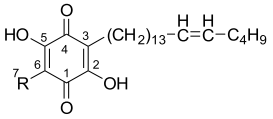
5-1-14



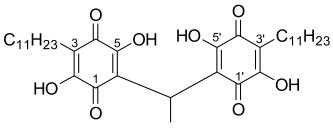
5-1-15



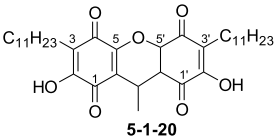
5-1-16



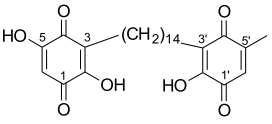
5-1-17 R = H
5-1-18 R = Me



5-1-19



5-1-20



5-1-21

Table 5-1-2: ^{1}H NMR spectroscopic data of benzoquinone-type quinones **5-1-1**~**5-1-6**.

H	5-1-1	5-1-2	5-1-3	5-1-4	5-1-5	5-1-6
2					3.81 s(OMe)	3.80 s(OMe)
3			6.50 s		5.89 d(2.5)	5.86 d(2.3)
5	3.79 s(OMe)	3.78 s(OMe)	6.42 s		6.69 dt(2.5, 1.5)	6.29 dt(2.3, 1.6)
6	5.92 s	5.90 s		6.46 s		
7	1.97 s	2.08 s	2.00 s	1.94 s		

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Table 5-1-2 (continued)

H	5-1-1	5-1-2	5-1-3	5-1-4	5-1-5	5-1-6
1′	3.65 s	2.68 d(6.6)	3.07 d(7.5)	3.15 d(6.8)	4.69 m	
2′		3.96 m	5.10 br t(7.5)	5.13 br t(7.5)	1.7 m	7.19 br d(6.7)
3′	2.26 s	1.25 d(6.2)			1.38 m	7.31 br t(7.1)
4′			1.69 s	1.62 s	1.38 m	7.24 tt(7.3, 1.4)
5′			1.58 s	1.75 s	0.89 t(7.3)	7.31 br t(7.1)
6′						7.19 br d(6.7)
7′						3.74 d(1.4)

Table 5-1-3: ^{1}H NMR spectroscopic data of benzoquinone-type quinones **5-1-7**~**5-1-10**.

H	5-1-7	5-1-8	5-1-9	5-1-10
2	4.00 s(OMe)	4.00 s(OMe)	3.98 or 4.01 s(OMe)	
3	4.00 s(OMe)	4.00 s(OMe)	3.98 or 4.01 s(OMe)	4.04 s(OMe)
5	2.36 m	2.10 m	α 2.06	
	2.47 m	2.54 m	β 2.59 dd(18.9, 2.2)	
7	2.21 dd(5.9, 7.8)	2.00 t	1.17 dd(12.8, 5.3)	3.22 br d(7.0)
8	2.48 m	2.24 m	α 2.84 ddd(19.3, 5.3, 2.5)	4.95 m
	2.56 m	2.66 m	β 2.21	
9		1.42 m	α 1.00	
		1.72 m	β 2.03 dd(12.6, 6.8)	
10	4.91 br s, 4.71 br s	1.52 m, 1.64 m	1.22	1.69 s
11	1.74 s	2.02 m, 2.40 m		1.76 s
12	0.98 s		α 0.34 t(3.9), β 0.94	3.19 br d(7.0)
13	5.78 dd(10.7, 16.6)	4.71 s, 4.87 s	1.21 s	4.95 m
14	4.98 dd(10.7, 1)	0.66 s	0.85 s	
	4.96 d(16.6)			
15				1.66 s
16				1.69 s
2′				3.90 s(COOMe)
3′				11.90 s(OH)
4′				6.11d(2.4)
5′				5.59 s(OH)
6′				5.72 (2.4)

Table 5-1-4: ^{1}H NMR spectroscopic data of benzoquinone-type quinones **5-1-11**~**5-1-16**.

H	5-1-11	5-1-12	5-1-13	5-1-14	5-1-15	5-1-16
2					3.81 s(OMe)	
3	6.50 s	6.50 s	6.51 s	6.50 s	5.86 d(2.5)	
5					6.47 dt(2.5, 1.3)	

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Table 5-1-4 (continued)

H	5-1-11	5-1-12	5-1-13	5-1-14	5-1-15	5-1-16
6	6.59 q(1.5)	6.59 q(1.5)	6.59 q(1.5)	6.60 q(1.5)		1.35 s
7	2.03 d(1.5)	2.04 d(1.5)	2.03 d(1.5)	2.04 d(1.5)		2.04 s
8						2.05 s
1′	3.11 d(7.5)	3.11 d(7.5)	3.11 d(7.5)	3.11 d(7.2)	2.41 dt(7.9, 1.4)	1.68 m, 2.02 m
2′	5.15 t(7.5)	5.15 t(7.5)	5.15 m	5.13 t(7.2)	1.49 m	1.59 m, 1.92 m
3′					1.24 m	–
4′	2.08 m	2.08 m	2.08 m	2.09 m	1.24 m	1.58 m, 1.65 m
5′	2.12 m	2.12 m	2.14 m	2.12 m	1.24 m	–
6′	5.12 m	5.11 m	5.22 t(7.0)	5.11 m	1.24 m	–
8′	2.02 m	2.02 m	2.10 m	1.96 m	1.24 m	–
9′	2.16 m	2.17 m	4.43 m	1.71 m	1.24 m	–
10′	5.31 t(7.0)	5.41 t(7.5)	5.16 m	4.85 dd(9.6, 3.0)	1.24 m	–
12′	2.13 m	2.09 m	2.00 m	1.43 m, 1.54 m	1.24 m	–
13′	2.12 m	2.08 m	2.09 m	2.05 m	1.24 m	–
14′	5.11 m	5.09 m	5.09 t(7.0)	5.11 m	1.24 m	–
16′	1.69 s	1.68 s	1.68 s	1.68 s	1.24 m	0.85 d(6.7)
17′	1.61 s	1.60 s	1.60 s	1.62 s	1.24 m	0.84 d(6.7)
18′	4.12 s	4.59 s	1.68 s	1.17 s	1.24 m	0.82 d(6.7)
19′	1.61 s	1.60 s	1.67 s	1.60 s	0.87 t(6.9)	0.83 d(6.7)
20′	1.62 s	1.62 s	1.63 s	1.62 s		1.31 s
OAc		2.07 s		2.11 s		
OH						3.79 s(OH)

Table 5-1-5: ^{1}H NMR spectroscopic data of benzoquinone-type quinones **5-1-17**~**5-1-21**.

H	5-1-17	5-1-18	5-1-19	5-1-20	5-1-21
2	7.70 s(OH)	7.60 s(OH)	7.80 s(OH)	7.04 s(OH)	7.50 s(OH)
5	7.70 s(OH)	7.60 s(OH)	7.80 s(OH)		7.50 s(OH)
2′			7.80 s(OH)	7.04 s(OH)	7.50 s(OH)
5′			7.80 s(OH)		
5′-Me					1.94 s
6	6.00 s				6.0 s
6′					6.45 s
7		1.95 s			
3,3′-CH_2	2.40 t(15.3, 7.5)	2.40 t(15.0, 7.5)	2.43 t(15.1, 7.1)	2.44 t(15.4, 7.2)	2.40 t(15.3, 7.6)
nCH_2	1.50~1.10 m	1.50~1.20 m	1.50~1.20 m	1.50~1.20 m	1.50~1.20 m
CH_2CH=CH	2.0 m	2.0 m			
CH=CH	5.40 m	5.30 m			
Me	0.90 t(13.5, 6.7)	0.85 t(13.2, 7.4)	0.88 t(13.3, 6.2)	0.88 t(13.2, 6.4)	
CH-Me			4.40 q(7.5)	4.00 q(7.6)	
CH-Me			1.58 d(7.5)	1.30 d(7.4)	

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Bibliography

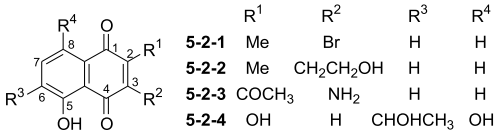
[1] Wang HJ, Gloer KB, Gloer JB. J Nat Prod, 1997, 60: 629.
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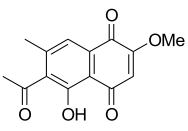
5.2 Naphthaquinone-type quinones

Table 5-2-1: Cos, MFs, and TSs of naphthaquinone-type quinones **5-2-1**~**5-2-11**.

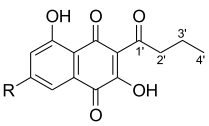
No.	Compounds	MFs	Test solvents	References
5-2-1	3-bromoplumbagin	$C_{11}H_7BrO_3$	$CDCl_3$	[10]
5-2-2	3-(2-hydroxyethyl)plumbagin	$C_{13}H_{12}O_4$	$CDCl_3$	[10]
5-2-3	5-hydroxy-3-amino-2-aceto-1,4-naphthoquinone	$C_{12}H_9NO_4$	$CDCl_3$	[11]
			CD_3COCD_3	[11]
5-2-4	cribrarione B	$C_{12}H_{10}O_6$	CD_3OD	[12]
5-2-5	2-methoxystypandrone	$C_{14}H_{12}O_5$	$CDCl_3$	[13]
5-2-6	2-butanoyl-3,6,8-trihydroxy-1,4-naphthoquinone 6-*O*-sulfate	$C_{14}H_{11}NaO_9S$	D_2O	[14]
5-2-7	2-butanoyl-3,6,8-trihydroxy-1,4-naphthoquinone	$C_{14}H_{12}O_6$	CD_3COCD_3	[14]
5-2-8	6-(1-ethoxyethyl)plumbagin	$C_{15}H_{16}O_4$	$CDCl_3$	[15]
5-2-9	8-formyl-7-hydroxy-5-isopropyl-2-methoxy-3-methyl-1,4-naphthoquinone	$C_{16}H_{16}O_5$	$CDCl_3$	[16]
5-2-10	2,7-dihydroxy-8-formyl-5-isopropyl-3-methyl-1,4-naphthoquinone	$C_{15}H_{14}O_5$	DMSO-d_6	[17]
5-2-11	7-hydroxy-5-isopropyl-2-methoxy-3-methyl-1,4-naphthoquinone	$C_{15}H_{16}O_4$	$CDCl_3$	[18]



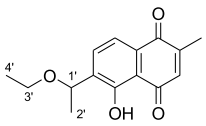
	R^1	R^2	R^3	R^4
5-2-1	Me	Br	H	H
5-2-2	Me	CH_2CH_2OH	H	H
5-2-3	$COCH_3$	NH_2	H	H
5-2-4	OH	H	$CHOHCH_3$	OH



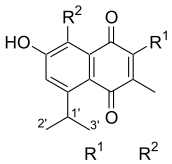
5-2-5



5-2-6 R = OSO_3Na
5-2-7 R = OH



5-2-8



	R^1	R^2
5-2-9	OMe	CHO
5-2-10	OH	CHO
5-2-11	OMe	H

Table 5-2-2: ^{1}H NMR spectroscopic data of naphthaquinone-type quinones **5-2-1**~**5-2-3**.

H	5-2-1	5-2-2	5-2-3($CDCl_3$)	5-2-3(CD_3COCD_3)
2	2.38 s(Me)	2.24 s(Me)		
5	11.78 s(OH)	12.11 s(OH)	11.38 s(OH)	11.40 s(OH)
6	7.26 dd(1.5, 8.0)	7.23 dd(1.0, 8.0)	7.21 dd(7.9, 1.8)	7.23 dd(8.4, 1.1)
7	7.62 t(8.0)	7.58 t(8.0)	7.73	7.83 dd(8.4, 7.6)
8	7.66 dd(1.5, 8.0)	7.62 dd(1.0, 8.0)	7.76	7.70 dd(7.6, 1.1)
1′		2.95 t(6.5)	2.73 s	2.62 s
2′		3.86 t(6.5), 2.19 br s(OH)		
NH_2			7.12 br s, 10.69 br s	10.71, 8.17 br s

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Table 5-2-3: ^{1}H NMR spectroscopic data of naphthaquinone-type quinones **5-2-4**~**5-2-7**.

H	5-2-4	5-2-5	5-2-6	5-2-7
2		3.91 s(OMe)		
3	5.67 s	6.09 s		
5		12.49 s(OH)	7.23 d(2.3)	6.97 d(1.4)
7	7.17 d(0.8)	2.33 s(Me)	6.93 d(2.3)	6.56 d(1.4)
8		7.50 s		
1′	5.13 qd(6.6, 0.8)			
2′	1.43 d(6.6)		2.64 t(7.5)	2.86 t(7.5)
3′			1.45 tq(7.5)	1.58 tq(7.5)
4′			0.73 t(7.5)	0.86 t(7.5)

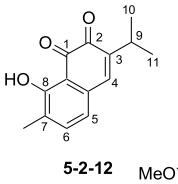
Table 5-2-4: ^{1}H NMR spectroscopic data of naphthaquinone-type quinones **5-2-8**~**5-2-11**.

H	5-2-8	5-2-9	5-2-10	5-2-11
2	2.19 d(1.5, Me)	4.02 s(OMe)	10.68 s(OH)	4.03 s(OMe)
3	6.79 q(1.5)	2.04 s(Me)	1.88 s(Me)	2.08 s(Me)
5	12.31 s(OH)			
6		7.24 s	7.24 s	7.17 d(2.7)
7	7.77 d(7.8)	12.32 s(OH)	11.06 s(OH)	6.70 br s(OH)
8	7.67 d(7.8)	10.45 s(CHO)	10.16 s(CHO)	7.51d(2.7)
1′	4.92 q(6.4)	4.15 sept(6.8)	4.31 sept(6.8)	4.34 sept(6.8)
2′	1.43 d(6.4)	1.25 d(6.8)	1.17 d(6.8)	1.25 d(6.8)
3′	3.40 dq(9.2, 7.0)	1.25 d(6.8)	1.17 d(6.8)	1.25 d(6.8)
	3.46 dq(9.2, 7.0)			
4′	1.23 t(7.0)			

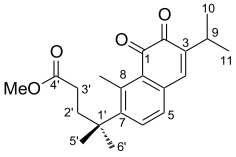
Table 5-2-5: Cos, MFs, and TSs of naphthaquinone-type quinones **5-2-12**~**5-2-23**.

No.	Compounds	MFs	Test solvents	References
5-2-12	lanigerone	$C_{14}H_{14}O_3$	$CDCl_3$	[19]
5-2-13	salvigerone	$C_{21}H_{26}O_4$	$CDCl_3$	[19]
5-2-14	davidianone A	$C_{15}H_{12}O_4$	$CDCl_3$	[20]
5-2-15	davidianone B	$C_{16}H_{12}O_5$	$CDCl_3$	[20]
5-2-16	davidianone C	$C_{17}H_{16}O_5$	$CDCl_3$	[20]
5-2-17	mansonone F	$C_{15}H_{12}O_3$	$CDCl_3$	[20]
5-2-18	mansonone E	$C_{15}H_{14}O_3$	$CDCl_3$	[20]
5-2-19	mansonone H	$C_{15}H_{14}O_4$	CD_3OD	[20]
5-2-20	mansonone I	$C_{15}H_{14}O_4$	CD_3OD	[20]
5-2-21	fusarnaphthoquinone A	$C_{15}H_{18}O_7$	$CDCl_3$	[21]
5-2-22	arthoniafurone B	$C_{14}H_{10}O_5$	DMSO-d_6	[22]
5-2-23	fusarnaphthoquinone B	$C_{15}H_{16}O_5$	$CDCl_3$	[21]

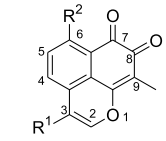
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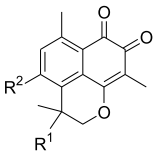
5-2-12



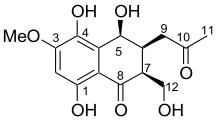
5-2-13



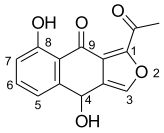
	R^1	R^2
5-2-14	CH_2OH	Me
5-2-15	Me	COOMe
5-2-16	Me	$CH(OMe)_2$
5-2-17	Me	Me



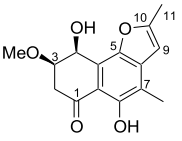
	R^1	R^2
5-2-18	H	H
5-2-19	H	OH
5-2-20	OH	H



5-2-21



5-2-22



5-2-23

Table 5-2-6: ^{1}H NMR spectroscopic data of naphthaquinone-type quinones **5-2-12**, **5-2-13**, and **5-2-21**~**5-2-23**.

H	5-2-12	5-2-13	5-2-21	5-2-22	5-2-23
1			11.67 s(OH)		
2			6.37 s		3.16 dd(16.8, 11.1)
					2.89 ddd(16.8, 4.8, 0.9)
3				8.26 d(1.2)	3.83 ddd(11.1, 4.8, 3.3)
4	7.05 s	7.02 s		5.72 br s	5.60 br s
					2.70 d(1.8, OH)
5	6.72 d(7.3)	7.00 d(7.6)	5.39 s	7.27 dt(7.9, 0.9)	
6	7.34 d(7.3)	7.19 d(7.6)	2.87 dd(8.1, 5.4)	7.66 dd(7.9, 7.9)	
7	2.26 s(Me)		2.99 d(5.4)	6.97 dd(7.9, 0.9)	
8	12.30 s(OH)	2.56 s(Me)		12.47 s(OH)	12.34 s(OH)
9	3.05 hept(7.1)	2.95 hept(7.0)	2.76 dd(17.7, 8.1)		6.41 q(0.9)
			2.49 dd(17.7, 5.4)		
10	1.17 d(7.1)	1.16 d(7)			
11	1.17 d(7.1)	1.16 d(7)	2.20 s	2.71 s	2.50 d(0.9)

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Table 5-2-6 (continued)

H	5-2-12	5-2-13	5-2-21	5-2-22	5-2-23
12			4.18 dd(9.0, 5.4) 3.77 d(9.0)		2.33 s
2′		2.14 m			
3′		2.26 m			
5′		1.42 s			
6′		1.42 s			
OMe		3.69 s	3.91 s		3.55 s

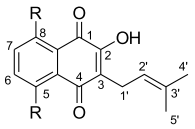
Table 5-2-7: ^{1}H NMR spectroscopic data of naphthaquinone-type quinones **5-2-14**~**5-2-20**.

H	5-2-14	5-2-15	5-2-16	5-2-17	5-2-18	5-2-19	5-2-20
2	7.28 s	7.09 d(1.5)	7.09 d(1.2)	7.08 d(1.2)	4.23 dd(10.7, 5.1) 4.41 dd(10.7, 3.9)	4.28 dd(10.3, 3.5) 4.40 br d(10.3)	4.24 d(10.8) 4.30 d(10.8)
3	4.65 d (4.5, CH_2)	2.11 d (1.5, Me)	2.12 d (6.8, Me)	2.11 d (1.2, Me)	3.10 m 1.37 d(6.8, Me)	3.21 m 1.24 d(7.3, Me)	1.56 s(Me)
4	7.73 d(8.4)	7.58 d(8.3)	7.61 d(8.3)	7.47 d(8.3)	7.35 d(7.8)		7.82 d(7.8)
5	7.70 d(8.4)	7.52 d(8.3)	7.98 d(8.3)	7.41 d(8.3)	7.25 d(7.8)	6.33 s	7.44 d(7.8)
6	2.78 s(Me)		6.15 s(CH)	2.70 s(Me)	2.63 s(Me)	2.48 s(Me)	2.63 s(Me)
9	2.00 s(Me)	1.97 s(Me)	1.97 s(Me)	1.97 s(Me)	1.94 s(Me)	1.85 s(Me)	1.92 s(Me)
OMe		3.96 s	3.53 s, 3.53 s				

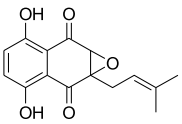
Table 5-2-8: Cos, MFs, and TSs of naphthaquinone-type quinones **5-2-24**~**5-2-35**.

No.	Compounds	MFs	Test solvents	References
5-2-24	lapachol	$C_{15}H_{14}O_3$	–	[23]
5-2-25	hydroxysesamone	$C_{15}H_{14}O_5$	$CDCl_3$	[24]
5-2-26	2,3-epoxysesamone	$C_{15}H_{14}O_5$	C_6D_6	[24]
5-2-27	lantalucratin D	$C_{17}H_{18}O_5$	$CDCl_3$	[25]
5-2-28	lantalucratin E	$C_{17}H_{18}O_6$	$CDCl_3$	[25]
5-2-29	lantalucratin F	$C_{17}H_{18}O_7$	$CDCl_3$	[25]
5-2-30	3,5,8-trihydroxy-6-methoxy-2-(5-oxohexa-1,3-dienyl)-1,4-naphthoquinone	$C_{17}H_{14}O_7$	DMSO-d_6	[26]
5-2-31	butylshikonin	$C_{20}H_{22}O_6$	$CDCl_3$	[27]
5-2-32	rhinacanthin D	$C_{23}H_{20}O_7$	$CDCl_3$	[28]
5-2-33	rhinacanthin M	$C_{22}H_{20}O_5$	$CDCl_3$	[29]
5-2-34	rhinacanthin N	$C_{27}H_{24}O_7$	$CDCl_3$	[29]
5-2-35	rhinacanthin Q	$C_{28}H_{26}O_7$	$CDCl_3$	[30]

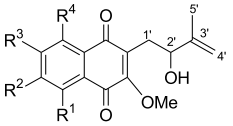
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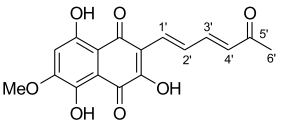
5-2-24 R = H
5-2-25 R = OH



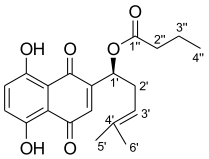
5-2-26



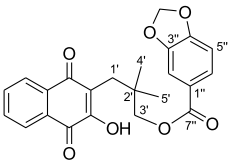
	R^1	R^2	R^3	R^4
5-2-27	OMe	H	H	H
5-2-28	OMe	H	H	OH
5-2-29	H	OMe	OH	OH



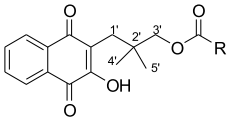
5-2-30



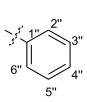
5-2-31



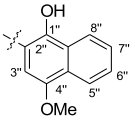
5-2-32



5-2-33 R =



5-2-34 R =



5-2-35 R =

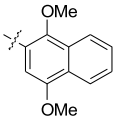


Table 5-2-9: ^{1}H NMR spectroscopic data of naphthaquinone-type quinones **5-2-24** and **5-2-25**.

H	5-2-24	5-2-25	H	5-2-24	5-2-25
2	7.30 br s(OH)	7.37 br s(OH)	8	8.11 dd(6.4, 1.3)	11.46 br s(OH)
5	8.16 dd(6.4, 1.3)	12.82 br s(OH)	1′	3.32 d(6.6)	3.28 br d(7.3)
6	7.80 td(6.4, 1.5)	7.26 d(9.4)	2′	5.23 t(6.7)	5.16 tqq(7.3, 1.4, 1.4)
7	7.73 td(6.4, 1.5)	7.14 d(9.4)	4′, 5′	1.80 s, 1.70 s	1.67 br s, 1.76 br s

Table 5-2-10: ^{1}H NMR spectroscopic data of naphthaquinone-type quinones **5-2-26**~**5-2-29**.

H	5-2-26	5-2-27	5-2-28	5-2-29
2	3.48 s			
5	11.89 s(OH)			7.45 s
6	6.68 d(9.4)	7.27 d(8.1)	7.26 or 7.29 d(9.2)	
7	6.71 d(9.4)	7.65 t(8.1)	7.26 or 7.29 d(9.2)	
8	11.71 s(OH)	7.74 dd(0.8, 8.1)	12.70 s(OH)	13.40 s(OH)

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Table 5-2-10 (continued)

H	5-2-26	5-2-27	5-2-28	5-2-29
1′	2.46 br dd(15.4, 6.9)	2.82 dd(8.0, 13.0)	2.82 dd(9.4, 14.6)	2.85~2.89 m
	2.74 br dd(15.4, 8.2)	2.90 dd(4.3, 13.0)	2.88 dd(4.2, 14.6)	
2′	4.92 ddqq(8.2, 6.9, 1.4, 1.4)	4.26 dd(4.3, 8.0)	4.27 dd(4.2, 9.4)	4.31 t(6.3)
4′	1.53 br s	4.83 s, 4.97 s	4.85 s, 4.98 s	4.87 s, 5.00 s
5′	1.44 br s	1.83 s	1.84 s	1.85 s
OMe		4.02 s, 4.15 s	3.98 s, 4.18 s	3.97 s, 4.21 s

Table 5-2-11: ^{1}H NMR spectroscopic data of naphthaquinone-type quinones **5-2-30**~**5-2-33**.

H	5-2-30	5-2-31	5-2-32	5-2-33
3		6.98 d(4)		
5			7.90 d(8)	8.07 d(7.6)
6	3.93 s(OMe)	7.16 s	7.71 t(8)	7.71 t(7.6)
7	6.83 s	7.16 s	7.70 d(8)	7.66 t(7.6)
8			8.03 d(8)	8.05 d(7.6)
1′	7.24 d(15.5)	6.02 m	2.71 s	2.78 s
2′	7.62 dd(15.5, 15.4)	2.56 m		
3′	7.42 dd(15.5, 15.4)	5.16 m	4.06 s	4.11 s
4′	6.21 d(15.5)		1.12 s	1.08 s
5′		1.75 s	1.12 s	1.08 s
6′	2.26 s	1.58 s		
2″		2.30 t(6)	7.24 d(2)	7.99 dd(7.6, 1.6)
3″		1.25 m		7.35 t(7.6)
4″		0.88 t(8)		7.50 tt(7.6, 1.6)
5″			6.71 d(8)	7.35 t(7.6)
6″			7.49 dd(8, 2)	7.99 dd(7.6, 1.6)
OH	13.71 s, 12.26 s	12.37 s, 12.43 s		
OCH_2O			5.98 s	

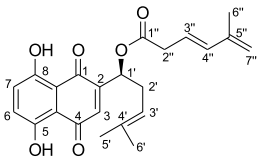
Table 5-2-12: ^{1}H NMR spectroscopic data of naphthaquinone-type quinones **5-2-34** and **5-2-35**.

H	5-2-34	5-2-35	H	5-2-34	5-2-35
5	7.97 dd(7.6, 1.2)	7.84 dd(7.6, 1.2)	1″	11.54 br s(OH)	3.95 s(OMe)
6	7.52 td(7.6, 1.2)	7.48 td(7.6, 1.2)	3″	7.00 s	7.14 s
7	7.57 td(7.6, 1.2)	7.39 td(7.6, 1.2)	4″	3.86 s(OMe)	3.96 s(OMe)
8	8.00 dd(7.6, 1.2)	7.90 dd(7.6, 1.2)	5″	8.13 br d(8.4)	8.1~8.2 m
1′	2.80 s	2.79 s	6″	7.61 ddd(8.4, 6.8, 1.6)	7.5~7.6 m
3′	4.18 s	4.16 s	7″	7.55 ddd(8.4, 6.8, 1.6)	7.5~7.6 m
4′, 5′	1.15 s, 1.15 s	1.16 s, 1.16 s	8″	8.35 br d(8.4)	8.0~8.1 m

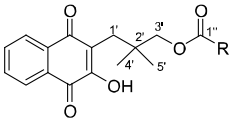
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Table 5-2-13: Cos, MFs, and TSs of naphthaquinone-type quinones **5-2-36**~**5-2-46**.

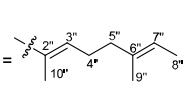
No.	Compounds	MFs	Test solvents	References
5-2-36	2′-methylhexa-1′,3′-dienoylshikonin	$C_{23}H_{24}O_6$	$CDCl_3$	[27]
5-2-37	rhinacanthin C	$C_{25}H_{30}O_5$	$CDCl_3$	[28]
5-2-38	rhinacanthin G	$C_{25}H_{30}O_6$	$CDCl_3$	[29]
5-2-39	rhinacanthin H	$C_{25}H_{30}O_6$	$CDCl_3$	[29]
5-2-40	rhinacanthin I	$C_{25}H_{30}O_6$	$CDCl_3$	[29]
5-2-41	rhinacanthin J	$C_{25}H_{28}O_6$	$CDCl_3$	[29]
5-2-42	rhinacanthin K	$C_{25}H_{32}O_7$	$CDCl_3$	[29]
5-2-43	rhinacanthin L	$C_{25}H_{32}O_8$	$CDCl_3$	[29]
5-2-44	cordiaquinone A	$C_{21}H_{26}O_3$	CD_3COCD_3	[31]
5-2-45	chabrolonaphthoquinone A	$C_{27}H_{32}O_4$	$CDCl_3$	[32]
5-2-46	chabrolonaphthoquinone B	$C_{29}H_{38}O_5$	$CDCl_3$	[33]



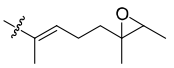
5-2-36



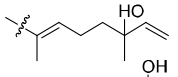
5-2-37 R =



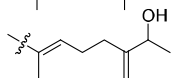
5-2-38 R =



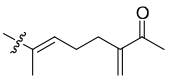
5-2-39 R =



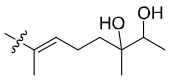
5-2-40 R =



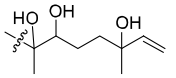
5-2-41 R =

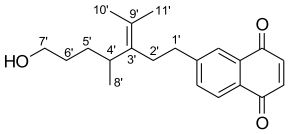


5-2-42 R =

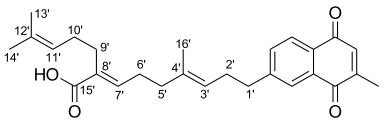


5-2-43 R =

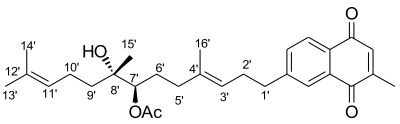




5-2-44



5-2-45



5-2-46

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Table 5-2-14: ^{1}H NMR spectroscopic data of naphthaquinone-type quinones **5-2-36**~**5-2-39**.

H	5-2-36	5-2-37	5-2-38	5-2-39
3	7.11 d(4)			
5		8.09 d(8)	8.06 dd(7.6, 1.2)	8.00 dd(7.6, 1.2)
6	7.18 s	7.70 t(8)	7.70 td(7.6, 1.2)	7.61 td(7.6, 1.2)
7	7.18 s	7.77 t(8)	7.75 td(7.6, 1.2)	7.68 td(7.6, 1.2)
8		8.12 d(8)	8.10 dd(7.6, 1.2)	8.03 dd(7.6, 1.2)
1′	6.02 m	2.71 s	2.70 s	2.63 s
2′	2.36 m			
3′	5.08 m	3.90 s	3.92 s	3.83 s
4′		1.02 s	1.02 s	0.94 s
5′	1.59 s	1.02 s	1.02 s	0.94 s
6′	1.69 s			
2″	2.58 br s			
3″	5.80 m	6.70 t(7)	6.70 tq(7.6, 1.2)	6.64 tq(7.6, 1.6)
4″	5.36 d(7)	2.17 dt(7)	2.21 q(7.6)	2.0~2.3 m
5″		2.02 t(7)	1.5~1.7 m	1.5~1.8 m
6″	4.74 br s, 4.70 br s			
7″	1.65 s	5.20 d(7)	2.86 q(4.0)	5.82 dd(17.2, 10.8)
8″		1.56 d(7)	1.30 d(4.0)	5.02 dd(10.8, 1.2)
				5.16 dd(17.2, 1.2)
9″		1.59 br s	1.27 s	1.23 s
10″		1.80 br s	1.82 d(1.2)	1.72 d(1.6)
OH	12.42 s, 12.60 s			

Table 5-2-15: ^{1}H NMR spectroscopic data of naphthaquinone-type quinones **5-2-40**~**5-2-43**.

H	5-2-40	5-2-41	5-2-42	5-2-43
5	7.98 dd(7.6, 1.2)	8.08 d(7.2)	8.00 d(7.6)	8.12 d(7.6)
6	7.60 td(7.6, 1.2)	7.67 t(7.2)	7.61 t(7.6)	7.69 t(7.6)
7	7.67 td(7.6, 1.2)	7.75 t(7.2)	7.68 t(7.6)	7.76 t(7.6)
8	8.02 dd(7.6, 1.2)	8.11 d(7.2)	8.05 d(7.6)	8.12 d(7.6)
1′	2.62 s	2.67 s	2.63 s	2.71 s
3′	3.82 s	3.90 s	3.86 s	3.89 d(10.7)
				4.02 d(10.7)
4′	0.93 s	1.01 s	0.95 s	1.00 s
5′	0.93 s	1.01 s	0.95 s	1.03 s
3″	6.67 tq(7.2, 1.2)	6.68 t(6.5)	6.69 t(7.6)	4.25 dd(10.8, 2.2)
4″	2.2~2.3 m	2.3~2.4 m	2.1~2.4 m	1.9~2.2 m
5″	2.03 dt(15.2, 7.6)	2.24 t(6.7)	1.2~1.7 m	1.5~1.9 m
	2.11 dt(15.2, 7.6)			
7″	4.20 q(6.4)		3.60 q(6.0)	6.07 dd(17.7, 11.0)
8″	1.22 d(6.4)	2.33 s	1.19 d(6.0)	5.18 d(11.0)
				5.25 d(17.7)
9″	4.71 s, 5.02 s	5.78 s, 6.03 s	1.19 s	1.20 s
10″	1.73 d(1.2)	1.77 s	1.75 s	1.35 s

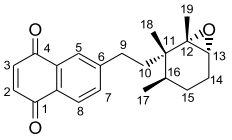
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Table 5-2-16: ^{1}H NMR spectroscopic data of naphthaquinone-type quinones **5-2-44**~**5-2-46**.

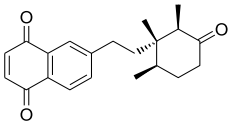
H	5-2-44	5-2-45	5-2-46	H	5-2-44	5-2-45	5-2-46
2	7.01 s	6.81 d(1.5)	6.81 d(1.0)	6′	1.47 m	2.28 m	1.69 m
3	7.01 s	2.19 d(1.5, Me)	2.18 d(1.0, Me)	7′	3.53 m	6.84 t(7.5)	4.82 dd(10.5, 2.5) 2.10 s(OAc)
5	7.96 d(7.8)	7.91 d(1.5)	7.90 d(1.5)	8′	1.05 d(6.8)		4.75 s(OH)
6	7.76 dd(7.8, 2.0)			9′		2.31 m	1.43 m, 1.54 m
7		7.53 dd(8.0, 1.5)	7.53 dd(8.0, 1.5)	10′	1.79 s	2.10 m	2.04 m
8	7.88 d(1.9)	7.96 d(8.0)	7.96 d(8.0)	11′	1.72 s	5.12 t(7.5)	5.11 t(7.0)
1′	2.85 m	2.78 t(7.5)	2.78 t(7.5)	13′		1.68 s	1.69 s
2′	2.31 m	2.38 m	2.35 m	14′		1.59 s	1.62 s
3′		5.18 t(7.0)	5.16 t(7.0)	15′			1.16 s
4′	2.81 m			16′		1.56 s	1.50 s
5′	1.47 m	2.10 m	1.95 m				

Table 5-2-17: Cos, MFs, and TSs of naphthaquinone-type quinones **5-2-47**~**5-2-55**.

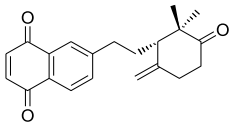
No.	Compounds	MFs	Test solvents	References
5-2-47	cordiaquinone E	$C_{21}H_{24}O_3$	$CDCl_3$	[34]
5-2-48	cordiaquinone B	$C_{21}H_{24}O_3$	$CDCl_3$	[34]
5-2-49	cordiaquinone K	$C_{21}H_{22}O_3$	CD_3COCD_3	[31]
5-2-50	cordiaquinone F	$C_{26}H_{30}O_5$	$CDCl_3$	[34]
5-2-51	cordiaquinone G	$C_{21}H_{26}O_4$	$CDCl_3$	[34]
5-2-52	cordiaquinone H	$C_{21}H_{26}O_4$	$CDCl_3$	[34]
5-2-53	cordiaquinone J	$C_{21}H_{24}O_3$	CD_3COCD_3	[31]
5-2-54	hygrocin A	$C_{28}H_{31}NO_8$	DMSO-d_6	[35]
5-2-55	hygrocin B	$C_{28}H_{29}NO_8$	CD_3OD	[35]



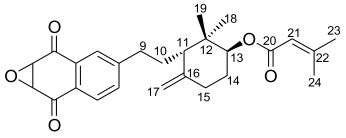
5-2-47



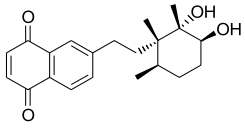
5-2-48



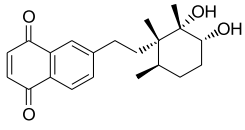
5-2-49



5-2-50

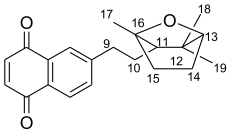


5-2-51

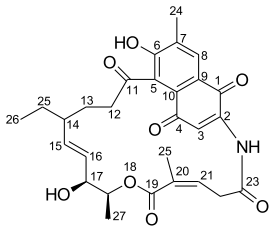


5-2-52

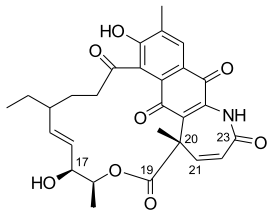
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5-2-53



5-2-54



5-2-55

Table 5-2-18: ^{1}H NMR spectroscopic data of naphthaquinone-type quinones **5-2-47**~**5-2-50**.

H	5-2-47	5-2-48	5-2-49	5-2-50
2	6.93 s	6.97 s	7.01 s	4.00 br s
3	6.93 s	6.97 s	7.01 s	4.00 br s
5	7.86 d(1.8)	7.89 d(1.9)	7.84 d(1.9)	7.80 d(1.8)
7	7.54 dd(7.8, 1.7)	7.57 dd(7.8, 1.8)	7.71 dd(8.0, 1.9)	7.57 dd(8.1, 1.8)
8	7.99 d(7.8)	8.02 d(7.8)	7.95 d(7.8)	7.92 d(8.1)
9	2.85 td(12.7, 3.4)	2.80 td(13.1, 4.9)	2.74 m	2.85 m
	2.62 td(12.7, 3.4)	2.64 td(13.1, 4.9)	2.60 m	2.53 m
10	1.78 m, 1.66 m	1.66 m, 1.65 m	1.94 m, 1.50 m	1.91 m, 1.88 m
11			2.33 dd(12.0, 3.7)	1.79 m
12		2.60 q(6.8)		
13	3.03 br s			4.71 dd(2.1, 3.6)
14	2.02 m, 1.72 m	2.41 m	2.67 m, 2.24 m	1.86 m, 1.63 m
15	1.42 m, 1.13 m	1.93 m, 1.68 m	2.67 m, 2.57 m	2.35 m, 2.07 m
16	1.52 m	2.14 m		
17	0.83 d(6.8)	1.01 d(6.4)	5.14 s, 4.95 s	4.97 br s, 4.69 br s
18	0.91 s	0.63 s	1.18 s	0.94 s
19	1.31 s	1.03 d(6.8)	0.99 s	0.82 s
21				5.64 br s
23				2.17 d(1.2)
24				1.89 d(1.2)

Table 5-2-19: ^{1}H NMR spectroscopic data of naphthaquinone-type quinones **5-2-51**~**5-2-55**.

H	5-2-51	5-2-52	5-2-53	5-2-54	5-2-55
2	6.92 s	6.92 s	7.00 s	7.10 s	
3	6.92 s	6.92 s	7.00 s		
5	7.86 d(1.9)	7.86 d(1.9)	7.85 d(1.3)		
7	7.54 dd(8.0, 1.8)	7.54 dd(8.0, 1.8)	7.72 dd(8.0, 1.8)	2.31 s(Me)	2.35 s(Me)
8	7.97 d(7.8)	7.97 d(7.8)	7.95 d(7.8)	7.67 s	7.91 s
9	2.96 td(13.2, 4.9)	3.15 td(13.2, 5.4)	2.80 m		
	2.72 td(13.2, 4.9)	2.82 td(13.2, 4.9)			
10	1.85 m, 1.70 m	1.69 m, 1.67 m	1.63 m, 1.72 m		
11			1.37 m		

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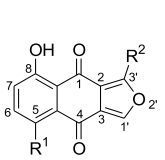
Table 5-2-19 (continued)

H	5-2-51	5-2-52	5-2-53	5-2-54	5-2-55
12				2.40 m	2.73 dd(7.8, 1.6)
13	3.67 dd(5.9, 3.9)	3.72 dd(11.8, 4.9)	3.67 d(5.4)	1.60 m, 1.81 m	1.53 m, 2.03 m
14	1.96 m, 1.57 m	1.82 m, 1.38 m	1.93 m, 1.59 m	1.45 br	1.51 m
15	1.55 m	1.48 m, 1.36 m	1.55 m, 1.37 m	5.27 dd(16.2, 7.5)	5.28 dd(16.0, 6.1)
16	2.00 m	1.55 m		5.03 dd(16.2, 3.5)	5.24 dd(16.0, 6.1)
17	0.98 d(6.9)	0.84 d(6.1)	1.32 s	3.88 br d(3.5)	3.98 br d(3.5)
18	1.01 s	1.01 s	1.12 s	4.64 br q(6.8)	4.86 br q(6.8)
19	1.34 s	1.28 s	1.08 s		
21				6.36 br	6.18 d(12.0)
22				3.57 br d	6.02 d(12.0)
25				1.24 m, 1.27 m	1.32 m
26				0.77 br t(6.0)	0.80 t(6.5)
27				0.84 br d(6.5)	1.29 d(6.8)
28				1.88 s	1.56 s
OH				9.42 br, 9.60 br	
NH				10.23 br	

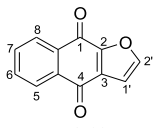
Table 5-2-20: Cos, MFs, and TSs of naphthaquinone-type quinones **5-2-56**~**5-2-68**.

No.	Compounds	MFs	Test solvents	References
5-2-56	arthoniafurone A	$C_{14}H_8O_5$	$CDCl_3$	[22]
5-2-57	8-hydroxy-1-methylnaphtho[2,3-*c*]furan-4,9-dione	$C_{13}H_8O_4$	$CDCl_3$	[36]
5-2-58	5,8-dihydroxy-1-methylnaphtho[2,3-*c*]furan-4,9-dione	$C_{13}H_8O_5$	$CDCl_3$	[36]
5-2-59	5,8-dihydroxy-1-hydroxymethylnaphtho-[2,3-*c*]furan-4,9-dione	$C_{13}H_8O_6$	$CDCl_3$	[36]
5-2-60	avicequinone B	$C_{12}H_6O_3$	$CDCl_3$	[37]
5-2-61	avicequinone C	$C_{15}H_{12}O_4$	$CDCl_3$	[37]
5-2-62	avicequinone D	$C_{15}H_{12}O_5$	$CDCl_3$	[38]
5-2-63	2-(1′-methylethenyl)naphtho[2,3-*b*]furan-4,9-dione	$C_{15}H_{10}O_3$	$CDCl_3$	[39]
5-2-64	2-(1′-methylethenyl)-5-hydroxynaphtho-[2,3-*b*]furan-4,9-dione	$C_{15}H_{10}O_4$	$CDCl_3$	[39]
5-2-65	2-(1′-methylethenyl)-7-hydroxynaphtho-[2,3-*b*]furan-4,9-dione	$C_{15}H_{10}O_4$	$CDCl_3$	[39]
5-2-66	2-isopropenyl-9-methoxy-1,8-dioxa-dicyclopenta[*b*,*g*]naphthal-ene-4,10-dione	$C_{18}H_{12}O_5$	$CDCl_3$	[40]
5-2-67	9-hydroxy-2-isopropenyl-1,8-dioxa-dicyclopenta[*b*,*g*]naphthal-ene-4,10-dione	$C_{17}H_{10}O_5$	$CDCl_3$	[40]
5-2-68	2-(1-hydroxy-1-methyl-ethyl)-9-methoxy-1,8-dioxa-dicyclo-penta[*b*,*g*]naphthalene-4,10-dione	$C_{18}H_{14}O_6$	$CDCl_3$	[40]

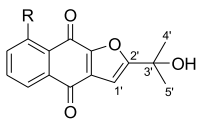
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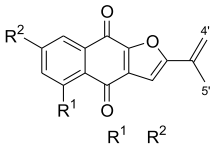
	R^1	R^2
5-2-56	H	COMe
5-2-57	H	Me
5-2-58	OH	Me
5-2-59	OH	CH_2OH



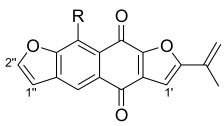
5-2-60



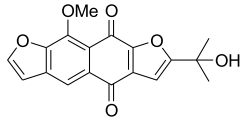
5-2-61 R = H
5-2-62 R = OH



	R^1	R^2
5-2-63	H	H
5-2-64	OH	H
5-2-65	H	OH



5-2-66 R = OMe
5-2-67 R = OH



5-2-68

Table 5-2-21: ^{1}H NMR spectroscopic data of naphthaquinone-type quinones **5-2-56**~**5-2-60**.

H	5-2-56	5-2-57	5-2-58	5-2-59	5-2-60
5	7.69 dd(8.0, 1.0)	7.80 dd(1.2, 8.0)	12.97 or 12.81 (OH)	12.81 or 12.60 (OH)	8.21 m
6	7.81 dd(8.0, 8.0)	7.67 t(8.0)	7.25	7.30	7.77 m
7	7.38 dd(8.0, 1.0)	7.27 dd(1.2, 8.0)	7.25	7.30	7.77 m
8	12.45 s(OH)	12.86 s(OH)	12.97 or 12.81 (OH)	12.81 or 12.60 (OH)	8.24 m
1′	8.96 s	8.05	8.07	8.14	7.01 d(1.5)
2′					7.78 d(1.5)
4′		2.78	2.78	4.98	
5′	2.75 s				

Table 5-2-22: ^{1}H NMR spectroscopic data of naphthaquinone-type quinones **5-2-61**~**5-2-64**.

H	5-2-61	5-2-62	5-2-63	5-2-64
5	8.14 m	7.70 dd(1.2, 7.5)	8.17 ddd(7.3, 2.4, 1.5)	12.18 s(OH)
6	7.73 m	7.58 dd(7.5, 8.3)	7.74 m	7.26 dd(8.2, 0.9)
7	7.73 m	7.25 dd(1.2, 8.3)	7.74 m	7.61 dd(8.2, 7.5)
8	8.18 m	12.04 s(OH)	8.22 ddd(7.3, 2.4, 1.5)	7.76 dd(7.5, 0.9)
1′	6.80 s	6.81 s	6.84 s	6.82 s
4′	1.67 s	1.67 s	5.36 br s, 5.95 br s	5.36 br s, 5.95 br s
5′	1.67 s	1.67 s	2.14 br s	2.14 br s

Table 5-2-23: ^{1}H NMR spectroscopic data of naphthaquinone-type quinones **5-2-65**~**5-2-68**.

H	5-2-65	5-2-66	5-2-67	5-2-68
5	8.11 d(8.4)	8.15 s	8.11 s	8.17 s
6	7.13 dd(8.4, 2.6)			

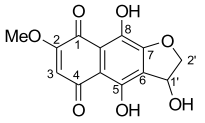
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Table 5-2-23 (continued)

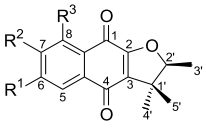
H	5-2-65	5-2-66	5-2-67	5-2-68
8	7.60 d(2.6)	3.87 s(OMe)	12.23 s(OH)	3.86 s(OMe)
1′	6.83 s	6.85 s	6.79 s	6.81 s
3′				2.13 br s(OH)
4′	5.34 br s, 5.95 br s	5.31 br s, 5.89 s	5.36 br s, 5.85 br s	1.66 s
5′	2.14 br s	2.16 s	2.14 s	1.66 s
1″		6.81 d(2.4)	6.84 d(2.4)	6.88 d(2.4)
2″		7.70 d(2.4)	7.68 d(2.4)	7.73 d(2.4)

Table 5-2-24: Cos, MFs, and TSs of naphthaquinone-type quinones **5-2-69**~**5-2-78**.

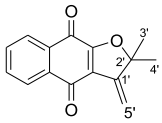
No.	Compounds	MFs	Test solvents	References
5-2-69	cribrarione A	$C_{13}H_{10}O_7$	$CDCl_3$	[41]
5-2-70	(*R*)-7-hydroxy-*α*-dunnione	$C_{15}H_{14}O_4$	CD_3COCD_3	[42]
5-2-71	(*R*)-8-hydroxy-*α*-dunnione	$C_{15}H_{14}O_4$	CD_3COCD_3	[42]
5-2-72	(*R*)-*α*-7,8-dihydroxy-*α*-dunnione	$C_{15}H_{14}O_5$	$CDCl_3$	[42]
5-2-73	(*R*)-7-methoxy-6,8-dihydroxy-*α*-dunnione	$C_{16}H_{16}O_6$	$CDCl_3$	[42]
5-2-74	dehydro-*α*-isodunnione	$C_{15}H_{12}O_3$	$CDCl_3$	[43]
5-2-75	5-hydroxy-7-methoxydehydroiso-*α*-lapachone	$C_{16}H_{14}O_5$	$CDCl_3$	[44]
5-2-76	avicequinone E	$C_{15}H_{14}O_5$	$CDCl_3$	[38]
5-2-77	avicequinone A	$C_{15}H_{14}O_5$	$CDCl_3$	[37]
5-2-78	glycoquinone	$C_{20}H_{24}O_4$	$CDCl_3$	[45]



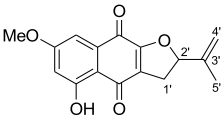
5-2-69



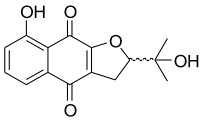
	R^1	R^2	R^3
5-2-70	H	OH	H
5-2-71	H	H	OH
5-2-72	H	OH	OH
5-2-73	OH	OMe	OH



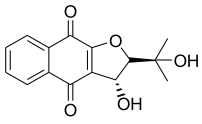
5-2-74



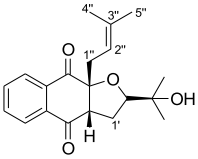
5-2-75



5-2-76



5-2-77



5-2-78

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Table 5-2-25: ^{1}H NMR spectroscopic data of naphthaquinone-type quinones **5-2-69**~**5-2-73**.

H	5-2-69	5-2-70	5-2-71	5-2-72	5-2-73
2	3.94 s(OMe)				
3	6.23 s				
5	13.2 s(OH)	7.86 dd(8.2, 0.3)	8.03 dd(7.5, 2.5)	7.55 d(8.0)	7.03 q(2.0)
6		7.17 dd(8.2, 2.5)	7.65 dd(8.2, 7.5)	7.14 d(8.0)	
7			7.16 dd(8.2, 2.5)	6.15 br s(OH)	3.88 s(OMe)
8	12.3 s(OH)	7.37 dd(2.5, 0.3)	11.63 s(OH)	11.84 br s(OH)	12.30 br s(OH)
1′	5.70 dd(7.3, 3.0)				
	2.78 br s(OH)				
2′	4.81 dd(11.0, 7.3)	4.57 q(6.4)	4.57 q(6.4)	4.58 q(6.5)	4.58 q(6.5)
	4.71 dd(11.0, 3.0)				
3′		1.38 d(6.4)	1.42 d(6.4)	1.44 d(6.5)	1.38 d(6.5)
4′		1.44 s	1.46 s	1.46 s	1.41 s
5′		1.26 s	1.26 s	1.26 s	1.22 s

Table 5-2-26: ^{1}H NMR spectroscopic data of naphthaquinone-type quinones **5-2-74**~**5-2-78**.

H	5-2-74	5-2-75	5-2-76	5-2-77	5-2-78
3					3.41 dd(9.5, 10.8)
5	8.32 m	12.38 s(OH)	7.59 dd(1.9, 7.4)	8.08 dd(7.7, 1.5)	8.09 m
6	7.81 m	6.62 d(2.4)	7.57 dd(7.4, 7.6)	7.76 dt(1.5, 7.7)	7.78 m
7	7.81 m	3.89 s(OMe)	7.19 dd(1.9, 7.6)	7.71 dt(1.5, 7.7)	7.78 m
8	8.32 m	7.21 d(2.4)	11.64 s(OH)	8.10 dd(7.7, 1.5)	8.09 m
1′		3.32 dd(17.1, 10.9)	3.14 d(10.1)	5.62 d(5.1)	2.46 ddd(4.4, 9.5, 13.4)
		3.01 dd(17.1, 8.8)			2.01 ddd(9.2, 10.8, 13.4)
2′		5.42 dd(10.9, 8.8)	4.83 t(10.1)	4.54 d(5.1)	3.93 dd(9.2, 4.4)
3′	1.58 s				
4′	1.58 s	5.12 s, 5.01 s	1.24 s	1.35 s	1.29 s
5′	4.90 br s	1.80 s	1.39 s	1.44 s	1.14 s
	4.92 br s				
1″					2.58 dd(14.3, 7.7)
					2.53 dd(14.3, 8.1)
2″					5.03 m
4″					1.51 s
5″					1.56 s
OH				3.04 br s, 1.85 br s	

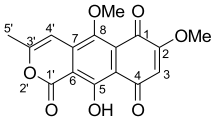
Table 5-2-27: Cos, MFs, and TSs of naphthaquinone-type quinones **5-2-79**~**5-2-88**.

No.	Compounds	MFs	Test solvents	References
5-2-79	5-methoxy-3,4-dehydroxanthomegnin	$C_{16}H_{12}O_7$	$CDCl_3$	[46]
5-2-80	4-*O*-methyl erythrostominone	$C_{18}H_{18}O_8$	$CDCl_3$	[26]

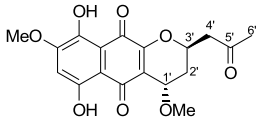
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Table 5-2-27 (continued)

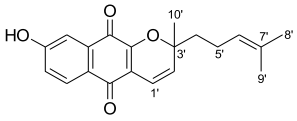
No.	Compounds	MFs	Test solvents	References
5-2-81	pyranokunthone B	$C_{20}H_{20}O_4$	$CDCl_3$	[47]
5-2-82	isagarin	$C_{15}H_{12}O_4$	$CDCl_3$	[48]
5-2-83	rhinacanthin A	$C_{15}H_{14}O_4$	$CDCl_3$	[29]
5-2-84	rhinacanthin B	$C_{25}H_{28}O_5$	$CDCl_3$	[29]
5-2-85	rhinacanthin O	$C_{25}H_{28}O_6$	$CDCl_3$	[29]
5-2-86	rhinacanthin P	$C_{25}H_{28}O_6$	$CDCl_3$	[29]
5-2-87	pyranokunthone A	$C_{20}H_{20}O_4$	$CDCl_3$	[47]
5-2-88	halawanone A	$C_{23}H_{22}O_9$	$CDCl_3$	[49]



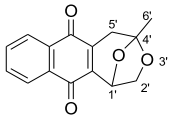
5-2-79



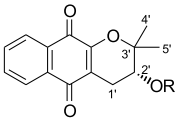
5-2-80



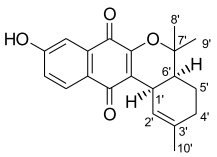
5-2-81



5-2-82

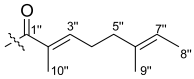


5-2-83 R = H

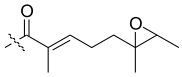


5-2-87

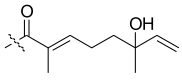
5-2-84 R =

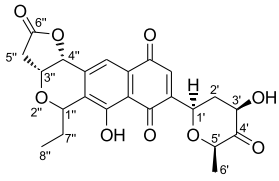


5-2-85 R =



5-2-86 R =





5-2-88

Table 5-2-28: ^{1}H NMR spectroscopic data of naphthaquinone-type quinones **5-2-79**~**5-2-82** and **5-2-87**.

H	5-2-79	5-2-80	5-2-81	5-2-82	5-2-87
2	3.86 s(OMe)				
3	6.05 s				

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Table 5-2-28 (continued)

H	5-2-79	5-2-80	5-2-81	5-2-82	5-2-87
5	14.47 (OH)		8.01 d(8.5)	8.04~8.13 m	7.89 d(8.0)
6		3.94 s(OMe)	7.14 dd(2.5, 8.5)	7.70~7.78 m	7.04 dd(2.5, 8.0)
7		6.42 s		7.70~7.78 m	
8	3.81 s(OMe)		7.52 d(2.5)	8.04~8.13 m	7.40 d(2.5)
1′		4.57 dd(2.5, 2.5) 3.54 s(OMe)	6.68 d(10.0)	5.58 d(4.0)	3.45 br s
2′		ax 1.58 ddd(14.4, 12.3, 2.9) eq 2.38 ddd(14.4, 2.5, 2.1)	5.67 d(10.0)	3.93~4.05 m	6.03 d(2.0)
3′		4.82 dddd(12.3, 6.3, 2.5, 2.1)			
4′	6.60 s	3.15 dd(16.8, 6.3) 2.75 dd(16.8, 6.3)	1.71 m, 1.92 m		1.22 m, 1.92 m
5′	2.28 s		1.92 m, 2.10 m	2.73 d(19.6) 2.87 dd(19.6, 1.3)	1.22 m, 1.89 m
6′		2.31 s	5.07 t(7.0)	1.68 s	1.70 m
8′			1.63 s		1.48 s
9′			1.55 s		1.25 s
10′			1.50 s		1.60 s
OH		13.42 s, 12.70 s			

Table 5-2-29: ^{1}H NMR spectroscopic data of naphthaquinone-type quinones **5-2-83**~**5-2-86**.

H	5-2-83	5-2-84	5-2-85	5-2-86
5	8.04 dd(7.0, 2.0)	8.13 dd(7.9, 1.8)	8.11 dd(7.9, 1.8)	8.12 dd(7.6, 1.6)
6	7.68 td(7.0, 2.0)	7.69 td(7.9, 1.8)	7.68 td(7.9, 1.8)	7.69 td(7.6, 1.6)
7	7.64 td(7.0, 2.0)	7.72 td(7.9, 1.8)	7.72 td(7.9, 1.8)	7.72 td(7.6, 1.6)
8	8.00 dd(7.0, 2.0)	8.07 dd(7.9, 1.8)	8.07 dd(7.9, 1.8)	8.08 dd(7.6, 1.6)
1′	2.68 dd(18.6, 5.1)	2.77 dd(19.5, 4.6)	2.78 dd(19.6, 4.8)	2.77 dd(19.6, 4.4)
	2.85 dd(18.6, 5.1)	2.91 dd(19.5, 4.6)	2.90 dd(19.6, 4.8)	2.90 dd(19.6, 4.4)
2′	3.90 t(5.1)	5.13 t(4.6)	5.14 t(4.8)	5.13 t(4.4)
4′	1.41 s	1.42 s	1.42 s	1.41 s
5′	1.48 s	1.48 s	1.48 s	1.47 s
3″		6.73 tq(7.6, 0.8)	6.71 tq(7.6, 1.2)	6.73 tq(7.6, 1.2)
4″		2.24 q(7.6)	2.25 q(7.6)	2.1~2.2 m
5″		2.06 t(7.6)	1.5~1.8 m	1.6~1.7 m
7″		5.18 qq(6.5, 1.2)	2.81 q(4.0)	5.88 dd(17.2, 10.8)
8″		1.57 d(1.2)	1.27 d(4.0)	5.07 dd(10.8, 1.2) 5.20 dd(17.2, 1.2)
9″		1.57 d(1.2)	1.24 s	1.23 s
10″		1.80 d(0.8)	1.82 d(1.2)	1.80 d(1.2)

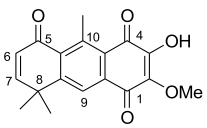
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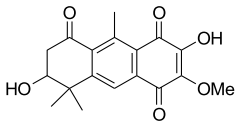
Table 5-2-30: ^{1}H NMR spectroscopic data of naphthaquinone-type quinone **5-2-88**.

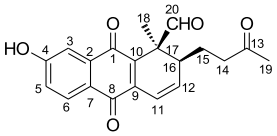
H	5-2-88	H	5-2-88	H	5-2-88
2	7.11 d(1.2)	3′	4.55 dd(12.3, 7.4)	4″	5.15 d(2.9)
5	12.28 (OH)	5′	4.30 q(6.1)	5″	3.01 dd(17.9, 5.6) 2.76 d(17.9)
8	7.76 s	6′	1.43 d(6.1)	7″	1.96 m, 1.71 m
1′	5.13 ddd(11.9, 1.9, 1.2)	1″	4.99 dd(11.3, 3.1)	8″	1.15 t(7.4)
2′	3.02 ddd(12.7, 7.0, 1.9) 1.81 ddd(12.7, 12.3, 11.9)	3″	4.74 dd(5.6, 3.0)		

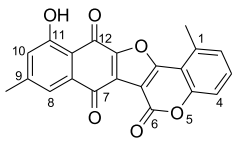
Table 5-2-31: Cos, MFs, and TSs of naphthaquinone-type quinones **5-2-89**~**5-2-96**.

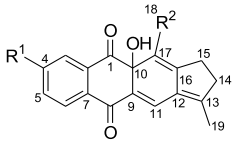
No.	Compounds	MFs	Test solvents	References
5-2-89	3-hydroxy-2-methoxy-8,8,10-trimethyl-8*H*-antracen-1,4,5-trione	$C_{18}H_{16}O_5$	$CDCl_3$	[50]
5-2-90	3,7-dihydroxy-2-methoxy-8,8,10-trimethyl-7,8-dihydro-6*H*-antracen-1,4,5-trione	$C_{18}H_{18}O_6$	$CDCl_3$	[50]
5-2-91	sterekunthal A	$C_{20}H_{18}O_5$	$CDCl_3$	[47]
5-2-92	crassiflorone	$C_{21}H_{12}O_6$	DMSO-d_6	[51]
5-2-93	sterequinone C	$C_{19}H_{16}O_3$	$CDCl_3$	[52]
5-2-94	sterequinone E	$C_{19}H_{16}O_4$	$CDCl_3$	[52]
5-2-95	sterekunthal B	$C_{20}H_{18}O_4$	$CDCl_3$	[47, 52]
5-2-96	sterequinone B	$C_{21}H_{20}O_5$	$CDCl_3$	[52]

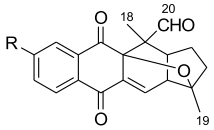

5-2-89


5-2-90


5-2-91


5-2-92


5-2-93 R^1=H R^2=Me
5-2-94 R^1=OMe R^2=H


5-2-95 R = H
5-2-96 R = OMe

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Table 5-2-32: ^{1}H NMR spectroscopic data of naphthaquinone-type quinones **5-2-89**, **5-2-90**, and **5-2-92**.

H	5-2-89	5-2-90	5-2-92	H	5-2-89	5-2-90	5-2-92
1			2.61 (Me)	8			7.47 br s
2	4.2 s(OMe)	4.16 s(OMe)	7.11 br d(8.0)	9	7.1 s	7.10 s	2.46 (Me)
3	12.4 s(OH)	12.51 s(OH)	7.45 t(8.0)	10			7.23 br s
4			7.09 br d(8.0)	11	1.4 s	1.37 s	11.91 s(OH)
6	6.33 d(10.0)	2.8 dd(17.0, 5.0) 3.1 dd(17.0, 5.0)		12	1.4 s	1.33 s	
7	6.7 d(10.0)	4.1 t(5.0)		13	1.9 s	1.9 s	

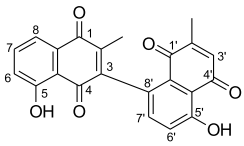
Table 5-2-33: ^{1}H NMR spectroscopic data of naphthaquinone-type quinones **5-2-91** and **5-2-93**~**5-2-96**.

H	5-2-91	5-2-93	5-2-94	5-2-95	5-2-96
3	7.49 d(2.5)	8.25 m	7.72 d(2.6)	8.15 dd(8.0, 1.4)	7.53 d(2.6)
4		7.78~7.73 m	3.99 s(OMe)	7.7~7.85 m	3.94 s(OMe)
5	7.16 dd(8.5, 2.5)	7.78~7.73 m	8.25 m	7.7~7.85 m	7.30 dd(2.9, 8.9)
6	7.99 d(8.5)	8.25 m	7.24 d(11.3)	8.25 dd(1.0, 8.0)	8.22 d(8.9)
11	6.95 d(9.5)	8.23 s	8.14 s	7.7~7.85 m	7.81 d(6.8)
12	6.44 dd(6.0, 9.5)			2.95 dd(4.0, 7.0)	2.94 dd(4, 7.1)
14	2.49 m	2.28 m	2.30 m	1.85~2.0 m	1.88~2.05 m
15	1.85 m	3.05 dm	3.05 dm	2.05~2.30 m	2.28 m, 1.88~2.05 m
16	2.49 m			1.85~2.0 m	1.88~2.05 m
17			8.23 s		
18	1.29 s	2.76 s		0.67 s	0.67 s
19	2.13 s	1.65 s	1.65 s	1.19 s	1.19 s
20	9.95 s				10.25 s

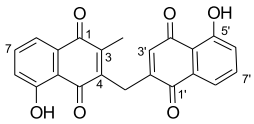
Table 5-2-34: Cos, MFs, and TSs of naphthaquinone-type quinones **5-2-97**~**5-2-106**.

No.	Compounds	MFs	Test solvents	References
5-2-97	3,8′-biplumbagin	$C_{22}H_{14}O_6$	$CDCl_3$	[15]
5-2-98	isozeylanone	$C_{22}H_{14}O_6$	$CDCl_3$	[15]
5-2-99	ethylidene-3,3′-biplumbagin	$C_{24}H_{18}O_6$	$CDCl_3$	[15]
5-2-100	ethylidene-3,6′-biplumbagin	$C_{24}H_{18}O_6$	$CDCl_3$	[15]
5-2-101	ethylidene-6,6′-biplumbagin	$C_{24}H_{18}O_6$	$CDCl_3$	[10]
5-2-102	adenophyllone	$C_{30}H_{22}O_5$	$CDCl_3$	[53]
5-2-103	dilapachone	$C_{30}H_{26}O_6$	$CDCl_3$	[53]
5-2-104	(3*α*,3′*α*,4*β*,4*β*′)-3,3′-dimethoxy-*cis*-[4,4′-bis(3,4,5,10-tetra-hydro-1*H*-naphtho-[2,3-*c*]pyran)]-5,5′,10,10′-tetraone	$C_{28}H_{22}O_8$	$CDCl_3$	[54]
5-2-105	fusarnaphthoquinone C	$C_{29}H_{26}O_{11}$	$CDCl_3$	[21]
5-2-106	lippisidoquinone	$C_{30}H_{26}O_5$	$CDCl_3$	[55]

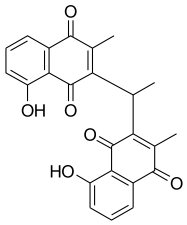
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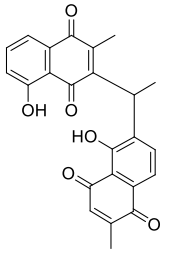
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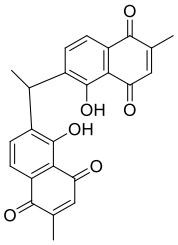
5-2-98



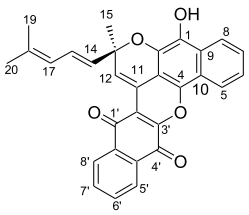
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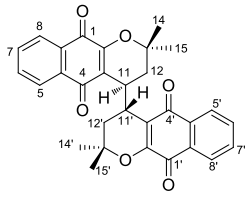
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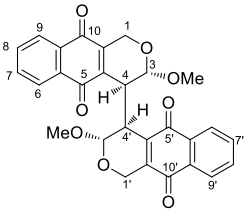
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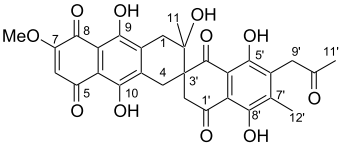
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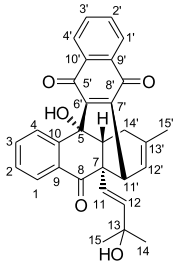
5-2-103



5-2-104



5-2-105



5-2-106

Table 5-2-35: ^{1}H NMR spectroscopic data of naphthaquinone-type quinones **5-2-97**~**5-2-101**.

H	5-2-97	5-2-98	5-2-99	5-2-100	5-2-101
2	1.94 s(Me)	2.23 s(Me)	2.36 s(Me)	2.21 s(Me)	2.14 d(1.5, Me)
3					6.73 q(1.5)
5	11.88 s(OH)	11.85 or 11.95 s(OH)	12.05 s(OH)	12.05 s(OH)	12.43 s(OH)

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Table 5-2-35 (continued)

H	5-2-97	5-2-98	5-2-99	5-2-100	5-2-101
6	7.26 dd(8.1, 1.1)	7.26 or 7.28 dd(7.5, 1.0)	7.20 dd(7.8, 1.1)	7.17 dd(7.9, 1.4)	
7	7.64 t(8.1)	7.62 or 7.64 t(7.5)	7.55 t(7.8)	7.53 t(7.9)	7.49 d(8.0)
8	7.73 dd(8.1, 1.1)	7.68 or 7.69 dd(7.5, 1.0)	7.60 dd(7.8, 1.1)	7.58 dd(7.9, 1.4)	7.57 d(8.0)
2′	2.08 d(1.5)		2.36 s(Me)	2.17 d(1.5, Me)	2.14 d(1.5, Me)
3′	6.85 q(1.5)	6.59 t(1.7)		6.74 q(1.5)	6.73 q(1.5)
5′	12.49 s(OH)	11.85 or 11.95 s(OH)	12.05 s(OH)	12.35 s(OH)	12.43 s(OH)
6′	7.38 d(8.5)	7.26 or 7.28 dd(7.5, 1.0)	7.20 dd(7.8, 1.1)		
7′	7.34 d(8.5)	7.62 or 7.64 t(7.5)	7.55 t(7.8)	7.91 d(8.0)	7.49 d(8.0)
8′		7.68 or 7.69 dd(7.5, 1.0)	7.60 dd(7.8, 1.1)	7.70 d(8.0)	7.57 d(8.0)
CH_2		3.94 br d(1.7)			
$\underline{CH}CH_3$			4.62 q(7.5)	4.74 q(7.1)	4.97 q(6.5)
$CH\underline{CH_3}$			1.76 d(7.5)	1.71 d(7.1)	1.64 d(6.5)

Table 5-2-36: ^{1}H NMR spectroscopic data of naphthaquinone-type quinones **5-2-102** and **5-2-103**.

H	5-2-102	5-2-103	H	5-2-102	5-2-103
1	5.74 s(OH)		19	1.66 s	
5	8.06 d(8.1)	8.10 d(7.9)	20	1.71 s	
6	7.47 br t(8.1)	7.68 dd(7.4, 7.4)	5′	8.16 d(7.3)	8.10 d(7.9)
7	7.43 br t(8.1)	7.72 dd(7.4, 7.4)	6′	7.73 br t(7.3)	7.68 dd(7.4, 7.4)
8	8.28 d(7.8)	8.09 d(7.9)	7′	7.77 br t(7.3)	7.72 dd(7.4, 7.4)
11		4.35 ddd(6.6, 6.6, 13.8)	8′	8.13 d(7.3)	8.09 d(7.9)
12	7.08 s	1.48 dd(13.8, 13.8) 1.34 dd(6.6, 13.8)	11′		4.35 ddd(6.6, 6.6, 13.8)
14	5.67 d(15.0)	1.44 s	12′		1.48 dd(13.8, 13.8) 1.34 dd(6.6, 13.8)
15	1.71 s	1.20 s	14′		1.44 s
16	6.45 dd(11.0, 15.0)		15′		1.20 s
17	5.75 d(11.0)				

Table 5-2-37: ^{1}H NMR spectroscopic data of naphthaquinone-type quinones **5-2-104**~**5-2-106**.

H	5-2-104	5-2-105	5-2-106
1	4.40~4.45 m	3.12 d(19.8), 3.02 d(19.8)	7.74 dd(8.0, 1.2)
2			7.32 br t(8.0)
3	5.12 s, 3.44 s(OMe)		7.59 dt(8.0, 1.2)
4	3.29 s	3.53 d(19.8), 2.92 d(19.8)	7.85 br d(8.0)
5			6.45 s(OH)
6	8.03~8.11 m	6.20 s	2.92 dd(1.7, 8.2)

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Table 5-2-37 (continued)

H	5-2-104	5-2-105	5-2-106
7	7.72~7.76 m	3.94 s(OMe)	
8	7.72~7.76 m		
9	8.03~8.11 m	12.76 s(OH)	
10		13.17 s(OH)	
11		1.30 s	5.93 d(16.1)
12			5.70 d(16.1)
14			1.28 s
15			1.58 s
1′	4.40~4.45 m		7.98 dd(2.2, 7.3)
2′		3.20 d(17.4), 2.88 d(17.4)	7.60~7.77 m
3′	5.12 s, 3.44 s(OMe)		7.60~7.77 m
4′	3.29 s		7.92 dd(2.2, 7.0)
5′		12.73 s(OH)	
6′	8.03~8.11 m		
7′	7.72~7.76 m		
8′	7.72~7.76 m	12.24 s(OH)	
9′	8.03~8.11 m	3.93 s	
11′		2.30 s	3.96 dd(1.7, 7.2)
12′		2.24 s	5.70 d(7.2)
14′			α 2.98 br d(20.0)
			β 2.17 dd(20.0, 8.2)
15′			1.58 s

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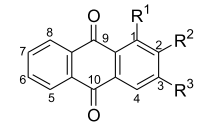
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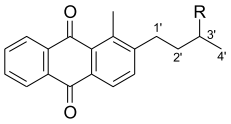
5.3 Anthraquinone-, anthrone-, and preanthraquinone-type quinones

Table 5-3-1: Cos, MFs, and TSs of anthraquinone-type quinones **5-3-1**~**5-3-6**.

No.	Compounds	MFs	Test solvents	References
5-3-1	rubiawallin C	$C_{16}H_{10}O_5$	$CDCl_3$	[56]
5-3-2	2-formyl-1-hydroxyanthraquinone	$C_{15}H_8O_4$	$CDCl_3$	[57]
5-3-3	sterequinone F	$C_{19}H_{16}O_3$	$CDCl_3$	[58]
5-3-4	sterequinone H	$C_{19}H_{18}O_3$	$CDCl_3$	[58]
5-3-5	1-acetoxy-3-methoxy-9,10-anthraquinone	$C_{17}H_{12}O_5$	$CDCl_3$	[59]
5-3-6	ophiohayatone C	$C_{15}H_8O_5$	DMSO-d_6	[60]



	R^1	R^2	R^3
5-3-1	OH	COOMe	H
5-3-2	OH	CHO	H
5-3-5	OAc	H	OMe
5-3-6	H	COOH	OH



5-3-3 R = =O
5-3-4 R = OH

Table 5-3-2: ^{1}H NMR spectroscopic data of anthraquinone-type quinones **5-3-1**~**5-3-6**.

H	5-3-1	5-3-2	5-3-3	5-3-4	5-3-5	5-3-6
1	13.60 s(OH)	13.26 s(OH)	2.78 s(Me)	2.80 s(Me)	2.36 s(OAc)	8.53 s
2	3.99 s(COOMe)	10.63 s(CHO)			6.26 d(3.4)	
3	7.85 d(7.4)	8.23 d(8.0)	7.58 d(8.3)	7.55 d(8.5)	4.01 s(OMe)	
4	8.26 d(7.4)	7.89 d(8.0)	8.18 d(8.3)	8.15 d(8.5)	7.66 d(3.5)	7.23 s
5	8.31 m	8.32 m	8.25 m	8.25 m	8.06~8.12 m	8.14 m
6, 7	7.85 m	7.88 m	7.75 m	7.75 m	7.69~7.89 m	7.85 m
8	8.31 m	8.35 m	8.25 m	8.25 m	8.06~8.12 m	8.14 m
1′			3.06 t(7.2)	2.90 m		
2′			2.75 t(7.2)	1.75 m		
3′				3.85 m		
4′			2.18 s	1.25 d		

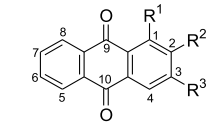
Table 5-3-3: Cos, MFs, and TSs of anthraquinone-type quinones **5-3-7**~**5-3-23**.

No.	Compounds	MFs	Test solvents	References
5-3-7	munjistin-1-*O*-methyl ether	$C_{16}H_{10}O_6$	DMSO-d_6	[61]
5-3-8	1,3-dimethoxy-2-methoxymethylanthraquinone	$C_{18}H_{16}O_5$	$CDCl_3$	[62]
5-3-9	1-hydroxy-2-hydroxymethyl-3-methoxyanthraquinone	$C_{16}H_{12}O_5$	$CDCl_3$	[63]

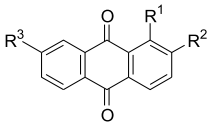
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Table 5-3-3 (continued)

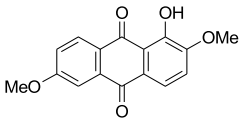
No.	Compounds	MFs	Test solvents	References
5-3-10	2-*n*-butoxymethyl-1,3-dihydroxyanthraquinone	$C_{19}H_{18}O_5$	$CDCl_3$	[63]
5-3-11	1-methoxy-3-hydroxy-2-carbomethoxy-9,10-anthraquinone	$C_{17}H_{12}O_6$	DMSO-d_6	[64]
5-3-12	rubiawallin B	$C_{16}H_{12}O_4$	$CDCl_3$	[56]
5-3-13	1,7-dihydroxy-2-hydroxymethylanthraquinone	$C_{15}H_{10}O_5$	C_5D_5N	[65]
5-3-14	sterequinone G	$C_{20}H_{18}O_4$	$CDCl_3$	[58]
5-3-15	anthrakunthone	$C_{19}H_{16}O_4$	$CDCl_3$	[66]
5-3-16	rubiawallin A	$C_{16}H_{12}O_5$	$CDCl_3$	[56]
5-3-17	3,6-dihydroxy-2-hydroxymethyl-9,10-anthraquinone	$C_{15}H_{10}O_5$	DMSO-d_6	[64]
5-3-18	ophiohayatone A	$C_{16}H_{12}O_5$	CD_3COCD_3	[60]
5-3-19	pustuline	$C_{16}H_{12}O_4$	DMSO-d_6	[67]
5-3-20	6-hydroxyxanthopurpurin	$C_{14}H_8O_5$	$CDCl_3$-CD_3OD	[68]
5-3-21	3-methoxycarbonyl-1,5-dihydroxyanthraquinone	$C_{16}H_{10}O_6$	$CDCl_3$	[69]
5-3-22	ziganein	$C_{15}H_{10}O_4$	$CDCl_3$	[70]
5-3-23	1,8-dihydroxy-4-methylanthraquinone	$C_{15}H_{10}O_4$	CD_3OD	[71]



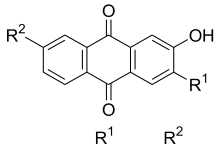
	R^1	R^2	R^3
5-3-7	OMe	COOH	OH
5-3-8	OMe	CH_2OMe	OMe
5-3-9	OH	CH_2OH	OMe
5-3-10	OH	$CH_2OC_4H_9$	OH
5-3-11	OMe	COOMe	OH



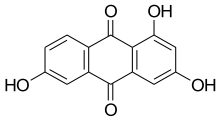
	R^1	R^2	R^3
5-3-12	OH	Me	OMe
5-3-13	OH	CH_2OH	OH
5-3-14	Me	CH_2CH_2COMe	OMe
5-3-15	Me	CH_2CH_2COMe	OH



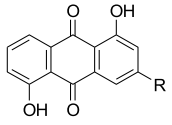
5-3-16



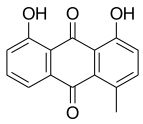
	R^1	R^2
5-3-17	CH_2OH	OH
5-3-18	CH_2OMe	OH
5-3-19	OMe	Me



5-3-20



5-3-21 R = COOMe
5-3-22 R = Me



5-3-23

Table 5-3-4: ^{1}H NMR spectroscopic data of anthraquinone-type quinones **5-3-7**~**5-3-9**, **5-3-11**, and **5-3-12**.

H	5-3-7	5-3-8	5-3-9	5-3-11	5-3-12
1	3.80 s(OMe)	4.02 s(OMe)	13.14 s(OH)	3.84 s(OMe)	13.11 s(OH)
2				3.86 s(COOMe)	2.38 s(Me)

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Table 5-3-4 (continued)

H	5-3-7	5-3-8	5-3-9	5-3-11	5-3-12
3		4.09 s(OMe)	4.06 s(OMe)	11.73 s(OH)	7.51 d(7.3)
4	7.16 s	7.71 s	7.45 s	7.56 s	7.75 d(7.3)
5	8.07 d(7.7)	8.28 m	8.28~8.32 m	8.14 dd(8.0, 1.5)	8.25 d(8.7)
6	7.87 dd(7.2, 7.6)	7.77 m	7.78~7.84 m	7.92 dt(8.0, 1.5)	7.27 dd(8.7, 2.3)
7	7.79 dd(7.2, 7.6)	7.77 m	7.78~7.84 m	7.87 dt(8.0, 1.5)	3.99 s(OMe)
8	8.13 d(7.7)	8.28 m	8.28~8.32 m	8.17 dd(8.0, 1.5)	7.72 d(2.3)
1′		4.64 s	4.89 br s		
		3.48 s(OMe)	2.58 br s(OH)		

Table 5-3-5: ^{1}H NMR spectroscopic data of anthraquinone-type quinones **5-3-10** and **5-3-13**~**5-3-15**.

H	5-3-10	5-3-13	5-3-14	5-3-15
1	13.30 s(OH)	12.81 br s(OH)	2.75 s(Me)	2.72 s(Me)
3	9.66 s(OH)	7.16 d(8.2)	7.55 d(8.0)	7.52 d(8.0)
4	7.32 s	8.06 d(8.2)	8.18 d(8.0)	8.11 d(8.0)
5	8.26~8.29 m	8.38 dd(8.5, 0.3)	8.20 d(8.5)	8.11 d(8.5)
6	7.75~7.81 m	7.47 dd(8.5, 2.5)	7.22 dd(8.5, 2.5)	7.16 dd(8.5, 2.5)
7	7.75~7.81 m	5.45 br s(OH)	3.98 s(OMe)	
8	8.26~8.29 m	8.01 dd(2.5, 0.3)	7.68 d(2.5)	7.58 d(2.5)
1′	4.97 s	4.70 s	3.10 t(7.2)	3.06 t(7.5)
2′	3.68 t(6.6)		2.78 t(7.2)	2.77 t(7.5)
3′	1.69 m			
4′	1.44 m		2.20 s	2.20 s
5′	0.96 t(7.5)			

Table 5-3-6: ^{1}H NMR spectroscopic data of anthraquinone-type quinones **5-3-16**~**5-3-19**.

H	5-3-16	5-3-17	5-3-18	5-3-19
1	13.20 s(OH)	7.51 s	7.52 s	7.53 s
2	4.02 s(OMe)	10.95 s(OH)		10.71 s(OH)
3	7.15 d(8.4)			3.99 s(OMe)
4	7.86 d(8.4)	8.22 s	8.13 s	7.61 s
5	7.73 d(2.4)	8.06 d(8.5)	8.04 d(8.8)	8.06 d(7.9)
6	4.00 s(OMe)	7.21 dd(8.5, 2.5)	7.19 dd(8.8, 1.4)	7.69 dd(1.4, 7.9)
7	7.25 dd(8.8, 2.4)	10.87 s(OH)		2.50 s(Me)
8	8.26 d(8.8)	7.47 d(2.5)	7.48 d(1.4)	7.94 d(1.4)
1′		4.59 s	4.52 s	
			3.42 s(OMe)	

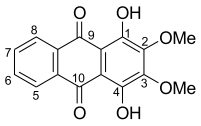
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Table 5-3-7: ^{1}H NMR spectroscopic data of anthraquinone-type quinones **5-3-20**~**5-3-23**.

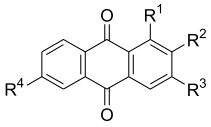
H	5-3-20	5-3-21	5-3-22	5-3-23
1		12.58 s(OH)		
2	6.62 d(2.3)	7.97 d(1.6)	7.10 br d(1.0)	7.21 d(8.7)
3		4.01 s(COOMe)	2.42 br s(Me)	7.49 d(8.7)
4	7.22 d(2.3)	8.64 d(1.6)	7.67 br d(1.0)	2.60 s(Me)
5	7.56 d(2.6)	12.59 s(OH)		6.76 dd(2.7, 8.0)
6		7.37 dd(8.0, 1.2)	7.30 dd(1.0, 9)	6.74 br d(8.0)
7	7.17 dd(8.4, 2.4)	7.73 t(8.0)	7.68 t(9.0)	6.70 dd(2.7, 8.0)
8	8.14 d(8.4)	7.89 dd(8.0, 1.2)	7.83 dd(1.0, 9)	
OH			12.01, 12.13	

Table 5-3-8: Cos, MFs, and TSs of anthraquinone-type quinones **5-3-24**~**5-3-36**.

No.	Compounds	MFs	Test solvents	References
5-3-24	1,4-dihydroxy-2,3-dimethoxyanthraquinone	$C_{16}H_{12}O_6$	$CDCl_3$	[72]
5-3-25	1,3,6-trihydroxy-2-methoxymethyl-9,10-anthraquinone	$C_{16}H_{12}O_6$	DMSO-d_6	[64]
5-3-26	1-methoxy-3,6-dihydroxy-2-hydroxymethyl-9,10-anthra-quinone	$C_{16}H_{12}O_6$	DMSO-d_6	[64]
5-3-27	2-methoxy-1,3,6-trihydroxyanthraquinone	$C_{15}H_{10}O_6$	$CDCl_3$	[73]
5-3-28	6-methoxylucidin ω-ethyl ether	$C_{18}H_{16}O_6$	$CDCl_3$	[68]
5-3-29	6-methylanthragallol 3-methyl ether	$C_{16}H_{12}O_5$	$CDCl_3$-CD_3OD	[68]
5-3-30	7-methylanthragallol 1,3-dimethyl ether	$C_{17}H_{14}O_5$	$CDCl_3$	[68]
5-3-31	7-methylanthragallol 2-methyl ether	$C_{16}H_{12}O_5$	$CDCl_3$	[68]
5-3-32	7-formylanthragallol 1,3-dimethyl ether	$C_{17}H_{12}O_6$	$CDCl_3$	[68]
5-3-33	8-hydroxy-6,7-dimethoxy-2-methyl-9,10-anthraquinone	$C_{17}H_{14}O_5$	$CDCl_3$	[74]
5-3-34	8-hydroxyanthragallol 2,3-dimethyl ether	$C_{16}H_{12}O_6$	$CDCl_3$	[68]
5-3-35	aloesaponarin I	$C_{17}H_{12}O_6$	$CDCl_3$	[75]
5-3-36	aloesaponarin I 3-methyl ether	$C_{18}H_{14}O_6$	$CDCl_3$	[75]

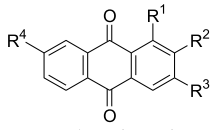


5-3-24

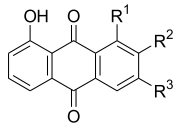


	R^1	R^2	R^3	R^4
5-3-25	OH	CH_2OMe	OH	OH
5-3-26	OMe	CH_2OH	OH	OH
5-3-27	OH	OMe	OH	OH
5-3-28	OH	CH_2OEt	OH	OMe
5-3-29	OH	OH	OMe	Me

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	R^1	R^2	R^3	R^4
5-3-30	OMe	OH	OMe	Me
5-3-31	OH	OMe	OH	Me
5-3-32	OMe	OH	OMe	CHO
5-3-33	OH	OMe	OMe	Me



	R^1	R^2	R^3
5-3-34	OH	OMe	OMe
5-3-35	Me	COOMe	OH
5-3-36	Me	COOMe	OMe

Table 5-3-9: ^{1}H NMR spectroscopic data of anthraquinone-type quinones **5-3-24**~**5-3-28**.

H	5-3-24	5-3-25	5-3-26	5-3-27	5-3-28
1	13.50 s(OH)	13.41 s(OH)	3.85 d(OMe)		13.21 s(OH)
2	4.13 s(OMe)			4.02 s(OMe)	
3	4.13 s(OMe)	11.24 s(OH)	10.80 br s(OH)		9.55 br s(OH)
4	13.50 s(OH)	7.19 s	7.48 s	7.32 s	7.29 s
5	8.34 d(6.1)	7.42 d(2.5)	7.41 d(2.5)	7.55 br s	7.69 d(2.6)
6	7.82 d(5.8)	11.02 s(OH)	10.80 br s(OH)		3.97 s(OMe)
7	7.82 d(5.8)	7.20 dd(8.5, 2.5)	7.22 dd(8.5, 2.5)	7.17 br d	7.23 dd(8.6, 2.6)
8	8.34 d(6.1)	8.04 d(8.5)	8.32 d(8.5)	8.15 d(8.4)	8.20 d(8.6)
1′		4.42 s	4.58 s		4.96 s
		3.27 s(OMe)			
2′					3.71 q(7.2)
3′					1.32 t(7.2)

Table 5-3-10: ^{1}H NMR spectroscopic data of anthraquinone-type quinones **5-3-29**~**5-3-33**.

H	5-3-29	5-3-30	5-3-31	5-3-32	5-3-33
1		4.03 s(OMe)	13.14 br s(OH)	4.05 s(OMe)	12.83 s(OH)
2		6.30 br s(OH)	4.13 s(OMe)	6.41 br s(OH)	4.02 s(OMe)
3	3.99 s(OMe)	4.08 s(OMe)	6.50 br s(OH)	4.11 s(OMe)	4.06 s(OMe)
4	7.62 s	7.70 s	7.47 s	7.73 s	7.48 s
5	7.59 d(0.8)	8.04 d(8.0)	8.14 d(7.9)	8.38 d(7.8)	8.16 d(8.0)
6	2.28 s(Me)	7.51 dd(8.0, 1.6)	7.55 dd(7.9, 0.5)	8.22 dd(7.8, 1.6)	7.58 dd(8.0, 2.0)
7	7.40 dd(7.7, 0.8)	2.51 s(Me)	2.52 s(Me)	10.21 s(CHO)	2.54 s(Me)
8	7.61 d(7.6)	7.97 d(1.6)	8.07 d(0.5)	8.74 d(1.6)	8.09 d(2.0)

Table 5-3-11: ^{1}H NMR spectroscopic data of anthraquinone-type quinones **5-3-34**~**5-3-36**.

H	5-3-34	5-3-35	5-3-36	H	5-3-34	5-3-35	5-3-36
1	12.21 br s(OH)	2.93 s(Me)	2.73 s(Me)	6	7.63 t(7.6)	7.60 t(8)	7.60 t(8)
2	4.02 s(OMe)	4.02 s(OMe)		7	7.25 dd(7.6, 1.2)	7.28 dd(8, 2)	7.30 dd(8, 1.3)
3	4.05 s(OMe)			8	12.09 br s(OH)		

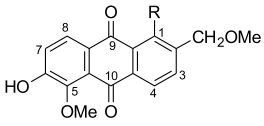
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Table 5-3-11 (continued)

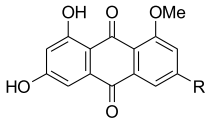
H	5-3-34	5-3-35	5-3-36	H	5-3-34	5-3-35	5-3-36
4	7.49 s	7.78 s	7.76 s	OMe			3.98 s, 4.02 s
5	7.80 dd(7.6, 1.2)	7.77 dd(8, 2)	7.78 dd(8, 1.3)	OH		10.42 br s, 12.92 s	12.89 s

Table 5-3-12: Cos, MFs, and TSs of anthraquinone-type quinones **5-3-37**~**5-3-48**.

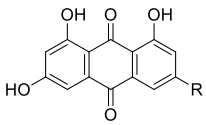
No.	Compounds	MFs	Test solvents	References
5-3-37	5,15-dimethylmorindol	$C_{17}H_{14}O_6$	$CDCl_3$	[76]
5-3-38	1,5,15-tri-*O*-methylmorindol	$C_{18}H_{16}O_6$	$CDCl_3$	[77]
			CD_3COCD_3	[78]
5-3-39	carviolin	$C_{16}H_{12}O_6$	DMSO-d_6	[79]
5-3-40	1-*O*-methylemodin	$C_{16}H_{12}O_5$	CD_3COCD_3	[79]
5-3-41	*ω*-acetylcarviolin	$C_{18}H_{14}O_7$	DMSO-d_6	[79]
5-3-42	*ω*-hydroxyemodin	$C_{15}H_{10}O_6$	CD_3COCD_3	[79]
5-3-43	lunatin	$C_{15}H_{10}O_6$	DMSO-d_6	[80]
5-3-44	emodin	$C_{15}H_{10}O_5$	CD_3COCD_3	[81]
5-3-45	alatinone	$C_{15}H_{10}O_5$	$CDCl_3$-DMSO-d_6	[82]
5-3-46	przewalskinone B	$C_{16}H_{12}O_5$	$CDCl_3$	[70]
5-3-47	monodictyquinone A	$C_{16}H_{12}O_5$	$CDCl_3$	[83]
5-3-48	heterophylline	$C_{16}H_{12}O_5$	DMSO-d_6	[67]



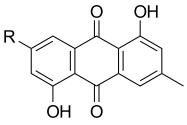
5-3-37 R = OH
5-3-38 R = OMe



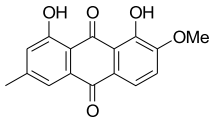
5-3-39 R = CH_2OH
5-3-40 R = Me
5-3-41 R = CH_2OAc



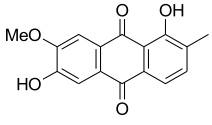
5-3-42 R = CH_2OH
5-3-43 R = OMe
5-3-44 R = Me



5-3-45 R = OH
5-3-46 R = OMe



5-3-47



5-3-48

Table 5-3-13: ^{1}H NMR spectroscopic data of anthraquinone-type quinones **5-3-37**~**5-3-40**.

H	5-3-37	5-3-38 ($CDCl_3$)	5-3-38(CD_3COCD_3)	5-3-39	5-3-40
1		3.94 s(OMe)	3.82 s(OMe)	3.93 s(OMe)	4.00 s(OMe)
2				7.49 br s	7.42 br s

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Table 5-3-13 (continued)

H	5-3-37	5-3-38 ($CDCl_3$)	5-3-38(CD_3COCD_3)	5-3-39	5-3-40
3	7.73 d(7.8)	7.85 d(8.6)	7.83 d(8.0)		2.50 s(Me)
4	7.78 d(7.8)	8.10 d(8.6)	7.95 d(8.0)	7.75 br s	7.67 br s
5	4.03 s(OMe)	4.02 s(OMe)	3.82 s(OMe)	7.04 d(2.4)	7.17 d(2.5)
6			10.66 s(OH)		
7	7.35 d(8.5)	7.35 d(8.6)	7.32 d(8.5)	6.56 d(2.4)	6.63 d(2.5)
8	8.14 d(8.5)	8.08 d(8.6)	7.86 d(8.5)	13.25 s(OH)	13.40 s(OH)
1′	4.64 s	4.64 s	4.58 s	4.64 s	
	3.51 s(OMe)	3.50 s(OMe)	3.40 s(OMe)		

Table 5-3-14: ^{1}H NMR spectroscopic data of anthraquinone-type quinones **5-3-41**~**5-3-44**.

H	5-3-41	5-3-42	5-3-43	5-3-44
1	3.96 s(OMe)	12.14 s(OH)	12.31 s(OH)	
2	7.57 br s	7.32 br s	6.82 d(2.5)	7.19 s
3			3.91 s(OMe)	2.48 s(Me)
4	7.74 br s	7.76 br s	7.14 d(2.5)	7.57 s
5	7.06 d(2.0)	7.28 d(2.4)	7.09 d(2.3)	7.26 d(2.5)
7	6.58 d(2.0)	6.68 d(2.4)	6.56 d(2.3)	6.69 d(2.5)
8	13.16 s(OH)	12.20 s(OH)	12.22 s(OH)	
1′	5.22 s	4.79 s		
	2.14 s(OMe)			

Table 5-3-15: ^{1}H NMR spectroscopic data of anthraquinone-type quinones **5-3-45**~**5-3-48**.

H	5-3-45	5-3-46	5-3-47	5-3-48
1		12.13 or 12.33 s(OH)	12.51 s(OH)	12.92 s(OH)
2	7.07 br s	7.09 br d(1.6)	4.00 s(OMe)	2.30 s(Me)
3	2.43 s(Me)	2.46 br s(Me)	7.15 d(8.4)	7.59 d(7.7)
4	7.60 br s	7.64 br d(1.6)	7.85 d(8.4)	7.65 d(7.7)
5		12.13 or 12.33 s(OH)	7.64 s	7.59 s
6	6.63 d(2.5)	6.69 d(2)	2.45 s(Me)	
7		3.94 s(OMe)	7.06 s	3.99 s(OMe)
8	7.30 d(2.5)	7.38 d(2)	11.97 s(OH)	7.56 s

Table 5-3-16: Cos, MFs, and TSs of anthraquinone-type quinones **5-3-49**~**5-3-62**.

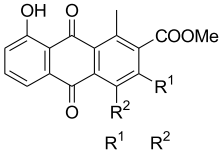
No.	Compounds	MFs	Test solvents	References
5-3-49	4,8-dihydroxy-3-methoxy-1-methylanthra-9,10-quinone-2-carboxylic acid methyl ester	$C_{18}H_{14}O_7$	$CDCl_3$	[75]

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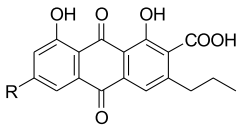
Table 5-3-16 (continued)

No.	Compounds	MFs	Test solvents	References
5-3-50	3,8-dihydroxy-4-methoxy-1-methylanthra-9,10-quinone-2-carboxylic acid methyl ester	$C_{18}H_{14}O_7$	$CDCl_3$	[75]
5-3-51	3,4,8-trihydroxy-1-methylanthra-9,10-quinone-2-carboxylic acid methyl ester	$C_{17}H_{12}O_7$	$CDCl_3$	[75]
5-3-52	2-hydroxyemodin 1-methyl ether	$C_{16}H_{12}O_6$	DMSO-d_6	[84]
5-3-53	ptilometric acid 6-*O*-sulfate	$C_{18}H_{13}NaO_{10}S$	DMSO-d_6	[85]
5-3-54	ptilometric acid	$C_{18}H_{14}O_7$	DMSO-d_6	[85]
5-3-55	3,8-dihydroxy-6-methoxy-1-methylanthra-9,10-quinone-2-carboxylic acid methyl ester	$C_{18}H_{14}O_7$	CD_3COCD_3	[75]
5-3-56	1,3-dihydroxy-5,6-dimethoxy-2-methyl-9,10-anthraquinone	$C_{17}H_{14}O_6$	DMSO-d_6	[74]
5-3-57	3-dihydroxy-1,5,6-trimethoxy-2-methyl-9,10-anthraquinone	$C_{18}H_{16}O_6$	DMSO-d_6	[74]
5-3-58	copareolatin 5,7-dimethyl ether	$C_{17}H_{14}O_6$	$CDCl_3$	[68]
5-3-59	copareolatin 6,7-dimethyl ether①	$C_{17}H_{14}O_6$	$CDCl_3$	[68]
5-3-60	3,7,8-trihydroxy-1-methylanthra-9,10-quinone-2-carboxylic acid methyl ester	$C_{17}H_{12}O_7$	CD_3COCD_3	[75]
5-3-61	7,8-dihydroxy-3-methoxy-1-methylanthra-9,10-quinone-2-carboxylic acid methyl ester	$C_{18}H_{14}O_7$	$CDCl_3$	[75]
5-3-62	7-hydroxy-3,8-dimethoxy-1-methylanthra-9,10-quinone-2-carboxylic acid methyl ester	$C_{19}H_{16}O_7$	$CDCl_3$	[75]

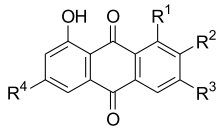
① Typographic error with the structure exists in the literature. Judging on the NMR and MS data, substituent R^5 on C-6 should be Me.



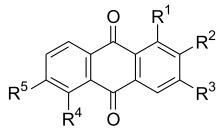
	R^1	R^2
5-3-49	OMe	OH
5-3-50	OH	OMe
5-3-51	OH	OH



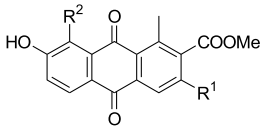
5-3-53 R = OSO_3Na
5-3-54 R = OH



	R^1	R^2	R^3	R^4
5-3-52	OMe	OH	Me	OH
5-3-55	Me	COOMe	OH	OMe



	R^1	R^2	R^3	R^4	R^5
5-3-56	OH	Me	OH	OMe	OMe
5-3-57	OMe	Me	OH	OMe	OMe
5-3-58	OMe	OH	OMe	OH	Me
5-3-59	OH	OMe	OMe	OH	Me



	R^1	R^2
5-3-60	OH	OH
5-3-61	OMe	OH
5-3-62	OMe	OMe

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Table 5-3-17: ^{1}H NMR spectroscopic data of anthraquinone-type quinones **5-3-49**~**5-3-52** and **5-3-55**.

H	5-3-49	5-3-50	5-3-51	5-3-52	5-3-55
1	2.63 s(Me)	2.75 s(Me)	2.70 s(Me)	3.80 s(OMe)	2.70 s(Me)
2				10.30 s(OH)	
3				2.29 s(Me)	
4				7.79 s	7.70 s
5	7.83 dd	7.70 dd	7.80 dd	7.06 br s	7.20 d(2.8)
6	7.65 t	7.60 t	7.63 t	11.12 s(OH)	
7	7.33 dd	7.27 dd	7.31 dd	6.56 br s	6.75 d(2.8)
8				13.12 s(OH)	13.17 s(OH)
OMe	3.98 s, 4.09 s	4.00 s, 4.03 s	4.00 s		3.92 s, 3.96 s
OH	12.90 s, 13.70 s	12.73 s	7.50 br s		13.17 s
			13.04 s, 13.67 s		

Table 5-3-18: ^{1}H NMR spectroscopic data of anthraquinone-type quinones **5-3-53**, **5-3-54**, **5-3-56**, and **5-3-57**.

H	5-3-53	5-3-54	5-3-56	5-3-57
1			13.22 s(OH)	3.75 s(OMe)
2			2.06 s(Me)	2.12 s(Me)
3			11.14 s(OH)	11.00 s(OH)
4	7.23 s	7.52 s	7.18 s	7.40 s
5	7.45 d(2.3)	7.10 d(1.8)	3.79 s(OMe)	3.79 s(OMe)
6			3.95 s(OMe)	3.92 s(OMe)
7	7.04 d(2.3)	6.57 d(1.8)	7.53 d(8.5)	7.50 d(8.5)
8	13.3 br s(OH)	12.0 br s(OH)	8.03 d(8.5)	7.94 d(8.5)
1′	3.16 t(7.5)	2.65 t(7.3)		
2′	1.58 tq(7.5)	1.63 tq(7.3)		
3′	0.94 t(7.5)	0.93 t(7.3)		

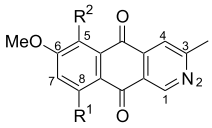
Table 5-3-19: ^{1}H NMR spectroscopic data of anthraquinone-type quinones **5-3-58**~**5-3-62**.

H	5-3-58	5-3-59	5-3-60	5-3-61	5-3-62
1	4.02 s(OMe)	12.89 s(OH)	2.70 s(Me)	2.74 s(Me)	2.67 s(Me)
2		3.96 s(OMe)			
3	4.08 s(OMe)	3.98 s(OMe)			
4	7.71 s	7.41 s	7.74 s	7.82 s	7.71 s
5	12.90 s(OH)	12.84 s(OH)	7.68 d(9)	7.83 d	8.05 d(8)
6	2.35 s(Me)	2.31 s(Me)	7.20 d(9)	7.24 d	7.30 d(8)
7	7.84 d(7.6)	7.49 d(7.6)			
8	7.67 d(7.6)	7.65 d(7.6)	13.10 s(OH)	13.26 s(OH)	
OMe			3.94 s	3.97 s, 4.01 s	3.96 s, 3.98 s, 3.98 s
OH			13.10 s	13.26 s	

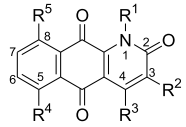
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Table 5-3-20: Cos, MFs, and TSs of anthraquinone-type quinones **5-3-63**~**5-3-70**.

No.	Compounds	MFs	Test solvents	References
5-3-63	scorpinone	$C_{16}H_{13}NO_4$	$CDCl_3$	[86]
5-3-64	bostrycoidin	$C_{15}H_{11}NO_5$	$CDCl_3$	[87]
5-3-65	marcanine A	$C_{14}H_9NO_3$	$CDCl_3$	[88]
5-3-66	dielsiquinone	$C_{15}H_{11}NO_4$	$CDCl_3$	[88]
5-3-67	marcanine B	$C_{16}H_{13}NO_4$	$CDCl_3$	[88]
5-3-68	marcanine C	$C_{16}H_{13}NO_5$	$CDCl_3$	[88]
5-3-69	marcanine D	$C_{15}H_{11}NO_5$	$CDCl_3$	[88]
5-3-70	marcanine E	$C_{16}H_{13}NO_5$	CD_3COCD_3	[88]



	R^1	R^2
5-3-63	OMe	H
5-3-64	OH	OH



	R^1	R^2	R^3	R^4	R^5
5-3-65	H	H	Me	H	H
5-3-66	H	OMe	Me	H	H
5-3-67	Me	OMe	Me	H	H
5-3-68	Me	OMe	CH_2OH	H	H
5-3-69	H	OMe	Me	OH	H
5-3-70	Me	OMe	Me	H	OH

Table 5-3-21: ^{1}H NMR spectroscopic data of anthraquinone-type quinones **5-3-63**~**5-3-66**.

H	5-3-63	5-3-64	5-3-65	5-3-66
1	9.42 sm	9.50 s		
3	2.77 s (Me)	2.80 s(Me)	6.69 q(0.9)	4.06 s(OMe)
4	7.84 s	7.96 s	2.71 d(0.9, Me)	2.66 s(Me)
5	7.43 d(2.4)	13.49 s(OH)	8.19 dd(7.6, 1.2)	8.16 dd(7.6, 0.9)
6	3.99~4.02 s(OMe)	4.02 s(OMe)	7.78 ddd(7.6, 7.6, 1.2)	7.76 ddd(7.7, 7.7, 0.9)
7	6.84 d(2.4)	6.76 s	7.86 ddd(7.6, 7.6, 1.2)	7.83 ddd(7.7, 7.7, 0.9)
8	3.99~4.02 s(OMe)	13.20 s(OH)	8.24 dd(7.6, 1.2)	8.22 dd(7.7, 0.9)
NH			9.27 br s	

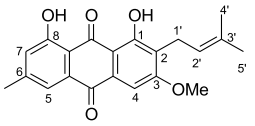
Table 5-3-22: ^{1}H NMR spectroscopic data of anthraquinone-type quinones **5-3-67**~**5-3-70**.

H	5-3-67	5-3-68	5-3-69	5-3-70
3	4.01 s(OMe)	4.01 s(OMe)	4.06 s(OMe)	3.97 s(OMe)
4			2.65 s(Me)	2.54 s(Me)
5	8.07 dd(7.6, 1.2)	8.09 dd(6.7, 2.3)	12.55 s(OH)	7.62 dd(7.6, 1.2)
6	7.73 ddd(7.6, 7.6, 1.5)	7.73 ddd(7.3, 6.9, 1.8)	7.36 dd(8.2, 1.2)	7.77 dd(8.5, 7.6)
7	7.77 dd(7.6, 7.6, 1.5)	7.79 ddd(7.3, 6.9, 1.8)	7.62 dd(8.2, 7.3)	7.26 dd(8.5, 1.2)
8	8.11 dd(7.3, 1.5)	8.14 dd(6.7, 2.3)	7.73 dd(7.3, 1.2)	11.52 s(OH)
NMe	3.96 s	3.97 s		3.95 s
CH_2		4.29 br s, 3.90 br s		

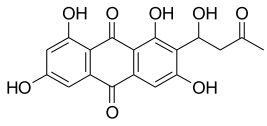
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Table 5-3-23: Cos, MFs, and TSs of anthraquinone-type quinones **5-3-71**~**5-3-84**.

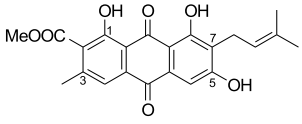
No.	Compounds	MFs	Test solvents	References
5-3-71	vismiaquinone C	$C_{21}H_{20}O_5$	$CDCl_3$	[89]
5-3-72	asparasone A	$C_{18}H_{14}O_8$	DMSO-d_6	[90]
5-3-73	laurentiquinone A	$C_{22}H_{20}O_7$	DMSO-d_6	[91]
	laurenquinone A	$C_{22}H_{20}O_7$	$CDCl_3$-CD_3OD	[96]
5-3-74	3-*O*-(2-hydroxy-3-methylbut-3-enyl)-emodin	$C_{20}H_{18}O_6$	$CDCl_3$	[92]
5-3-75	3-*O*-(2-methoxy-3-methylbut-3-enyl)-emodin	$C_{21}H_{20}O_6$	$CDCl_3$	[92]
5-3-76	3-*O*-(*E*-3-hydroxymethylbut-2-enyl)-emodin	$C_{20}H_{18}O_6$	$CDCl_3$	[92]
5-3-77	3-*O*-(3-hydroxymethyl-4-hydroxybut-2-enyl)-emodin	$C_{20}H_{18}O_7$	$CDCl_3$	[92]
5-3-78	pruniflorone J	$C_{25}H_{26}O_6$	$CDCl_3$	[93]
5-3-79	araliorhamnone A	$C_{18}H_{12}O_8$	$CDCl_3$	[94]
5-3-80	araliorhamnone B	$C_{19}H_{14}O_8$	$CDCl_3$	[94]
5-3-81	araliorhamnone C	$C_{17}H_{10}O_7$	$CDCl_3$	[94]
5-3-82	laurentiquinone B	$C_{22}H_{18}O_7$	$CDCl_3$	[91]
	laurenquinone B	$C_{22}H_{18}O_7$	$CDCl_3$-CD_3OD	[96]
5-3-83	laurentiquinone C	$C_{24}H_{20}O_9$	$CDCl_3$	[91]
5-3-84	ploiariquinone A	$C_{25}H_{24}O_5$	$CDCl_3$	[95]



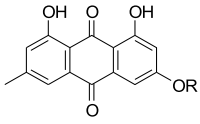
5-3-71



5-3-72

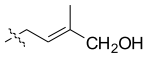


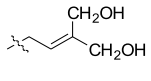
5-3-73

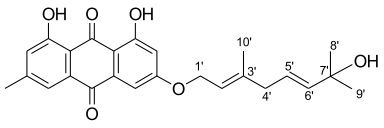


5-3-74 R = 

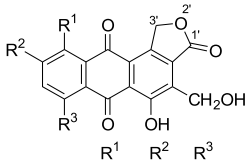
5-3-75 R = 

5-3-76 R = 

5-3-77 R= 

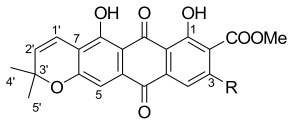


5-3-78

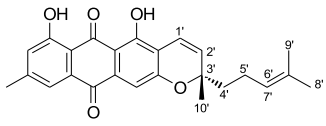


	R^1	R^2	R^3
5-3-79	OMe	H	OH
5-3-80	OMe	OMe	H
5-3-81	OH	H	H

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5-3-82 R = Me
5-3-83 R = CH_2OAc



5-3-84

Table 5-3-24: ^{1}H NMR spectroscopic data of anthraquinone-type quinones **5-3-71**~**5-3-74**.

H	5-3-71	5-3-72	5-3-73(DMSO-d_6)	5-3-73($CDCl_3$-CD_3OD)	5-3-74
1	12.12 s(OH)	12.74 br s(OH)	12.30 s(OH)	12.38 s(OH)	12.10 s(OH)
2			3.89 s(COOMe)	3.94 s(COOMe)	6.98 d(1.7)
3	4.00 s(OMe)		2.35 s(Me)	2.54 s(Me)	
4	7.35 s	7.10 br s	7.53 s	7.54 s	7.65 d(1.7)
5	7.55 br s	7.07 br s	7.25 s	7.15 s	7.29 d(2.5)
6	2.44 s(Me)				2.35 s(Me)
7	7.02 br s	6.55 br s			6.70 d(2.5)
8	12.40 s(OH)	12.08 br s(OH)	11.25 s(OH)	12.60 s(OH)	12.30 s(OH)
1′	3.40 d(7.0)	5.56 br d(5.0)	3.31 d(ov)	3.38 d(7.1)	4.05 dd(1.7, 8.7) 4.14 dd(9.6, 8.7)
2′	5.18 t(7.0)	3.24 dd(5.0, 15.6) 2.69 br d(15.6)	5.17 t(6.0)	5.20 t(7.1)	4.46 dd(1.7, 9.6) 5.60 br s(OH)
4′	1.69 s	2.38 s	1.63 s	1.76 s	4.97 m, 5.11 m
5′	1.80 s		1.74 s	1.65 s	1.82 br s

Table 5-3-25: ^{1}H NMR spectroscopic data of anthraquinone-type quinones **5-3-75**~**5-3-78** and **5-3-84**.

H	5-3-75	5-3-76	5-3-77	5-3-78	5-3-84
1	12.10 s(OH)	12.00 s(OH)	12.04 s(OH)	12.30 s(OH)	12.50 s(OH)
2	6.98 d(1.7)	6.99 d(1.7)	7.00 d(1.8)	6.68 d(2.5)	
4	7.65 d(1.7)	7.63 d(1.7)	7.66 d(1.8)	7.37 d(2.5)	7.12 d(0.7)
5	7.29 d(2.5)	7.34 d(2.5)	7.36 d(2.5)	7.62 br s	7.46 m
6	2.38 s(Me)	2.40 s(Me)	2.38 s(Me)	2.45 s(Me)	2.39 br s(Me)
7	6.70 d(2.5)	6.62 d(2.5)	6.60 d(2.5)	7.08 br s	7.04 m
8	12.30 s(OH)	12.20 s(OH)	12.24 s(OH)	12.13 s(OH)	12.04 s(OH)
1′	4.00 dd(1.8, 8.5) 4.16 dd(9.5, 8.5)	4.60 br d(6.9)	4.64 br d(6.8)	4.68 d(6.5)	6.75 dd(0.7, 10.2)
2′	4.40 dd(1.8, 9.5) 3.95 s(OMe)	5.20 br t(6.9)	5.24 br t(6.8)	5.50 br t(6.5)	5.67 d(10.2)
4′	4.90 m, 5.00 m	3.63 s	3.85 s	2.79 d(6.5)	1.71 m
5′	1.85 br s	1.82 br s	4.02 s	5.62 dd(6.5, 15.5)	2.03 m
6′				5.69 d(15.5)	5.07 br t(7.1)
8′				1.33 s	1.56 s
9′				1.33 s	1.64 s
10′				1.77 s	1.46 s

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Table 5-3-26: ^{1}H NMR spectroscopic data of anthraquinone-type quinones **5-3-79**~**5-3-81**.

H	5-3-79	5-3-80	5-3-81
3	5.18 d(7, CH_2)	5.19 d(7, CH_2)	5.21 d(9, CH_2)
4		13.26 s(OH)	
5		8.22 d(9)	7.92 dd(7.6, 1.2)
6	7.42 d(9)	7.31 d(9)	7.79 dd(8.4, 7.6)
7	7.52 d(9)	3.98 or 4.02 s(OMe)	7.40 dd(8.4, 1.2)
8	4.09 s(OMe)	3.98 or 4.02 s(OMe)	
3′	5.80 s	5.79 s	5.79 s
OH	12.34 s, 12.62 s	4.22 t(7, OH)	12.27 s, 13.21 s
	4.22 t(7)		4.20 t(9)

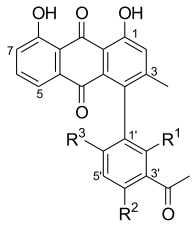
Table 5-3-27: ^{1}H NMR spectroscopic data of anthraquinone-type quinones **5-3-82** and **5-3-83**.

H	5-3-82 ($CDCl_3$)	5-3-82($CDCl_3$-CD_3OD)	5-3-83
1	12.46 s(OH)	12.49 s(OH)	12.57 s(OH)
2	3.97 s(COOMe)	3.98 s(COOMe)	3.97 s(COOMe)
3	2.40 s(Me)	2.43 s(Me)	5.18 s (CH_2)
			2.12 s (OAc)
4	7.59 s	7.63 s	7.78 s
5	7.21 s	7.20 s	7.23 s
8	12.38 s(OH)	12.42 s(OH)	12.32 s(OH)
1′	6.73 d(10.0)	6.76 d(10.1)	6.73 d(10.0)
2′	5.73 d(10.0)	5.75 d(10.1)	5.74 d(10.0)
4′, 5′	1.49 s, 1.49 s	1.50 s, 1.50 s	1.49 s, 1.49 s

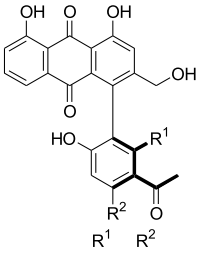
Table 5-3-28: Cos, MFs, and TSs of anthraquinone-type quinones **5-3-85**~**5-3-93**.

No.	Compounds	MFs	Test solvents	References
5-3-85	4′-demethylknipholone	$C_{23}H_{16}O_8$	DMSO-d_6	[97]
5-3-86	knipholone	$C_{24}H_{18}O_8$	DMSO-d_6	[98]
			$CDCl_3$	[99]
5-3-87	isoknipholone	$C_{24}H_{18}O_8$	DMSO-d_6	[98]
			$CDCl_3$	[99]
5-3-88	knipholone-6′-methyl ether	$C_{25}H_{20}O_8$	$CDCl_3$	[98]
5-3-89	gaboroquinone A	$C_{24}H_{18}O_9$	CD_3COCD_3	[100]
5-3-90	gaboroquinone B	$C_{24}H_{18}O_9$	CD_3COCD_3	[100]
5-3-91	sodium *ent*-knipholone 6′-*O*-sulfate	$C_{24}H_{17}NaO_{11}S$	CD_3COCD_3	[101]
5-3-92	sodium 4′-*O*-demethylknipholone 6′-*O*-sulfate	$C_{23}H_{15}NaO_{11}S$	CD_3COCD_3	[101]
5-3-93	sodium isoknipholone 6′-*O*-sulfate	$C_{24}H_{17}NaO_{11}S$	CD_3COCD_3	[101]

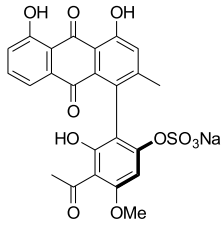
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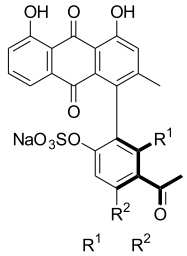
	R^1	R^2	R^3
5-3-85	OH	OH	OH
5-3-86	OH	OMe	OH
5-3-87	OMe	OH	OH
5-3-88	OH	OMe	OMe



	R^1	R^2
5-3-89	OMe	OH
5-3-90	OH	OMe



5-3-91



	R^1	R^2
5-3-92	OH	OH
5-3-93	OMe	OH

Table 5-3-29: ^{1}H NMR spectroscopic data of anthraquinone-type quinones **5-3-85**~**5-3-87**.

H	5-3-85	5-3-86①	5-3-86②	5-3-87①	5-3-87②
2	7.34 br s	7.36 s	7.32 br s	7.39 s	7.31 br s
3	2.08 s(Me)	2.06 s(Me)	2.17 s(Me)	2.10 s(Me)	2.19 s(Me)
5	7.49 dd(8.0, 1.0)	7.47 dd(8.0, 1.1)	7.56 br d(8)	7.52 dd(8.0, 1.0)	7.63 br d(8)
6	7.74 t(7.9)	7.73 t(8.0)	7.75 t(8)	7.76 t(8.0)	7.41 t(8)
7	7.32 dd(8.0, 1.0)	7.32 dd(8.0, 1.1)	7.30 br d(8)	7.35 dd(8.0, 1.0)	7.28 br d(8)
2′				3.29 s(OMe)	3.33 s(OMe)
3′	2.61 s(Ac)	2.59 s(Ac)	2.62 s(Ac)	2.51 s(Ac)	2.65 s(Ac)
4′		3.90 s(OMe)	3.98 s(OMe)		
5′	6.11 s	6.17 s	6.24 s	6.22 s	6.34 s
OH	13.79 s, 12.44 s	14.10 s	14.22 s	13.22 s	13.46 s
	11.85 s, 10.87 s	12.45 s	12.53 s	12.85 s	12.60 s
	10.19 s	11.95 s	12.00 s	11.98 s	

① Recorded with DMSO-d_6.
② Recorded with $CDCl_3$.

Table 5-3-30: ^{1}H NMR spectroscopic data of anthraquinone-type quinones **5-3-88**~**5-3-93**.

H	5-3-88	5-3-89	5-3-90	5-3-91	5-3-92	5-3-93
1		12.59 s(OH)	12.60 s(OH)	12.52 s(OH)	12.53 s(OH)	
2	7.26 s	7.72 s	7.66 s	7.27 s	7.29 s	7.32 s
3	2.10 s(Me)			2.20 s(Me)	2.23 s(Me)	2.26 s(Me)

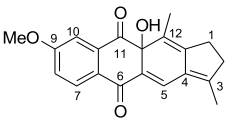
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Table 5-3-30 (continued)

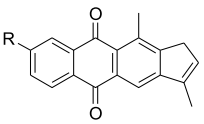
H	5-3-88	5-3-89	5-3-90	5-3-91	5-3-92	5-3-93
5	7.61 dd(1.9, 7.7)	7.59 dd(7.6, 1.1)	7.55 dd(7.6, 1.2)	7.53 dd(7.6, 1.1)	7.56 dd(7.5, 0.5)	7.58 dd(7.6)
6	7.56 t(7.7)	7.78 dd(8.5, 7.6)	7.75 dd(8.2, 7.7)	7.72 dd(8.2, 7.7)	7.74 d(8.0)	7.77 dd(8.3, 7.5)
7	7.21 dd(1.9, 7.7)	7.33 dd(8.5, 1.2)	7.30 dd(8.4, 1.1)	7.27 dd(8.3, 1.2)	7.28 d(6.6)	7.30 dd(8.4, 1.1)
8		11.96 s(OH)	12.01 s(OH)	12.02 s(OH)	12.03 s(OH)	
2′		3.42 s(OMe)	14.20 s(OH)	13.87 s(OH)	13.28 s(OH)	3.39 s(OMe)
3′	2.67 s(Ac)	2.63 s(Ac)	2.62 s(Ac)	2.67 s(Ac)	2.69 s(Ac)	2.65 s(Ac)
4′		13.57 s(OH)	3.98 s(OMe)	3.98 s(OMe)	10.02 s(OH)	13.25 s(OH)
5′	6.13 s	6.29 s	6.24 s	7.30 s	7.20 s	7.39 s
6′		14.20 s(OH)				
OMe	4.00, 3.77 s					
CH_2		4.22 d(16.5) 4.51 d(16.5)	4.43 dd(16.5, 1.2) 4.54 dd(16.6, 1.1)			
OH	13.92 s, 12.61 s 12.08 s					

Table 5-3-31: Cos, MFs, and TSs of anthraquinone-type quinones **5-3-94**~**5-3-102**.

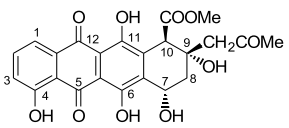
No.	Compounds	MFs	Test solvents	References
5-3-94	sterequinone I	$C_{20}H_{18}O_4$	$CDCl_3$	[58]
5-3-95	sterequinone A	$C_{19}H_{14}O_2$	$CDCl_3$	[102]
5-3-96	sterequinone D	$C_{20}H_{16}O_3$	$CDCl_3$	[102]
5-3-97	11-hydroxysulfurmycinone	$C_{23}H_{20}O_{10}$	$CDCl_3$	[103]
5-3-98	blanchaquinone	$C_{22}H_{20}O_7$	$CDCl_3$	[103]
5-3-99	halawanone C	$C_{21}H_{20}O_7$	$CDCl_3$	[104]
5-3-100	brasiliquinone D	$C_{28}H_{29}NO_8$	$CDCl_3$	[105]
5-3-101	nepalenside A	$C_{21}H_{22}O_{11}$	C_5D_5N	[106]
5-3-102	nepalenside B	$C_{21}H_{22}O_{11}$	CD_3OD	[106]



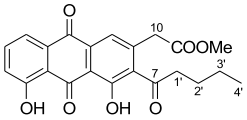
5-3-94



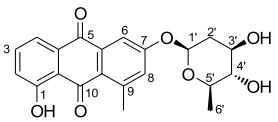
5-3-95 R = H
5-3-96 R = OMe



5-3-97

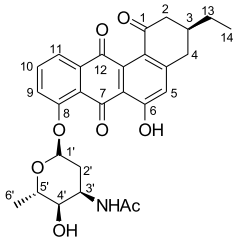


5-3-98

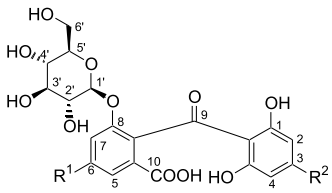


5-3-99

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5-3-100



	R^1	R^2
5-3-101	Me	H
5-3-102	H	Me

Table 5-3-32: ^{1}H NMR spectroscopic data of anthraquinone-type quinones **5-3-94**~**5-3-97**.

H	5-3-94	5-3-95	5-3-96	5-3-97
1	2.25 m	3.45 d(0.6)	3.45 d(0.6)	7.87 dd(1.2, 7.3)
2	3.02 dm	6.5	6.45	7.68 dd(7.3, 8.5)
3	1.65 s(Me)	2.30 d(1.2, Me)	2.25 d(1.2, Me)	7.30 dd(1.2, 8.5)
5	8.13 s	8.20 s	8.19 s	
7	8.18 d(8.6)	8.25 m	8.22 d(10.7)	5.15 dd(4.6, 8.8) 4.10 d(9.3, OH)
8	7.20 dd(8.6, 2.6)	7.8 m	7.23 m	ax 2.07 dd(5.0, 14.5) eq 2.25 ddd(1.5, 1.7, 14.5)
9	3.98 s(OMe)	7.8 m	3.99 s(OMe)	
10	7.60 d(2.6)	8.25 m	7.65 d(3)	4.50 d(1.5) 3.67 s(COOMe)
12	2.70 s(Me)	2.85 s(Me)	2.85 s(Me)	
1′				2.86 d(17.4) 2.65 d(17.4)
2′				2.28 s
OH				13.42 s, 12.93 s, 12.19 s

Table 5-3-33: ^{1}H NMR spectroscopic data of anthraquinone-type quinones **5-3-98**~**5-3-102**.

H	5-3-98	5-3-99	5-3-100	5-3-101	5-3-102
1	7.83 dd(1.1, 7.4)	12.97 s(OH)			
2	7.70 dd(7.4, 8.5)	7.28 dd(8.3, 1.2)	2.18 m 2.93 dd(4.7, 15.9)	6.57 br d(8.1)	6.27 s
3	7.32 dd(1.2, 7.8)	7.62 dd(8.3, 7.5)	2.55 dd(11.2, 15.9)	7.26 br t(8.1)	2.19 s(Me)
4		7.74 dd(7.5, 1.2)	2.66 br dd(10.9, 16.6) 2.97 br dd(3.6, 16.6)	6.57 br d(8.1)	6.27 s
5			7.01 s	7.90 s	7.69 dd(7.6, 1.5)
6		7.83 d(2.2)	12.95 s(OH)	2.13 s(Me)	7.40 dd(7.8, 7.6)
7				7.72 s	7.47 br d(7.8)
8		7.23 d(2.2)			
9		2.83 s(Me)	7.66 d(8.3)		

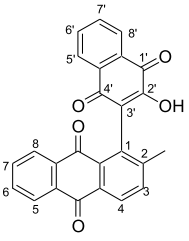
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Table 5-3-33 (continued)

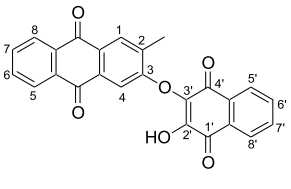
H	5-3-98	5-3-99	5-3-100	5-3-101	5-3-102
10	3.77 s 3.69 s(COOMe)		7.76 dd(7.5, 8.3)		
11	7.71 s		7.84 d(7.5)		
13			1.53 m		
14			1.01 t(7.4)		
1′	2.98 t(7.5)	5.83 br s	5.76 br d(3.0)	5.60 d(7.7)	4.86 d(7.7)
2′	1.69 m(7.5)	2.38 dd(13.4, 4.7) 1.91 br t(12.0)	2.34 dt(15.0, 3.9) 2.24 br d(15.0)	4.90 m	3.25 m
3′	1.40 m(7.5)	4.10 m	4.68 m	4.06 m	3.36 m
4′	0.94 t(7.3)	3.21 t(9.1)	3.60 dd(3.6, 9.7)	4.12 m	3.30 m
5′		3.67 m	3.86 dq(9.7, 6.1)	4.24 m	3.33 m
6′		1.23 d(6.3)	1.26 d(6.1)	4.52 d(11.6) 4.22 d(8.8)	3.64 dd(9.6, 1.8) 3.82 dd(9.6, 5.2)
NAc			2.28 s		
NH			8.52 br d(6.3)		
OH	12.45 s, 11.93 s				

Table 5-3-34: Cos, MFs, and TSs of anthraquinone-type quinones **5-3-103**~**5-3-112**.

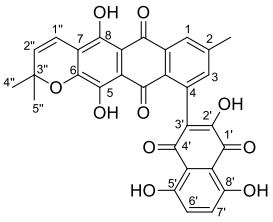
No.	Compounds	MFs	Test solvents	References
5-3-103	newbouldiaquinone	$C_{25}H_{14}O_5$	$CDCl_3$	[107]
5-3-104	newbouldiaquinone A	$C_{25}H_{14}O_6$	$CDCl_3$	[108]
5-3-105	tectograndone	$C_{30}H_{20}O_{10}$	$CDCl_3$-DMSO-d_6 (1:1)	[109]
5-3-106	cratoxyarborequinone A	$C_{44}H_{46}O_9$	CD_3COCD_3	[110]
5-3-107	cratoxyarborequinone B	$C_{49}H_{54}O_9$	CD_3COCD_3	[110]
5-3-108	(*S*)-5,5′-bisoranjidiol	$C_{30}H_{18}O_8$	DMSO-d_6	[67]
5-3-109	floribundone	$C_{32}H_{22}O_{10}$	$CDCl_3$	[111, 112]
5-3-110	phaeosphenone	$C_{30}H_{26}O_{10}$	C_5D_5N	[113]
			DMSO-d_6	[113]
5-3-111	*R*-(–)-skyrin-6-*O*-*β*-xylopyranoside	$C_{35}H_{26}O_{14}$	CD_3OD	[114]
5-3-112	8-*O*-*β*-D-glucopyranosyl-1,1′,8′-trihydroxy-3,3′-dimethyl-2,7′-bianthraquinone	$C_{36}H_{28}O_{13}$	DMSO-d_6	[115]



5-3-103

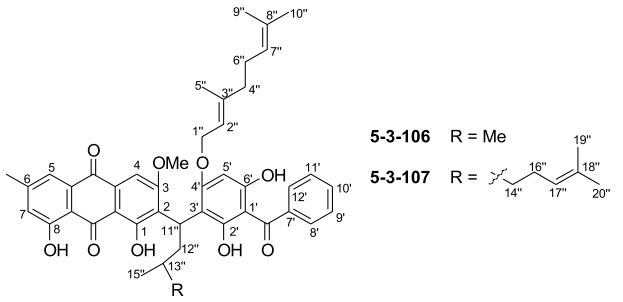


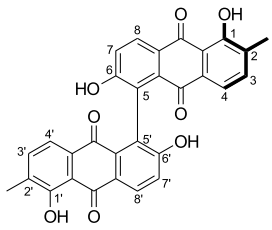
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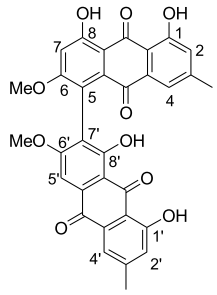
5-3-105

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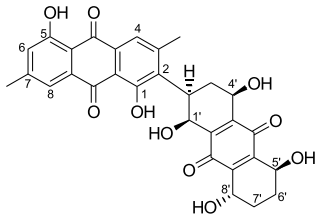




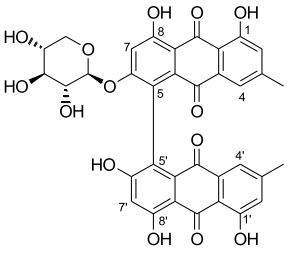
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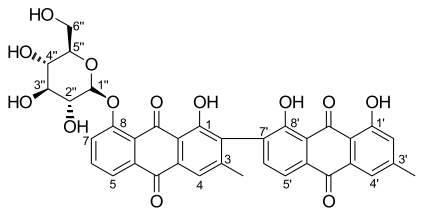
5-3-109



5-3-110



5-3-111



5-3-112

Table 5-3-35: ^{1}H NMR spectroscopic data of anthraquinone-type quinones **5-3-103**, **5-3-104**, **5-3-108**, and **5-3-109**.

H	5-3-103	5-3-104	5-3-108	5-3-109
1		8.18 s	13.18 s(OH)	12.10 s(OH)
2	2.50 s(Me)	2.51 s(Me)	2.29 s(Me)	7.04 d(2)
3	7.42 d(6.1)		7.34 d(7.6)	2.35 s(Me)
4	8.19 d(6.1)	8.27 s	7.57 d(7.6)	7.42 d(2)
5	8.16 dd(7.5, 1.2)	8.37~8.32 m		
6	7.76 td(7.5, 1.2)	7.95 td(8.5, 1.5)		3.82 s(OMe)
7	7.67 td(7.5, 1.5)	7.95 td(8.5, 1.5)	7.36 d(8.5)	6.83 s
8	8.22 dd(7.5, 1.5)	8.37~8.32 m	8.27 d(8.5)	12.05 s(OH)
1′			13.18 s(OH)	12.20 s(OH)

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Table 5-3-35 (continued)

H	5-3-103	5-3-104	5-3-108	5-3-109
2′	7.25 br s(OH)		2.29 s(Me)	7.06 d(2)
3′			7.34 d(7.6)	2.45 s(Me)
4′			7.57 d(7.6)	7.67 d(2)
5′	8.02 dd(7.5, 1.4)	8.22 dd(8.5, 1.5)		7.57 s
6′	7.63 td(7.5, 1.4)	7.90 td(8.5, 1.5)		3.85 s(OMe)
7′	7.71 td(7.5, 1.3)	7.90 td(8.5, 1.5)	7.36 d(8.5)	
8′	8.12 dd(7.5, 1.3)	8.25 dd(8.5, 1.5)	8.27 d(8.5)	13.10 s(OH)

Table 5-3-36: ^{1}H NMR spectroscopic data of anthraquinone-type quinones **5-3-105** and **5-3-110**~**5-3-112**.

H	5-3-105	5-3-110(C_5D_5N)	5-3-110(DMSO-d_6)	5-3-111	5-3-112
1	8.16 d(1.4)				13.25 s(OH)
2	2.54 s(Me)			7.08 d(2.0)	
3	7.43 d(1.4)	2.17 s(Me)	2.37 s(Me)	2.34 or 2.37 s(Me)	2.23 s(Me)
4		7.74 s	7.50 s	7.35 d(2.0)	7.67 s
5	12.92 s(OH)				7.71 d(7.4)
6		7.00 br d(1.6)	6.95 br d(1.6)		7.87 t(7.4)
7		2.91 s(Me)	2.72 s(Me)	7.02 s	7.90 d(7.4)
8	13.74 s(OH)	7.55 br d(1.6)	7.40 br d(1.6)		
1′		4.83 dd(8.0, 2.5)	4.20 dd(8.0, 2.3)		11.77 s(OH)
2′		5.04 ddd(8.0, 3.5, 1.5)	4.44 ddd(8.0, 3.5, 1.3)	7.02 d(2.0)	7.21 br s
3′		3.73 ddd(19.2, 3.5, 1.5)	3.09 ddd(19.2, 3.5, 1.3)	2.34 or 2.37 s(Me)	2.45 s(Me)
		3.22 td(3.5, 19.2)	2.79 td(3.2, 19.2)		
4′		4.85 td(3.5, 2.5)	4.26 td(3.5, 2.4)	7.30 d(2.0)	7.56 br s
5′	11.89 s(OH)	4.44 ddd(6.5, 5.0, 2.0)	3.95 m		7.83 d(7.6)
6′	7.19 d(9.6)	3.33 dddd(19.5, 9.0, 6.5, 2.5)	2.77 m		7.75 d(7.6)
			2.71 m		
		3.15 m			
7′	7.26 d(9.6)	3.14 m	2.71 m	6.62 s	
		2.99 tdd(3.0, 5.0, 19.5)	2.63 m		
8′	12.73 s(OH)	4.42 ddd(6.5, 5.0, 2.0)	3.95 m		12.33 s(OH)
1″	6.66 d(10.0)			4.86 d(7.5)	5.16 d(7.5)
2″	5.80 d(10.0)			3.03 dd(8.5, 7.5)	3.29 m
3″				3.26 dd(9.0, 8.5)	3.45 m
4″	1.46			3.40 m	3.34 m
5″	1.47			3.43 m	3.20 m
				3.92 dd(11.0, 6.0)	
6″					3.47 m, 3.72 m
OH		12.83 s			

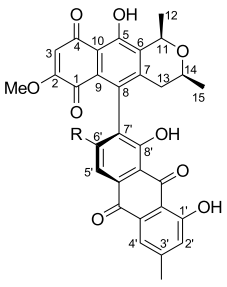
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Table 5-3-37: ^{1}H NMR spectroscopic data of anthraquinone-type quinones **5-3-106** and **5-3-107**.

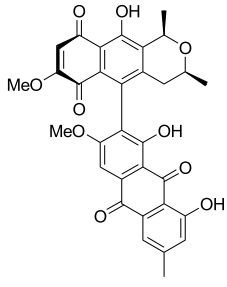
H	5-3-106	5-3-107	H	5-3-106	5-3-107
1	13.32 s(OH)	13.31 s(OH)	4″	2.11 m	2.09 m
3	4.00 s(OMe)	3.98 s(OMe)	5″	1.71 s	1.70 s
4	7.42 s	7.41 s	6″	2.11 m	2.12 m
5	7.61 s	7.61 s	7″	5.11 br t(6.6)	5.10 br t(6.6)
6	2.44 s(Me)	2.44 s(Me)	9″	1.69 s	1.68 s
7	7.07 s	7.07 s	10″	1.61 s	1.61 s
8	11.94 s(OH)	11.93 s(OH)	11″	5.33 t(8.2)	5.34 t(9.0)
2′	7.90 s(OH)	7.89 s(OH)	12″	1.81 m, 2.00 m	1.66 m, 2.16 m
5′	6.14 s	6.13 s	13″	1.51 m	1.39 m
6′	11.38 s(OH)	11.40 s(OH)	14″	0.93 d(6.5)	1.13 m, 1.39 m
8′, 12′	7.66 d(7.4)	7.64 d(7.7)	15″	0.89 d(6.5)	0.88 d(6.3)
9′, 11′	7.43 t(7.4)	7.42 t(7.7)	16″		1.89 m
10′	7.53 t(7.4)	7.51 t(7.7)	17″		5.06 br t(6.9)
1″	4.53 dd(11.7, 6.3)	4.52 dd(11.7, 6.4)	19″		1.64 s
	4.58 dd(11.7, 6.3)	4.57 dd(11.7, 6.4)			
2″	5.47 t(6.3)	5.46 t(6.4)	20″		1.56 s

Table 5-3-38: Cos, MFs, and TSs of anthraquinone- and anthrone-type quinones **5-3-113**~**5-3-124**.

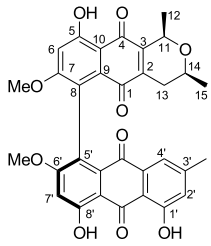
No.	Compounds	MFs	Test solvents	References
5-3-113	floribundiquinone A	$C_{32}H_{26}O_{10}$	$CDCl_3$	[116]
5-3-114	floribundiquinone B	$C_{32}H_{26}O_{10}$	$CDCl_3$	[116]
5-3-115	floribundiquinone C	$C_{31}H_{24}O_9$	$CDCl_3$	[116]
5-3-116	floribundiquinone D	$C_{32}H_{26}O_{10}$	$CDCl_3$	[116]
5-3-117	anhydrophlegmacin-9′,10′-quinone	$C_{32}H_{26}O_{10}$	$CDCl_3$	[111]
5-3-118	isosengulone	$C_{32}H_{22}O_{10}$	$CDCl_3$	[112]
5-3-119	isomericsengulone	$C_{32}H_{22}O_{10}$	$CDCl_3$	[112]
5-3-120	presengulone	$C_{32}H_{26}O_{10}$	$CDCl_3$	[117]
5-3-121	icterinoidin A	$C_{30}H_{22}O_{10}$	$CDCl_3$	[118]
5-3-122	icterinoidin B	$C_{30}H_{22}O_{10}$	$CDCl_3$	[118]
5-3-123	febrifuquinone	$C_{40}H_{38}O_{10}$	DMSO-d_6	[119]
5-3-124	adamabianthrone	$C_{45}H_{46}O_8$	DMSO-d_6	[119]



5-3-113 R = OMe
5-3-115 R = H

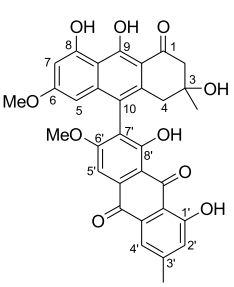


5-3-114

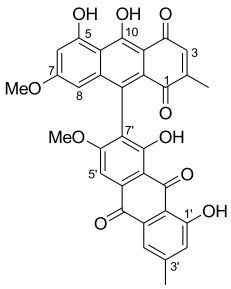


5-3-116

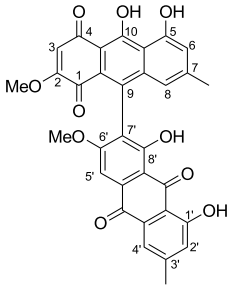
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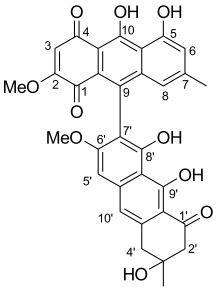
5-3-117



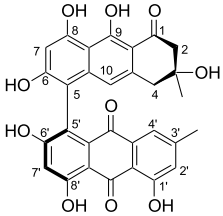
5-3-118



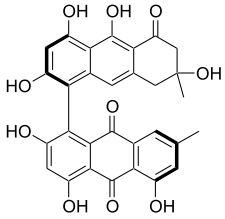
5-3-119



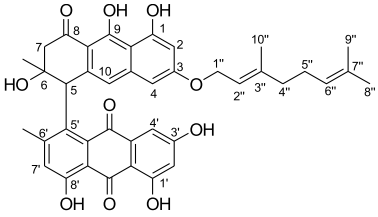
5-3-120



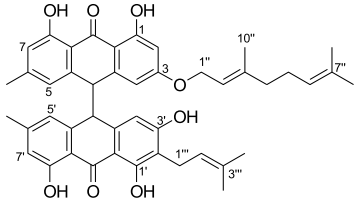
5-3-121



5-3-122



5-3-123



5-3-124

Table 5-3-39: ^{1}H NMR spectroscopic data of anthraquinone-type quinones **5-3-113**~**5-3-116**.

H	5-3-113	5-3-114	5-3-115	5-3-116
2	3.82 s(OMe)	3.83 s(OMe)	3.83 s(OMe)	3.70 s(OMe)
3	6.05 s	6.06 s	6.07 s	
5	13.41 s(OH)	13.43 s(OH)	13.39 s(OH)	13.14 s(OH)
6				6.76 s
11	5.15 q(6.5)	5.16 q(6.5)	5.16 q(6.5)	4.80 q(7.0)
12	1.70 d(6.5)	1.70 d(6.5)	1.68 d(6.5)	1.60 d(7.0)
13	2.24 br s	2.16 dt(16.5, 2.0)	2.14 dt(16.5, 3.0)	2.04 ddd(18.0, 10.0, 4.0)
		2.40 ddd(16.5, 11.0, 4.0)	2.32 dd(16.5, 13.0)	2.46 dt(18.0, 2.5)
14	3.65 m	3.63 m	3.62 m	3.47 m
15	1.23 d(6.5)	1.23 d(6.0)	1.23 d(6.5)	1.25 d(6.5)
1′	12.03 s(OH)	12.01 s(OH)	11.97 s(OH)	12.15 s(OH)
2′	7.09 d(2.0)	7.11 d(2.0)	7.11 d(2.0)	7.03 d(2.0)

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Table 5-3-39 (continued)

H	5-3-113	5-3-114	5-3-115	5-3-116
3′	2.47 s(Me)	2.48 s(Me)	2.49 s(Me)	2.34 s(Me)
4′	7.67 d(2.0)	7.67 d(2.0)	7.69 d(2.0)	7.36 d(2.0)
5′	7.50 s	7.51 s	7.94 d(7.5)	
6′	3.90 s(OMe)	3.86 s(OMe)	7.41 d(7.5)	3.75 s(OMe)
7′				6.71 s
8′	12.27 s(OH)	12.29 s(OH)	12.36 s(OH)	13.08 s(OH)

Table 5-3-40: ^{1}H NMR spectroscopic data of anthraquinone-type quinones **5-3-117**~**5-3-120**.

H	5-3-117	5-3-118	5-3-119	5-3-120
2	2.72 br s	2.05 d(1.4)	3.82 s(OMe)	3.82 s(OMe)
3	1.35 br s(Me)	6.91 d(1.6)	6.20 s	6.20 s
4	2.79, 2.92 ABq(17.0)			
5	6.07 d(2.4)	10.99 s(OH)	10.32 s(OH)	10.40 s(OH)
6	3.71 s(OMe)	6.38 d(2.4)	6.95 br s	6.92 s
7	6.53 d(2.4)	3.72 s(OMe)	2.32 br s(Me)	2.30 s(Me)
8	10.23 s(OH)	6.70 d(2.4)	6.79 br s	6.85 br s
9	16.72 s(OH)			
10		17.10 s(OH)	17.25 s(OH)	17.40 s(OH)
1′	12.42 s(OH)	12.24 s(OH)	12.25 s(OH)	
2′	7.08 br s	7.08 br s	7.99 s	3.10 br s
3′	2.49 br s(Me)	2.47 br s(Me)	2.49 br s(Me)	1.40 s(Me)
4′	7.65 br s	7.67 br s	7.70 br s	2.90 br s
5′	7.58 s	7.58 s	7.59 s	6.70 s
6′	3.89 s(OMe)	3.84 s(OMe)	3.88 s(OMe)	3.72 s(OMe)
8′	12.01 s(OH)	12.03 s(OH)	12.04 s(OH)	9.80 s(OH)
10′				7.00 s

Table 5-3-41: ^{1}H NMR spectroscopic data of anthraquinone-type quinones **5-3-121** and **5-3-122**.

H	5-3-121	5-3-122	H	5-3-121	5-3-122
2	2.75, 2.90 ABq(18)	ax 2.75 d(18) eq 2.82 br d(18)	10	6.28 s	6.28 s
			1′	12.0 s(OH)	11.97 s(OH)
3	1.38 s(Me)	1.38 s(Me)	2′	7.05 br s	7.03 br s
	2.88 br s(OH)	3.49 s(OH)	3′	2.34 s(Me)	2.32 s(Me)
4	2.80 br s	2.85, 2.90 ABq(16)	4′	7.35 br s	7.33 br s
6	5.79 s(OH)	5.99 s(OH)	6′	5.25 s(OH)	5.50 s(OH)
7	6.63 s	6.58 s	7′	6.96 s	6.92 s
8	10.17 s(OH)	10.16 s(OH)	8′	12.92 s(OH)	12.89 s(OH)
9	16.19 s(OH)	16.11 s(OH)			

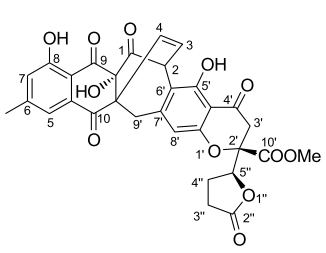
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Table 5-3-42: ^{1}H NMR spectroscopic data of anthraquinone- and anthrone-type quinones **5-3-123** and **5-3-124**.

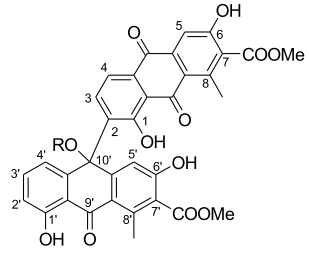
H	5-3-123	5-3-124	H	5-3-123	5-3-124
1	9.78 s(OH)	12.37 s(OH)	7′	6.77 s	6.37 d(2.5)
2	6.38 d(2.2)	6.10 d(2.5)	8′	11.99 s(OH)	11.74 s(OH)
4	6.70 d(2.2)	6.30 d(2.5)	10′		4.50 s
5	2.96 s	6.60 d(1.8)	1″	4.62 d(6.4)	4.64 d(6.0)
6	1.23 s(Me), 4.30 s(OH)	2.25 s(Me)	2″	5.45 t(6.4)	5.46 t(6.0)
7	2.65 d(17), 2.88 d(17)	6.20 d(1.8)	4″	2.05 m	2.05 m
8		11.84 s(OH)	5″	2.05 m	2.05 m
9	15.79 s(OH)		6″	5.06 t(7.5)	5.30 t(8)
10	6.89 s	4.50 s	8″	1.60 s	1.60 s
1′	12.06 s(OH)		9″	1.56 s	1.62 s
2′	6.57 d(2.5)		10″	1.72 s	1.81 s
3′	11.33 s(OH)	9.54 s(OH)	1‴		3.35 d(7.9)
4′	7.11 d(2.5)	6.27 s	2‴		5.10 t(7.9)
5′		6.66 d(2.5)	4‴		1.86 s
6′	2.40 s(Me)	2.25 s(Me)	5‴		1.86 s

Table 5-3-43: Cos, MFs, and TSs of anthraquinone-type quinones **5-3-125**~**5-3-132**.

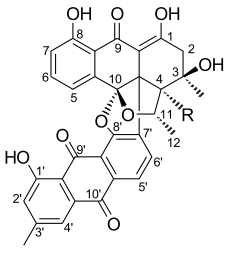
No.	Compounds	MFs	Test solvents	References
5-3-125	chaetomanone	$C_{31}H_{24}O_{12}$	DMSO-d_6	[120]
5-3-126	scutianthraquinone A	$C_{39}H_{32}O_{13}$	CD_3OD	[121]
5-3-127	scutianthraquinone B	$C_{38}H_{30}O_{13}$	CD_3OD	[121]
5-3-128	scutianthraquinone C	$C_{34}H_{24}O_{12}$	CD_3OD	[121]
5-3-129	–	$C_{32}H_{24}O_9$	DMSO-d_6	[122]
5-3-130	–	$C_{32}H_{24}O_{10}$	$CDCl_3$	[122]
5-3-131	–	$C_{32}H_{22}O_8$	DMSO-d_6	[122]
5-3-132	scutianthraquinone D	$C_{61}H_{52}O_{20}$	CD_3OD	[121]



5-3-125

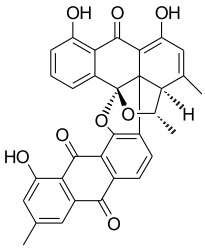


5-3-126 R = $COCH(CH_3)CH_2CH_3$
5-3-127 R = $COCH(CH_3)_2$
5-3-128 R = H

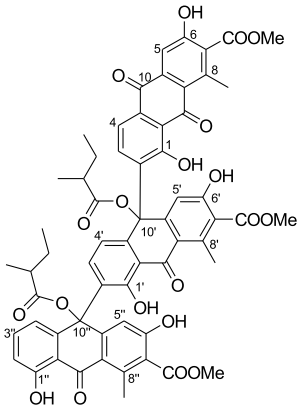


5-3-129 R = H
5-3-130 R = OH

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5-3-131



5-3-132

Table 5-3-44: ^{1}H NMR spectroscopic data of anthraquinone-type quinones **5-3-125**~**5-3-128**.

H	5-3-125	5-3-126	5-3-127	5-3-128
2	4.60 d(6.6)			
3	6.58 dd(8.8, 6.6)	8.64 d(7.8)	8.65 d(8.1)	8.66 d(8.0)
4	5.96 d(8.8)	7.86 d(7.8)	7.92 d(8.1)	7.89 d(8.0)
5	7.40 s	7.52 s	7.54 s	7.57 s
6	2.44 s(Me)			
7	7.23 s	3.89 s(COOMe)	3.89 s(COOMe)	3.89 s(COOMe)
8		2.49 s(Me)	2.54 s(Me)	2.55 s(Me)
2′	3.68 s(COOMe)	6.86 br d(7.7)	6.86 br d(8.3)	6.83 br d(8.0)
3′	*α* 3.03 d(17.2)	7.330/7.326①	7.33 t(8.3, 8.3)	7.33 t(8.0, 8.0)
	β 3.56 d(17.2)	t(7.7, 7.7)		
4′		6.71 br d(7.7)	6.71 br d(8.3)	6.76 d(8.0)
5′		6.67/6.66 s①	6.65 s	6.75 s
7′		3.88 s(COOMe)	3.88 s(COOMe)	3.89 s(COOMe)
8′	6.43 s	2.77 s(Me)	2.76 s(Me)	2.74 s(Me)
9′	*α* 3.35 d(19.9)			
	β 3.60 d(19.9)			
1″		2.53 m	2.68 m	
2″		1.69 m, 1.53 m	1.17/1.15 d(7.2)①	
3″	2.59 t(8.2)	1.15/1.12 d(7.2)①		
4″	2.35 m	0.85/0.83 d(7.4)①		
5″	4.98 t(8.9)			
OH		13.68 br s, 13.24 s	14.89 br s, 13.25 br s	13.23 brs, 11.93 br s
		11.80 br s, 10.99 br s	11.92 br s, 10.79 br s	11.73 br s, 10.90 br s

① Doubling of signals due to atropisomers.

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Table 5-3-45: ^{1}H NMR spectroscopic data of anthraquinone-type quinones **5-3-129**~**5-3-131**.

H	5-3-129	5-3-130	5-3-131
1	14.46 s(OH)	13.87 s(OH)	14.35 s(OH)
2	α 3.03 d(16)	α 3.01 d(18)	6.37 s
	β 2.59 d(16)	β 2.72 d(18)	
3	1.27 s(Me), 5.18 s(OH)	1.38 s(Me), 2.08 s(OH)	2.03 s(Me)
4	2.39 d(5.1)	2.60 s(OH)	2.94 d(10.2)
5	7.40 d(7.6)	7.47 dd(1.2, 7.6)	7.41 d(7.8)
6	7.71 m	7.55 m	7.66 m
7	6.97 d(8.2)	6.91 dd(1.2, 8.4)	6.97 d(8.4)
8	12.05 s(OH)		
11	4.92 m	5.06 m(6.6)	4.52 m
12	1.49 d(6.5)	1.57 d(6.6)	1.55 d(5.7)
1′	12.60 s(OH)	12.65 s(OH)	12.64 s(OH)
2′	7.14 br s	7.05 m(0.8)	7.16 s
3′	2.38 s(Me)	2.41 s(Me)	2.39 s(Me)
4′	7.44 br s	7.55 m	7.44 br s
5′	7.70 d(8)	7.87 d(7.6)	7.69 m
6′	7.66 d(8)	7.41 d(7.6)	7.52 d(7.4)

Table 5-3-46: ^{1}H NMR spectroscopic data of anthraquinone-type quinone **5-3-132**.

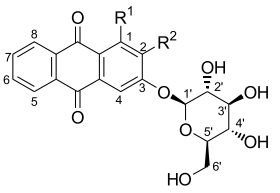
H	5-3-132	H	5-3-132
3	8.67 d(7.8)	10′-OCOCH(CH_3)CH_2CH_3	2.41 m①, 1.62 m②
			1.05/1.03 d(6.8)②
			0.85/0.84 t(7.1)②
4	7.95 d(7.8)	2″	6.85 br d(8.1)
5	7.53 s	3″	7.30 t(8.1)
7	3.90 s(COOMe)	4″	6.62 br d(8.1)
8	2.53 s(Me)	5″	6.58/6.57 s①
3′	8.33/8.32 d(8.5)①	7″	3.89 s(COOMe)
4′	6.92 d(8.5)	8″	2.78 s(Me)
5′	6.60/6.59 s①	10″-OCOCH(CH_3)CH_2CH_3	2.58 m②, 1.69 m②
			1.17/1.16 d(6.3)②
			0.76 t(7.1)②
7′	3.84 s(COOMe)	OH	14.92 br s, 13.66 br s, 13.23 br s
			11.91 br s, 10.77 br s, 9.71 br s
8′	①.60 (Me)		

① Doubling of signals due to atropisomers.
② The chemical shifts of 10′-OCOCH(CH_3)CH_2CH_3 and 10″-OCOCH(CH_3)CH_2CH_3 were not assigned.

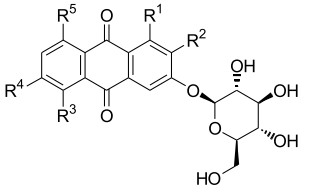
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Table 5-3-47: Cos, MFs, and TSs of anthraquinone-type quinones **5-3-133**~**5-3-146**.

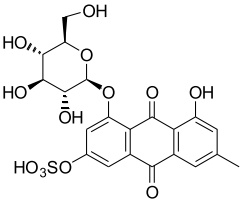
No.	Compounds	MFs	Test solvents	References
5-3-133	rubiadin-3-*O*-*β*-glucoside	$C_{21}H_{20}O_9$	DMSO-d_6	[61]
5-3-134	lucidin-3-*O*-*β*-glucoside	$C_{21}H_{20}O_{10}$	DMSO-d_6	[61]
5-3-135	lasianthuoside A	$C_{22}H_{22}O_{10}$	DMSO-d_6	[123]
5-3-136	lasianthuoside B	$C_{23}H_{24}O_{10}$	DMSO-d_6	[123]
5-3-137	emodin-6-*O*-*β*-D-glucopyranoside	$C_{21}H_{20}O_{10}$	DMSO-d_6	[124]
5-3-138	putorinoside A	$C_{22}H_{22}O_{12}$	DMSO-d_6	[125]
			CD_3OD	[125]
5-3-139	putorinoside B	$C_{22}H_{22}O_{11}$	DMSO-d_6	[125]
			CD_3OD	[125]
5-3-140	sulfemodin 8-*O*-*β*-D-glucoside	$C_{21}H_{20}O_{13}S$	CD_3OD	[126]
5-3-141	4′-*O*-demethylknipholone-4′-*O*-*β*-D-glucoside	$C_{29}H_{26}O_{13}$	CD_3OD	[100]
5-3-142	sodium-4′-*O*-demethylknipholone-4′-*β*-D-gluc-opyranoside 6′-*O*-sulfate	$C_{29}H_{25}NaO_{16}S$	CD_3COCD_3	[101]
5-3-143	bulbineloneside A	$C_{30}H_{28}O_{13}$	DMSO-d_6	[127]
5-3-144	bulbineloneside B	$C_{28}H_{24}O_{12}$	DMSO-d_6	[127]
5-3-145	bulbineloneside C	$C_{28}H_{24}O_{12}$	DMSO-d_6	[127]
5-3-146	bulbineloneside D	$C_{29}H_{26}O_{13}$	DMSO-d_6	[127]



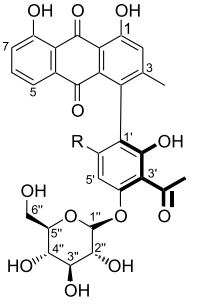
	R^1	R^2
5-3-133	OH	Me
5-3-134	OH	CH_2OH
5-3-135	OMe	CH_2OH
5-3-136	OMe	CH_2OMe



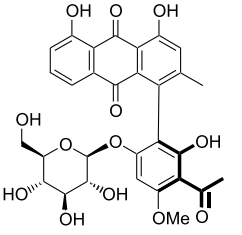
	R^1	R^2	R^3	R^4	R^5
5-3-137	OH	H	H	Me	OH
5-3-138	OMe	CH_2OH	OH	OH	H
5-3-139	OMe	CH_2OH	H	OH	H



5-3-140

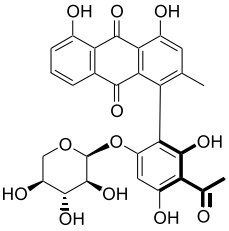


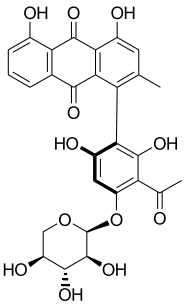
5-3-141 R = OH
5-3-142 R = OSO_3Na



5-3-143

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5-3-144


5-3-145

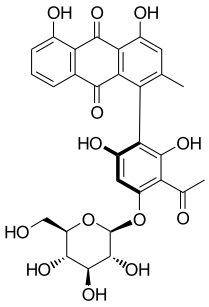

5-3-146

Table 5-3-48: ^{1}H NMR spectroscopic data of anthraquinone-type quinones **5-3-133**~**5-3-137**.

H	5-3-133	5-3-134	5-3-135	5-3-136	5-3-137
1	12.98 s(OH)	13.05 s(OH)	3.89 s(OMe)	3.89 s(OMe)	
2	2.18 s(Me)				7.33 d(2.1)
4	7.40 s	7.47 s	7.74 s	7.75 s	7.87 d(2.1)
5	8.16~8.27 d(4.6)	8.17~8.23 dd(5.9, 2.8)	8.13~8.23 m	8.14~8.19 m	7.50 br s
6	7.92~7.93 d(4.2)	7.93~7.95 m	7.86~7.94 m	7.87~7.94 m	2.42 s(Me)
7	7.92~7.93 d(4.2)	7.93~7.95 m	7.86~7.94 m	7.87~7.94 m	7.17 br s
8	8.16~8.27 d(4.6)	8.17~8.23 dd(5.9, 2.8)	8.13~8.23 m	8.14~8.19 m	
1′	5.14 d(5.8)	5.12 d(6.9)	5.11 d(7.0)	5.07 d(5.5)	5.07 d(7.4)
2′ ~5′	3.24~3.54 m	3.15~3.56 m	3.24~3.56 m	3.25~3.70 m	3.10~3.50
6′	3.24~3.54 m	3.15~3.56 m	3.24~3.56 m	3.25~3.70 m	3.55 dd(11.5, 3)
	3.69 d(11.6)	3.70 d(11.1)	3.73 d(11.0)		3.73 dd(11.5, 3)
2-CH_2		4.56 d(11.0)	4.58 d(11.0)	4.53 d(10.0)	
		4.65 d(11.0)	4.67 d(11.0)	4.63 d(10.0)	
		4.89 t(OH)		3.29 s(OMe)	

Table 5-3-49: ^{1}H NMR spectroscopic data of anthraquinone-type quinones **5-3-138**~**5-3-140**.

H	5-3-138(DMSO-d_6)	5-3-138(CD_3OD)	5-3-139(DMSO-d_6)	5-3-139(CD_3OD)	5-3-140
1	3.82 s(OMe)	3.86 s(OMe)	3.83 s(OMe)	3.92 s(OMe)	
2					7.10 s
3					2.44 s(Me)
4	7.75 s	7.80 s	7.69 s	7.80 s	7.56 s
5	12.4 br s(OH)		7.41 br s	7.40 br s	7.87 d(2.2)
6	10.6 br s(OH)				
7	7.20 d(8.0)	7.20 d(8.0)	7.21 br d(8.0)	7.11 dd(2.0, 8.4)	7.79 d(2.2)
8	7.58 d(8.0)	7.60 d(8.0)	8.02 d(8.0)	8.04 d(8.4)	
1′	5.10 d(7.8)	5.14 d(7.8)	5.06 d(7.8)	5.18 d(7.8)	5.11 d(7.6)
2′	3.37 (ov)	3.40~3.59	3.36 (ov)	3.45~3.65	3.68~3.72 m
3′	3.34 (ov)	3.40~3.59	3.34 (ov)	3.45~3.65	3.54~3.61 m
4′	3.24 (ov)	3.40~3.59	3.25 (ov)	3.45~3.65	3.51~3.58 m
5′	3.40 (ov)	3.40~3.59	3.41 (ov)	3.45~3.65	3.54~3.61 m

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Table 5-3-49 (continued)

H	5-3-138(DMSO-d_6)	5-3-138(CD_3OD)	5-3-139(DMSO-d_6)	5-3-139(CD_3OD)	5-3-140
6′	3.53 dd(11.0, 4.5)	3.73 dd(4.0, 11.0)	3.54 dd(5.0, 11.0)	3.79 dd(5.0, 12.0)	3.81 dd(12.1, 3.7)
	3.70 dd(11.0, 2.0)	3.90 br d(11.0)	3.71 br d(11.0)	3.94 dd(2.5, 12.0)	3.98 br d(12.1)
2-CH_2	4.60 m	4.70 d(11.0)	4.64 d(11.0)	4.73 d(11.4)	
		4.73 d(11.0)	4.56 d(11.0)	4.82 d(11.4)	

Table 5-3-50: ^{1}H NMR spectroscopic data of anthraquinone-type quinones **5-3-141**~**5-3-144**.

H	5-3-141	5-3-142	5-3-143	5-3-144
1		12.53 s(OH)	12.44 s(OH)	12.43 s(OH)
2	7.27 s	7.30 s	7.31 s	7.36 s
3	2.13 s(Me)	2.22 s(Me)	2.07 s(Me)	2.07 s(Me)
5	7.50 d(6.8)	7.55 dd(7.5)	7.47 dd(7.4, 0.7)	7.49 dd(7.5, 1.0)
6	7.65 dd(8.0, 7.9)	7.73 t(8.0)	7.72 dd(8.2, 7.4)	7.72 dd(8.3, 7.5)
7	7.24 d(8.3)	7.27 dd(8.3)	7.31 dd(8.2, 0.7)	7.31 dd(8.3, 1.0)
8		12.02 s(OH)	11.86 s(OH)	11.83 s(OH)
2′		13.78 s(OH)	13.75 s(OH)	13.96 s(OH)
3′	2.77 s(Ac)	2.82 s(Ac)	2.64 s(Ac)	2.70 s(Ac)
4′			3.98 s(OMe)	10.35 s(OH)
5′	6.38 s	7.51 s	6.57 s	6.31 s
1″	5.13 d(7.7)	5.21 d(7.4)	4.90 d(7.9)	5.53 d(7.5)
2″	3.58~3.60 m	3.66~3.73 m	2.90 m	4.08 m
3″	3.50~3.53 m	3.66~3.73 m	3.19 m	4.16 m
4″	3.50~3.53 m	3.66~3.73 m	2.98 m	4.15 m
5″	3.42~3.46 m	3.41 m	3.39 ddd(9.0, 5.2, 2.2)	4.27 dd(10.6, 5.1)
				3.67 dd(10.6, 10.6)
6″	3.75 dd(12.0, 5.7)	3.66~3.73 m	3.72 m	
	3.95 dd(12.0, 1.9)	4.03 m	3.31 m	

Table 5-3-51: ^{1}H NMR spectroscopic data of anthraquinone-type quinones **5-3-145** and **5-3-146**.

H	5-3-145	5-3-146	H	5-3-145	5-3-146
1	12.43 s(OH)		5′	6.35 s	6.34 s
2	7.36 s	7.36 s	1″	4.95 d(7.6)	4.97 d(7.7)
3	2.06 s(Me)	2.05 s(Me)	2″	3.41 m	3.40 m
5	7.49 dd(7.6, 0.9)	7.48 dd(7.4, 0.7)	3″	3.31 m	3.40 m
6	7.74 dd(8.3, 7.6)	7.74 dd(8.3, 7.4)	4″	3.46 m	3.32 m
7	7.32 dd(8.3, 0.9)	7.32 dd(8.3, 0.7)	5″	3.89 dd(11.2, 5.2)	
8	11.84 s(OH)			3.30 dd(11.2, 10.7)	
2′	13.94 s(OH)	13.96 s(OH)	6″		3.78 dd(11.9, 1.5)
3′	2.69 s(Ac)	2.70 s(Ac)			3.62 dd(11.9, 3.8)

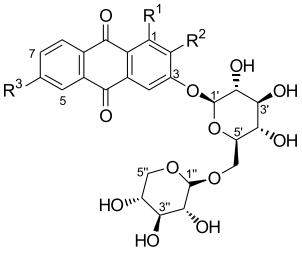
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Table 5-3-52: Cos, MFs, and TSs of anthraquinone-type quinones **5-3-147**~**5-3-154**.

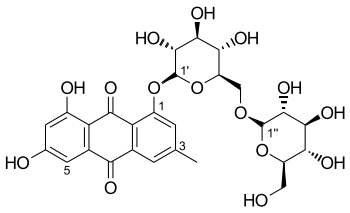
No.	Compounds	MFs	Test solvents	References
5-3-147	ophiohayatone-B①	$C_{27}H_{30}O_{14}$	DMSO-d_6	[60]
5-3-148	1-methoxy-3-hydroxy-2-carbomethoxy-9,10-anthra-quinone 3-*O*-β-primeveroside	$C_{28}H_{30}O_{15}$	DMSO-d_6	[64]
5-3-149	1,3-dihydroxy-2-carbomethoxy-9,10-anthraquinone 3-*O*-β-primeveroside	$C_{27}H_{28}O_{15}$	DMSO-d_6	[64]
5-3-150	1,3,6-trihydroxy-2-hydroxymethyl-9,10-anthraquinone 3-*O*-β-primeveroside	$C_{26}H_{28}O_{15}$	DMSO-d_6	[64]
5-3-151	lasianthuoside C	$C_{28}H_{32}O_{14}$	DMSO-d_6	[123]
5-3-152	emodin-1-*O*-β-gentiobioside	$C_{27}H_{30}O_{15}$	DMSO-d_6	[128]
5-3-153	knipholone-8-β-D-gentiobioside②	$C_{36}H_{38}O_{18}$	CD_3COCD_3	[129]
5-3-154	bulbineloneside E	$C_{34}H_{34}O_{17}$	DMSO-d_6	[127]

① Typographic error for the structure exists in the literature. Judging on the NMR and MS data, the substituent on C-2 should be CH_2OMe.

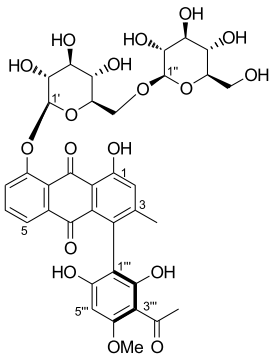
② Typographic error exists in the literature. This structure corresponds to compound **2** in the literature. However, the NMR data corresponds to that of compound **1**.



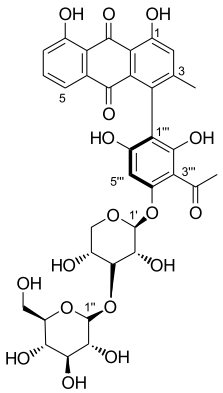
	R^1	R^2	R^3
5-3-147	OH	CH_2OMe	H
5-3-148	OMe	COOMe	H
5-3-149	OH	COOMe	H
5-3-150	OH	CH_2OH	OH
5-3-151	OMe	CH_2OMe	H



5-3-152



5-3-153



5-3-154

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Table 5-3-53: ^{1}H NMR spectroscopic data of anthraquinone-type quinones **5-3-147**~**5-3-150**.

H	5-3-147	5-3-148	5-3-149	5-3-150
1	13.08 s(OH)	3.84 s(OMe)	12.80 s(OH)	13.32 br s(OH)
2		3.88 s(COOMe)	3.87 s(COOMe)	
4	7.48 s	7.75 s	7.50 s	7.45 s
5	8.20 dd(7.6, 2.8)	8.15 (ov)	8.20 dd(9.0, 2.0)	7.48 d(2.5)
6	7.94 m	7.85 dt(8.0, 1.5)	7.96 (ov)	
7	7.94 m	7.93 dt(8.0, 1.5)	7.96 (ov)	7.23 dd(8.5, 2.5)
8	8.17 dd(7.6, 2.8)	8.15 (ov)	8.24 dd(9.0, 2.0)	8.11 d(8.5)
1′	5.11 d(6.8)	5.22 d(7.5)	5.24 d(8.0)	5.08 d(7.0)
2′	3.33 m	3.25 dd(8.5, 7.5)	3.26 dd(8.5, 8.0)	3.40 dd(8.5, 7.0)
3′	3.32 m	3.38 (ov)	3.35 (ov)	3.37 t(8.5)
4′	3.40 m	3.30 (ov)	3.30 (ov)	3.32 (ov)
5′	3.60 m	3.65 m	3.63 m	3.62 m
6′	3.64 m	3.70 dd(12.0, 5.5)	3.65 dd(12.0, 5.0)	3.67 dd(11.0, 5.5)
	3.92 d(9.6)	3.95 dd(12.0, 2.0)	3.93 dd(12.0, 2.0)	3.97 dd(11.0, 2.0)
1″	4.12 d(7.2)	4.13 d(7.5)	4.14 d(7.5)	4.16 d(7.5)
2″	2.98 m	3.00 dd(8.5, 7.5)	3.00 dd(8.5, 7.5)	3.02 dd(8.5, 7.5)
3″	3.06 m	3.08 t(8.5)	3.07 t(8.5)	3.10 t(8.5)
4″	3.39 m	3.30 (ov)	3.30 (ov)	3.32 (ov)
5″	2.97 m	3.00 dd(11.5, 1.5)	3.05 dd(11.5, 1.5)	3.03 dd(11.0, 1.5)
	2.68 m	3.70 dd(11.5, 5.5)	3.70 dd(11.5, 5.5)	3.72 dd(11.0, 5.5)
2-CH_2	4.58 d(10.0)			4.57 d(11.5)
	4.48 d(10.0)			4.65 d(11.5)
	3.24 s(OMe)			

Table 5-3-54: ^{1}H NMR spectroscopic data of anthraquinone-type quinones **5-3-151**~**5-3-154**.

H	5-3-151	5-3-152	5-3-153	5-3-154
1	3.86 s(OMe)		13.09 (OH)	
2		7.57 br s	7.26 br s	7.36 s
3		2.46 s(Me)	2.08 br s(Me)	2.06 s(Me)
4	7.74 s	7.66 br s		
5	8.14~8.18 m	7.04 d(2.0)	7.70 dd(7.7, 1.1)	7.48 dd(7.6, 0.8)
6	7.85~7.93 m		7.82 dd(8.1, 7.7)	7.74 dd(8.5, 7.6)
7	7.85~7.93 m	6.54 d(2.0)	7.96 dd(8.1, 1.1)	7.33 dd(8.5, 0.8)
8	8.14~8.18 m	13.24 br s(OH)		
1′	5.11 d(7.0)	5.10 d(8.0)	5.03 d(7.7)	5.09 d(7.6)
2′	2.97~3.96 m	2.97 t(8.0)	3.65 m	3.67 m
3′	2.97~3.96 m	3.10 t(8.0)	3.83 m	3.53 m
4′	2.97~3.96 m	3.04 t(8.0)	3.32 m	3.62 m
5′	2.97~3.96 m	3.73 m	3.34 m	3.99 dd(11.5, 5.3)

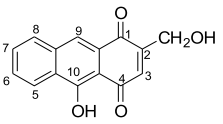
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Table 5-3-54 (continued)

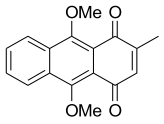
H	5-3-151	5-3-152	5-3-153	5-3-154
				3.42 dd(11.5, 9.2)
6′	*α* 2.97~3.96 m	4.00 br d(12.0)	4.19 m	
	β 3.96 d(10.5)	3.64 m	3.78 m	
1″	5.16 d(5.0)	4.19 d(8.0)	4.43 d(7.8)	4.38 d(7.8)
2″	2.97~3.96 m	3.3~3.5 (ov)	3.21 m	3.12 m
3″	2.97~3.96 m	3.3~3.5	3.23 m	3.24 m
4″	2.97~3.96 m	3.18 t(8.0)	3.43 m	3.07 m
5″	2.97~3.96 m	3.04 t(8.0)	3.54 m	
6″		3.64 m, 3.3~3.5	3.81 m, 3.62 m	3.74 m, 3.41 m
2‴			14.15 s(OH)	13.94 s(OH)
3‴			2.61 s(Ac)	2.71 s(Ac)
4‴			3.96 s(OMe)	
5‴			6.23 s	6.30 s
6‴			9.16 br s(OH)	
2-CH_2	4.50 d(11.0)			
	4.60 d(11.0)			
	3.31 s(OMe)			

Table 5-3-55: Cos, MFs, and TSs of anthraquinone-type quinones **5-3-155**~**5-3-159**.

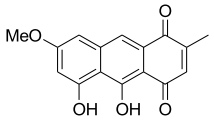
No.	Compounds	MFs	Test solvents	References
5-3-155	2-hydroxymethyl-10-hydroxy-1,4-anthraquinone	$C_{15}H_{10}O_4$	$CDCl_3$	[130]
5-3-156	9,10-dimethoxy-2-methylanthra-1,4-quinone	$C_{17}H_{14}O_4$	$CDCl_3$	[131]
5-3-157	physcion	$C_{16}H_{12}O_5$	$CDCl_3$	[112]
5-3-158	2,3-dimethoxy-9-hydroxy-1,4-anthraquinone	$C_{16}H_{12}O_5$	$CDCl_3$	[72]
5-3-159	kengaquinone	$C_{25}H_{26}O_5$	$CDCl_3$	[132]



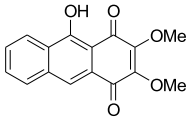
5-3-155



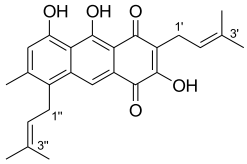
5-3-156



5-3-157



5-3-158



5-3-159

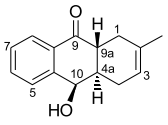
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Table 5-3-56: ^{1}H NMR spectroscopic data of anthraquinone-type quinones **5-3-155**~**5-3-159**.

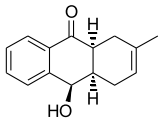
H	5-3-155	5-3-156	5-3-157	5-3-158	5-3-159
2	4.73 s(CH_2)	2.19 s(Me)	2.21 d(1.5, Me)		
3	7.10 br t(1.8)	6.80 q(1.5)	6.91 q(1.5)		7.59 s(OH)
5	8.51 dd(7.0, 1.5)	8.38 or 8.40 dd(7, 1)	10.32 s(OH)	7.93 br dd	
6	7.73 m	7.73 or 7.76 t(7)	6.67 d(2.3)	7.72 ddd	2.41 s(Me)
7	7.73 m	7.73 or 7.76 t(7)	3.95 s(OMe)	7.68 ddd	6.94 s
8	7.98 dd(7.0, 1.2)	8.38 or 8.40 dd(7, 1)	6.86 d(2.3)	8.45 br dd	10.04 s(OH)
9	8.13 s		7.86 s	13.7 s(OH)	16.62 s(OH)
10	13.87 s(OH)		16.20 s(OH)	8.10 s	8.27 s
OMe		4.06 s, 4.08 s		4.15 s, 4.16 s	
1′					3.30 d(7.2)
2′					5.21 t(7.2)
4′, 5′					1.78 s, 1.68 s
1″					3.63 d(6.1)
2″					4.95 t(6.1)
4″, 5″					1.88 s, 1.66 s

Table 5-3-57: Cos, MFs, and TSs of anthrone-type quinones **5-3-160**~**5-3-169**.

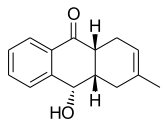
No.	Compounds	MFs	Test solvents	References
5-3-160	rubiasin A	$C_{15}H_{16}O_2$	$CDCl_3$	[133]
5-3-161	rubiasin B	$C_{15}H_{16}O_2$	$CDCl_3$	[133]
5-3-162	rubiasin C	$C_{15}H_{16}O_2$	$CDCl_3$	[133]
5-3-163	rubanthrone A	$C_{17}H_{14}O_{10}$	DMSO-d_6	[134]
5-3-164	rubanthrone B	$C_{17}H_{14}O_9$	DMSO-d_6	[134]
5-3-165	rubanthrone C	$C_{16}H_{12}O_{10}$	DMSO-d_6	[134]
5-3-166	knipholone anthrone	$C_{24}H_{20}O_7$	CD_3COCD_3	[135]
			$CDCl_3$	[99]
5-3-167	isoknipholone anthrone	$C_{24}H_{20}O_7$	$CDCl_3$	[99]
5-3-168	isofoliosone	$C_{24}H_{20}O_8$	$CDCl_3$	[99]
5-3-169	foliosone	$C_{24}H_{20}O_8$	$CDCl_3$	[99]



5-3-160

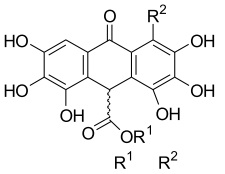


5-3-161

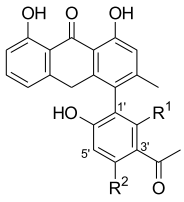


5-3-162

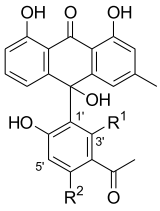
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	R^1	R^2
5-3-163	Me	OH
5-3-164	Me	H
5-3-165	H	OH



	R^1	R^2
5-3-166	OH	OMe
5-3-167	OMe	OH



	R^1	R^2
5-3-168	OMe	OH
5-3-169	OH	OMe

Table 5-3-58: ^{1}H NMR spectroscopic data of anthrone-type quinones **5-3-160**~**5-3-162**.

H	5-3-160	5-3-161	5-3-162
1	α 2.18 m, β 2.55 m	α 2.16 m, β 2.86 m	α 2.19 m, β 3.01 m
2	1.74 s(Me)	1.73 s(Me)	5.45 br s
3	5.47 s	5.43 br s	1.61 s(Me)
4	α 2.18 m, β 2.55 m	α 1.90 m, β 2.16 m	α 1.71 m, β 2.15 m
4a	2.25 m	2.76 m	2.85 m
5	7.41 dd(7.5, 1.0)	7.73 dd(7.8, 1.0)	7.73 dd(7.8, 1.0)
6	7.58 ddd(7.5, 7.4, 1.0)	7.62 ddd(7.5, 7.4, 1.0)	7.63 ddd(7.7, 7.5, 1.3)
7	7.46 ddd(7.5, 7.4, 1.0)	7.40 ddd(7.5, 7.4, 1.0)	7.40 ddd(7.5, 7.4, 1.0)
8	8.06 dd(7.8, 1.0)	8.00 dd(7.8, 1.3)	8.03 dd(7.8, 1.3)
9a	2.99 m	2.90 m	2.88 m
10	4.72 br s	5.43 br s	5.33 br s

Table 5-3-59: ^{1}H NMR spectroscopic data of anthrone-type quinones **5-3-163**~**5-3-165**.

H	5-3-163	5-3-164	5-3-165
1		7.25 s	
8	7.29 s	7.25 s	7.20 s
10	4.40 dd(1.9, 7)	4.34 dd(7.8, 1.8)	4.35 br dd
1′	2.42 dd(1.9, 19)	(ov)	2.70 m
	2.97 dd(7.0, 19)	2.91 dd(7.8, 19)	
OMe	3.61 s	3.73 s	

Table 5-3-60: ^{1}H NMR spectroscopic data of anthrone-type quinones **5-3-166**~**5-3-169**.

H	5-3-166 (CD_3COCD_3)	5-3-166($CDCl_3$)	5-3-167	5-3-168	5-3-169
2	6.88 br s	6.88 br s	6.96 br s	6.66 br s	6.66 br s
3	2.12 br s(Me)	2.12 s(Me)	2.20 s(Me)	2.29 s(Me)	2.29 s(Me)
4				6.90 br s	6.86 br s
5	6.67 or 6.40dd(7, 1.5)	6.40 br d(8)	6.85 br s	7.08 br d	7.05 br d
6	7.49 t(7)	7.49 t(8, 8)	7.41 t	7.47 t	7.41 t

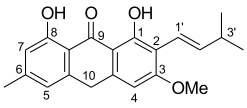
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Table 5-3-60 (continued)

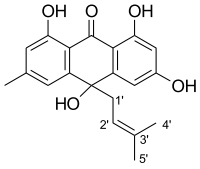
H	5-3-166 (CD_3COCD_3)	5-3-166($CDCl_3$)	5-3-167	5-3-168	5-3-169
7	6.67 or 6.40dd(7, 1.5)	6.67 br d(8)	6.76 br d	6.85 br d	6.84 br d
10	4.07 br s	4.07 br s	4.10 d(23.0)		
			3.84 d(23.0)		
2′			3.35 s(OMe)	2.64 s(OMe)	
3′	2.63 s(Ac)	2.63 s(Ac)	2.63 s(Ac)	2.24 s(Ac)	2.46 s(Ac)
4′	4.00 s(OMe)	4.00 s(OMe)			3.89 s(OMe)
5′	6.30 s	6.30 s	6.40 s	6.31 s	6.03 s
OH	14.32 s	14.32 s	13.46 s	12.31 s	14.10 s
	12.35 s	12.35 s	12.60 s	12.25 s	12.34 s
	12.25 s	12.25 s	12.17 s	11.96 s	12.27 s
				11.19 s	11.17 s
				4.80 br s	4.13 br s

Table 5-3-61: Cos, MFs, and TSs of anthrone-type quinones **5-3-170**~**5-3-183**.

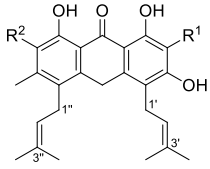
No.	Compounds	MFs	Test solvents	References
5-3-170	2-(3-methyl-1-butenyl)-1,8-dihydroxy-3-methoxy-6-methylanthrone	$C_{21}H_{22}O_4$	$CDCl_3$	[136]
5-3-171	10-isopentenylemodinanthran-10-ol	$C_{20}H_{20}O_5$	CD_3COCD_3	[137]
5-3-172	harunganol A	$C_{25}H_{28}O_4$	CD_3COCD_3	[136]
5-3-173	kenganthranol A	$C_{25}H_{28}O_5$	$CDCl_3$	[132]
5-3-174	kenganthranol C	$C_{26}H_{30}O_6$	$CDCl_3$	[132]
5-3-175	harunganol B	$C_{30}H_{36}O_4$	CD_3COCD_3	[136]
			$CDCl_3$	[138]
5-3-176	kenganthranol B	$C_{30}H_{36}O_5$	$CDCl_3$	[132]
5-3-177	harungin anthrone	$C_{30}H_{36}O_4$	$CDCl_3$	[138]
5-3-178	bazouanthrone	$C_{30}H_{36}O_5$	$CDCl_3$	[139]
5-3-179	harunmadagascarin A	$C_{30}H_{34}O_4$	$CDCl_3$	[138]
5-3-180	harunmadagascarin B	$C_{35}H_{42}O_4$	$CDCl_3$	[138]
5-3-181	harunmadagascarin C	$C_{30}H_{36}O_4$	$CDCl_3$	[140]
5-3-182	harunmadagascarin D	$C_{30}H_{36}O_5$	$CDCl_3$	[140]
5-3-183	kenganthranol D	$C_{30}H_{32}O_6$	$CDCl_3$	[140]



5-3-170



5-3-171



	R^1	R^2
5-3-172	H	H
5-3-175	H	Prenyl
5-3-177	Prenyl	H

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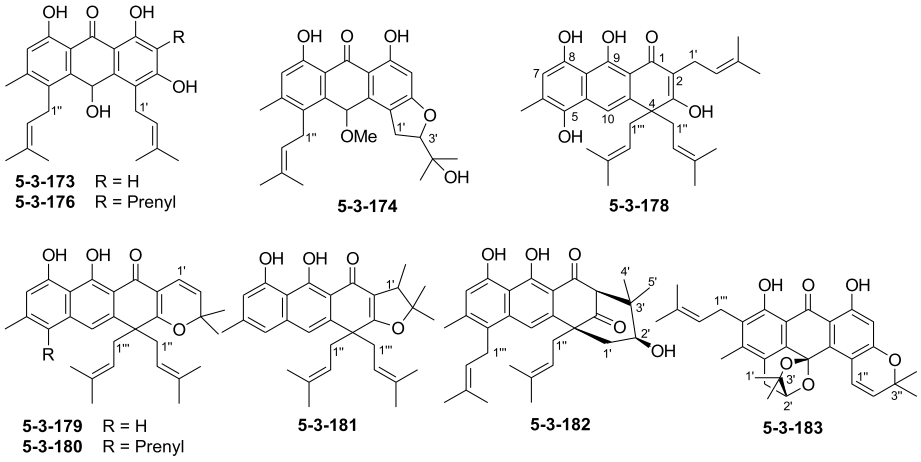


Table 5-3-62: ^{1}H NMR spectroscopic data of anthrone-type quinones **5-3-170**~**5-3-174**.

H	5-3-170	5-3-171	5-3-172	5-3-173	5-3-174
1	13.16 s(OH)	12.33 or 12.15 s(OH)	12.66 s(OH)	12.59 s(OH)	12.77 s(OH)
2		6.28 d(2)	6.43 s	6.41 s	6.39 s
3	3.92 s(OMe)		9.58 br s(OH)	5.85 s(OH)	
4	6.40 br s	7.0 d(2)			
5	6.65 br s	7.25 d(1.5)			
6	2.34 br s(Me)	2.40 s(Me)	2.34 s(Me)	2.34 s(Me)	2.32 s(Me)
7	6.67 br s	6.65 d(1.5)	6.72 s	6.83 s	6.83 s
8	12.29 s(OH)	12.33 or 12.15 s(OH)	12.46 s(OH)	12.33 s(OH)	12.46 s(OH)
10	4.21 br s		4.18 s	5.94 d(6.2)	5.76 s
				2.10 d(6.2, OH)	2.74 s(OMe)
1′	6.57 d(16.1)	2.55 d(7)	3.43 m	3.41~3.70 m	3.08 dd(7.6, 15.7)
					3.75 dd(9.0, 15.7)
2′	6.69 dd(16.1, 6.8)	4.60 m	4.96 or 5.06 m	5.01 br s	4.77 dd(7.6, 9.0)
3′	2.48 m				
4′	1.12 d(6.8)	1.45 br s	1.84 or 1.85 s	1.85 s	1.22 s
5′	1.12 d(6.8)	1.02 br s	1.69 or 1.72 s	1.74 s	1.36 s
1″			3.43 m	3.41~3.70 m	3.36 m
2″			4.96 or 5.06 m	5.18 br s	4.93 br t
4″			1.84 or 1.85 s	1.82 s	1.80 s
5″			1.69 or 1.72 s	1.69 s	1.69 s

Table 5-3-63: ^{1}H NMR spectroscopic data of anthrone-type quinones **5-3-175**~**5-3-177**.

H	5-3-175 (CD_3COCD_3)	5-3-175 ($CDCl_3$)	5-3-176	5-3-177
1	13.04 s(OH)	12.86 s(OH)	13.00 s	13.21 s(OH)
2	6.43 s	5.73 s		
3	9.56 br s(OH)	6.33 s(OH)	6.35 s(OH)	6.30 s(OH)
6	2.32 s(Me)	2.29 s(Me)	2.32 s(Me)	2.31 s(Me)

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Table 5-3-63 (continued)

H	5-3-175 (CD_3COCD_3)	5-3-175 ($CDCl_3$)	5-3-176	5-3-177
7			6.81 s	6.73 s
8	12.68 s(OH)	12.97 s(OH)	12.37 s(OH)	12.57 s(OH)
10	4.17 s	4.05 s	5.93 d(5.4)	4.03 s
			2.10 d(5.4, OH)	
1′	3.46 m	3.35 br s	3.49~3.70 m	3.35 d(6.5)
2′	4.95 or 5.06 or 5.09 m	5.05 br s	5.00 br t	4.86 t(5.1)
4′	1.81 or 1.84 or 1.86 s	1.67~1.81 s	1.81 s	1.68~1.84 s
5′	1.67 or 1.68 or 1.72 s	1.67~1.81 s	1.72 s	1.68~1.84 s
1″	3.46 m	3.35 br s	3.49~3.70 m	3.31 d(6.1)
2″	4.95 or 5.06 or 5.09 m	4.89 t(6.4)	5.23 br t	5.25 t(5.8)
4″	1.81 or 1.84 or 1.86 s	1.67~1.81 s	1.81 s	1.68~1.84 s
5″	1.67 or 1.68 or 1.72 s	1.67~1.81 s	1.69 s	1.68~1.84 s
1‴	3.46 m	3.44 d(6.4)	3.44 d(6.9)	3.46 d(7.1)
2‴	4.95 or 5.06 or 5.09 m	5.07 br s	5.24 t(6.9)	5.02 t(5.3)
4‴	1.81 or 1.84 or 1.86 s	1.67~1.81 s	1.84 s	1.68~1.84 s
5‴	1.67 or 1.68 or 1.72 s	1.67~1.81 s	1.75 s	1.68~1.84 s

Table 5-3-64: ^{1}H NMR spectroscopic data of anthrone-type quinones **5-3-178**~**5-3-181**.

H	5-3-178	5-3-179	5-3-180	5-3-181
3	5.70 s(OH)			
5	12.20 s(OH)	6.66 d(1.0)		6.66 d(0.9)
6	2.39 s(Me)	2.40 s(Me)	2.39 s(Me)	2.40 s(Me)
7	6.79 s	6.94 d(1.0)	6.68 s	6.95 d(0.9)
8	9.90 s(OH)	9.97 s(OH)	10.04 s(OH)	10.03 s(OH)
9	16.20 s(OH)	16.98 s(OH)	16.92 s(OH)	17.00 s(OH)
10	7.40 s	7.07 s	7.30 s	7.09 s
1′	2.66 dd(6.8, 13.4)	6.57 d(10.0)	6.58 d(10.0)	3.04 q(6.9)
	2.99 dd(6.8, 13.6)			
2′	4.61 t(7.2)	5.35 d(10.0)	5.36 d(10.0)	
3′				1.37 s
4′	1.44 s	1.42 s	1.43 s	1.32 s
5′	1.45 s	1.42 s	1.43 s	1.14 d(6.9)
1″	2.66 dd(6.8, 13.4)	2.58 dd(14.3, 6.8)	2.60 dd(14.1, 6.9)	2.86 d(6.2)
	2.99 dd(6.8, 13.6)	2.91 dd(14.3, 6.8)	2.90 dd(14.2, 6.9)	
2″	4.61 t(7.2)	4.54 br t(6.8)	4.56 br t(6.9)	4.51 t(6.2)
4″	1.44 s	1.46 s	1.44 s	1.42 s
5″	1.45 s	1.43 s	1.43 s	1.48 s
1‴	3.65 d(6.0)	2.58 dd(14.3, 6.8)	2.60 dd(14.1, 6.9)	2.86 d(6.2)
		2.91 dd(14.3, 6.8)	2.90 dd(14.2, 6.9)	
2‴	5.05 t(7.2)	4.54 br t(6.8)	4.56 br t(6.9)	4.51 t(6.2)
4‴	1.65 s	1.46 s	1.44 s	1.46 s
5‴	1.90 s	1.43 s	1.43 s	1.50 s
1⁗			3.55 d(6.1)	
2⁗			5.01 t(6.1)	
4⁗			1.64 br s	
5⁗			1.87 br s	

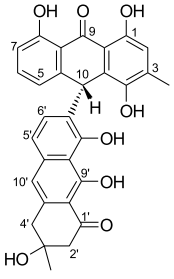
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Table 5-3-65: ^{1}H NMR spectroscopic data of anthrone-type quinones **5-3-182** and **5-3-183**.

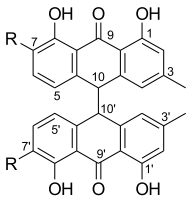
H	5-3-182	5-3-183	H	5-3-182	5-3-183
1		13.07 s(OH)	5′	1.04 s	1.19 s
2	3.14 s	6.44 s	1″	2.83 dd(6.4, 15.5)	7.63 d(10.5)
6	2.38 s(Me)	2.19 s(Me)		2.64 dd(5.9, 15.5)	
7	6.74 s		2″	4.94 dd(5.9, 6.4)	5.67 d(10.5)
8	9.63 s(OH)	12.40 s(OH)	4″	1.72 s	1.44 s
9	15.77 s(OH)		5″	1.60 s	1.42 s
10	7.23 s		1‴	3.52 d(6.1)	3.43 dd(6.5, 11.8)
1′	2.54 dd(4.2, 14.8)	3.13 dd(5.0, 16.7)			3.39 dd(5.4, 11.8)
	2.18 dd(1.6, 14.8)	2.70 dd(0.8, 16.7)	2‴	4.94 t(6.1)	5.03 dd(5.4, 6.5)
2′	3.61 dd(1.6, 4.2)	4.75 dd(0.8, 5.0)	4‴	1.82 s	1.78 s
4′	1.29 s	1.45 s	5‴	1.66 s	1.67 s

Table 5-3-66: Cos, MFs, and TSs of anthrone-type quinones **5-3-184**~**5-3-190**.

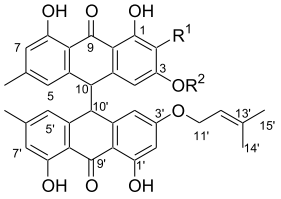
No.	Compounds	MFs	Test solvents	References
5-3-184	abyquinone C	$C_{30}H_{24}O_8$	–	[141]
5-3-185	chrysophanol-10,10′-bianthrone	$C_{30}H_{22}O_6$	$CDCl_3$	[142]
5-3-186	isophyscion-10,10′-bianthrone	$C_{32}H_{26}O_8$	$CDCl_3$	[142]
5-3-187	glaberianthrone	$C_{45}H_{46}O_8$	$CDCl_3$	[143]
5-3-188	bianthrone A2b	$C_{40}H_{38}O_8$	$CDCl_3$	[143]
5-3-189	adamabianthrone	$C_{45}H_{46}O_8$	DMSO-d_6	[119]
5-3-190	bianthrone A_1	$C_{50}H_{54}O_8$	$CDCl_3$	[119]



5-3-184

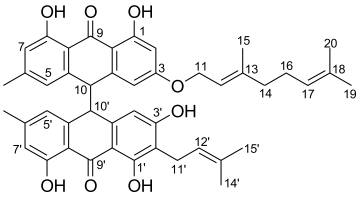


5-3-185 R = H
5-3-186 R = OMe

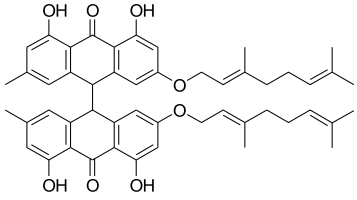


	R^1	R^2
5-3-187	Ger	H
5-3-188	H	Prenyl

Ger =



5-3-189



5-3-190

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Table 5-3-67: ^{1}H NMR spectroscopic data of anthrone-type quinones **5-3-184** and **5-3-189**.

H	5-3-184	5-3-189	H	5-3-184	5-3-189
1	11.96 s(OH)	12.37 s(OH)	1′		12.05 s(OH)
2	6.72 br s	6.10 d(2.5)	2′	2.86 br s	
3	2.18 s(Me)		3′	1.4 s(Me)	9.54 s(OH)
4		6.30 d(2.5)	4′	3.06 br s	6.27 s
5	6.87 dd(8.0, 1.5)	6.60 d(1.8)	5′	6.98 d(8.0)	6.66 d(2.5)
6	7.38 t(8.0, 8.0)	2.25 s(Me)	6′	6.84 d(8.0)	2.25 s(Me)
7	6.84 dd(8.0, 1.5)	6.20 d(1.8)	7′		6.37 d(2.5)
8	12.36 s(OH)	11.84 s(OH)	8′	10.74 s(OH)	11.74 s(OH)
9			9′	16.12 s(OH)	
10	6.13 s	4.50 s	10′	6.93 s	4.50 s
11		4.64 d(6.0)	11′		3.35 d(7.9)
12		5.46 t(6.0)	12′		5.10 t(7.9)
14		2.05 m	14′		1.86 s
15		1.81 s	15′		1.86 s
16		2.05 m			
17		5.30 t(8)			
19		1.60 s			
20		1.62 s			

Table 5-3-68: ^{1}H NMR spectroscopic data of anthrone-type quinones **5-3-185**~**5-3-188** and **5-3-190**.

H	5-3-185	5-3-186	5-3-187	5-3-188	5-3-190
1, 1′	11.78, 11.88 (OH)	12.10, 12.15 (OH)	12.56, 12.19 s(OH)	12.23 s(OH)	12.10 s(OH)
2, 2′	6.61 br s	6.33 d(2.5)	6.37 d(1.9)	6.42 d(1.9)	6.35 d(2.2)
	6.69 br s	6.36 d(2.5)			
3, 3′	2.20 s(Me)	2.26 s(Me)	6.17 s(OH)		
	2.30 s(Me)	2.27 s(Me)			
4, 4′	5.73 br s	5.88 d(2.0)	6.02 s	6.14 s	6.00 d(2.2)
	6.15 br s	6.0 d(2.0)	6.12 d(1.9)		
5, 5′	6.32 d(8.0)	6.10 d(8.3)	5.90 s	6.03 s	6.12 br s
	6.72 d(8.0)		5.92 s		
6, 6′	7.35 t(8.0)	6.68 d(8.3)	2.22 s(Me)	2.28 s(Me)	2.31 s(Me)
	7.45 t(8.0)		2.23 s(Me)		
7, 7′	6.88 d(8.0)	3.78 s(OMe)	6.62 s	6.68 s	6.69 br s
	6.92 d(8.0)	3.80 s(OMe)			
8, 8′	11.65, 11.73 (OH)	11.88, 11.80 (OH)	11.80, 11.79 s(OH)	11.84 s(OH)	11.90 s(OH)
10, 10′	4.47 br s	4.34 br s	4.27 d(3.0)	4.36 s	4.33 s
			4.28 d(3.0)		
11, 11′			3.44 dd(15.5, 7.0)	4.56 d(7.2)	4.54 d(6.6)
			4.53 d(7.0)		
12, 12′			5.28 t(7.2)	5.52 t(7.2)	5.47 t(6.6)
			5.48 t(7.2)		
14, 14′			1.82 s, 1.77 s	1.82 s	2.12 m
15, 15′			2.09~2.14 m, 1.83 s	1.87 s	1.79 br s

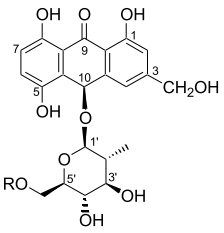
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Table 5-3-68 (continued)

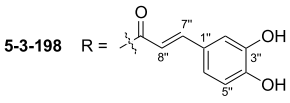
H	5-3-185	5-3-186	5-3-187	5-3-188	5-3-190
16			2.09~2.14 m		2.14 m
17			5.06 t(7.2)		5.12 m
19			1.60 s		1.70 br s
20			1.68 s		1.63 br s

Table 5-3-69: Cos, MFs, and TSs of anthrone-type quinones **5-3-191**~**5-3-208**.

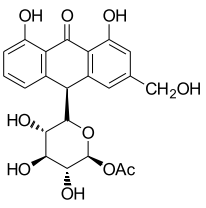
No.	Compounds	MFs	Test solvents	References
5-3-191	5-hydroxyaloin A	$C_{21}H_{22}O_{10}$	CD_3OD-DMSO-d_6	[144]
5-3-192	5-hydroxyaloin A 6′-*O*-acetate	$C_{23}H_{24}O_{10}$	CD_3COCD_3	[145]
5-3-193	picramnioside B	$C_{22}H_{22}O_{10}$	DMSO-d_6	[146]
5-3-194	picramnioside C	$C_{22}H_{22}O_{10}$	DMSO-d_6	[146]
5-3-195	picramnioside A	$C_{27}H_{24}O_{10}$	DMSO-d_6	[146]
5-3-196	10-*epi*-uveoside	$C_{27}H_{24}O_9$	CD_3COCD_3	[147]
5-3-197	uveoside	$C_{27}H_{24}O_9$	CD_3COCD_3	[148]
5-3-198	microstigmin A	$C_{30}H_{28}O_{13}$	CD_3OD-DMSO-d_6	[144]
5-3-199	microdontin A	$C_{30}H_{28}O_{11}$	CD_3OD	[149]
5-3-200	microdontin B	$C_{30}H_{28}O_{11}$	CD_3OD	[149]
5-3-201	picramnioside D	$C_{26}H_{24}O_{10}$	CD_3OD	[150]
5-3-202	picramnioside E	$C_{26}H_{24}O_{10}$	CD_3OD	[150]
5-3-203	picramniosdie G	$C_{27}H_{24}O_8$	$CDCl_3$	[151]
5-3-204	picramnioside H	$C_{27}H_{24}O_8$	$CDCl_3$	[151]
5-3-205	mayoside D	$C_{27}H_{24}O_9$	$CDCl_3$	[151]
5-3-206	mayoside E	$C_{27}H_{24}O_9$	$CDCl_3$	[151]
5-3-207	mayoside B	$C_{26}H_{24}O_{11}$	CD_3OD	[150]
5-3-208	mayoside	$C_{26}H_{24}O_{11}$	CD_3OD	[150]



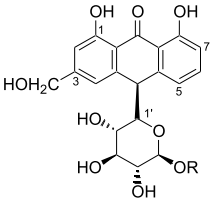
5-3-191 R = H
5-3-192 R = Ac



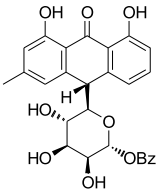
5-3-198 R =



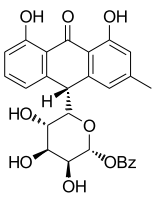
5-3-193



5-3-194 R = Ac
5-3-195 R = Bz

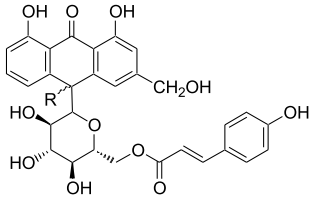


5-3-196

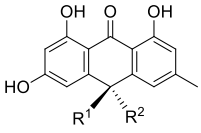


5-3-197

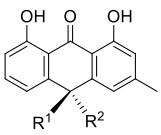
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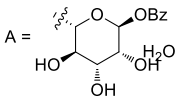
5-3-199 R = α-H
5-3-200 R = β-H



	R^1	R^2
5-3-201	A	H
5-3-202	H	A
5-3-207	A	OH
5-3-208	OH	A



	R^1	R^2
5-3-203	B	H
5-3-204	H	B
5-3-205	OH	B
5-3-206	B	OH



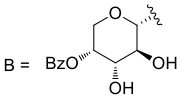


Table 5-3-70: ^{1}H NMR spectroscopic data of anthrone-type quinones **5-3-191**~**5-3-194**.

H	5-3-191	5-3-192	5-3-193	5-3-194
1	11.87 s(OH)	11.74 s(OH)	11.85 s(OH)	11.84 s(OH)
2	6.89 br s	6.91 d(0.8)	6.89 s	6.80 s
4	7.16 br s	7.10 d(0.8)	7.07 s	6.98 s
5			6.99 d	7.13 d
6	6.78 d(8.9)	6.79 d(8.8)	7.53~7.57	7.55~7.59 dd
7	7.18 d(8.9)	7.19 d(8.8)	6.86 d	6.91 d
8	11.46 s(OH)	11.36 s(OH)	11.89 s(OH)	11.93 s(OH)
10	4.83 d(2.1)	4.83 d(2.0)	4.58~4.62 m	4.51~4.63 m
CH_2	4.69 s	4.71 s	4.58~4.62 m, 5.46 t(OH)	4.51~4.63 m, 5.48 t(OH)
OAc		2.29 s	1.17 s	1.72 s
1′	3.55 dd(9.7, 2.1)	3.25 dd	3.64~3.67 dd(2.2, 9.7)	3.67~3.70 dd(2.0, 9.9)
2′	2.88 dd(9.7, 9.6)	3.12 t	3.34~3.41 m, 5.32 d(OH)	3.38~3.44 m, 5.38 d(OH)
3′	3.30	3.34 t	3.46~3.48 m, 4.85 d(OH)	3.54~3.57 m, 4.85 d(OH)
4′	3.03	2.83 t	3.46~3.48 m, 4.94 d(OH)	3.54~3.57 m, 4.93 d(OH)
5′	3.01	3.07 m	5.42 s	5.40 s
6′	3.45 dd	4.14 dd(11.6, 2.0)		
	3.56 dd	3.81 dd(11.6, 6.8)		

Table 5-3-71: ^{1}H NMR spectroscopic data of anthrone-type quinones **5-3-195**~**5-3-197**.

H	5-3-195	5-3-196	5-3-197
1	11.83 s(OH)	11.95 s(OH)	
2	6.62 s	6.73 dd(1.3, 0.7)	6.49 s
3		2.37 s(Me)	1.88 s(Me)

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Table 5-3-71 (continued)

H	5-3-195	5-3-196	5-3-197
4	6.83 s	7.04 dd(1.4, 0.7)	6.70 s
5	7.15 d	6.88 ddd(7.5, 1.0, 0.9)	7.20 d(7.3)
6	7.57~7.61 dd	7.14 t(8.0)	7.54 m
7	6.93 d	6.66 dd(8.4, 1.1)	6.90 d(8.4)
8	11.96 s(OH)	12.01 s(OH)	
10	4.65 d	4.67 d(2.4)	4.67 d(2.5)
CH_2	4.03 d, 5.20 t(OH)		
1′	3.85 dd(2.1, 9.9)	5.88 d(1.2)	5.85 s
2′	3.45~3.53 m, 5.42 d(OH)	3.87 m	3.88 m
3′	3.67 m, 4.91 d(OH)	3.85 m	3.88 m
4′	3.67 m, 5.01 d(OH)	3.67 ddd(9.9, 8.8, 5.1)	3.66 ddd(9.7, 8.6, 4.5)
5′	5.62 s	4.00 dd(10.0, 2.5)	4.01 dd(2.5, 9.7)
2″, 6″	7.71~7.73 dd	7.82 m	7.86 dd(3.1, 1.1)
3″, 5″	7.50~7.53 dd	7.49 m	7.54 dd(3.1, 1.1)
4″	7.65~7.69 dd	7.64 m	7.64 t(7.4)

Table 5-3-72: ^{1}H NMR spectroscopic data of anthrone-type quinones **5-3-198**~**5-3-200**.

H	5-3-198	5-3-199	5-3-200
1	11.50 s(OH)		
2	6.84 d(1.0)	6.88 d(1.4)	6.72 d(1.4)
4	7.05 d(1.0)	7.25	7.06
5		7.07	7.28
6	6.77 d(8.9)	7.49 dd(7.6, 8.4)	7.50 dd(7.6, 8.4)
7	7.12 d(8.9)	6.87 dd(1.1, 8.4)	6.69 dd(1.1, 8.4)
8	11.20 s(OH)		
10	4.85 d(1.9)	4.50 d(2.4)	4.55 d(2.4)
CH_2	4.64 s	4.63~4.72	4.63~4.72
1′	3.40 dd(9.5, 1.9)	4.01 dd(2.4, 9.9)	4.04 dd(2.4, 9.9)
2′	3.02 dd(9.5, 9.4)	4.38 dd(9.9, 9.1)	4.35 dd(9.9, 9.1)
3′	3.34 t	3.36 t(9.1, 9.1)	3.37 t(9.1, 9.1)
4′	2.98 t	3.08 t(9.1)	3.07 t(9.1)
5′	3.14 ddd(9.5, 6.9, 1.9)	3.30	3.30
6′	3.93 dd(11.8, 6.9)	3.64 dd(11.9, 6.1)	3.64 dd(11.9, 6.1)
	4.34 dd(11.8, 1.9)	3.86 dd(11.9, 2.2)	3.88 dd(11.9, 2.2)
2″	7.14 d(1.9)	7.35 d(8.7)	7.35 d(8.7)
3″		6.81 d(8.7)	6.81 d(8.7)
5″	6.87 d(8.2)	6.81 d(8.7)	6.81 d(8.7)
6″	7.04 dd(8.2, 1.9)	7.35 d(8.7)	7.35 d(8.7)
7″	7.45 d(15.9)	7.23 d(15.9)	7.23 d(15.9)
8″	6.20 d(15.9)	5.89 d(15.9)	5.88 d(15.9)

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Table 5-3-73: ^{1}H NMR spectroscopic data of anthrone-type quinones **5-3-201**~**5-3-204**.

H	5-3-201	5-3-202	5-3-203	5-3-204
1			12.10 s(OH)	12.09 s(OH)
2	6.20 d(2.1)	6.24 d(2.4)	6.83 br s	6.74 br s
3	2.27 s(Me)	1.79 s(Me)	2.40 s(Me)	2.37 s(Me)
4	5.94 d(2.1)	6.58 d(2.4)	6.86 br s	6.84 br s
5	6.80 br s	6.55 br s	7.02 d(7.5)	7.04 d(7.5)
6			7.47 t(7.9)	7.49 t(8.0)
7	6.57 br s	6.41 br s	6.93 d(8.3)	7.01 d(8.3)
8			11.99 s(OH)	11.96 s(OH)
10	4.36 d(2.1)		4.59 br s	4.59 br s
1′	5.76 d(1.5)	5.84 d(0.8)	3.47 dd(9.2, 1.9)	3.45 t(7.7)
2′	3.76 dd(3.4, 1.5)	3.77~3.84 m	3.66 t(9.2)	3.67 t(9.1)
3′	3.71 dd(9.6, 3.4)	3.77~3.84 m	3.76 dd(9.2, 2.8)	3.76 d(7.0)
4′	3.60 t(9.6)	3.76 t(9.8)	5.21 br s	5.18 br s
5′	3.83 dd(9.6, 2.1)	3.89 dd(9.9, 2.4)	3.88 dd(13.1,1.8)	3.84 br d(11.7)
			3.37 d(13.1)	3.84 d(13.0)
2″, 6″	7.72 dt(8.4, 1.2)	7.82 dt(7.2, 1.4)	7.58 m	7.57 m
3″, 5″	7.36 td(8.4, 1.2)	7.48 td(7.2, 1.2)	7.39 t(7.7)	7.38 t(7.8)
4″	7.51 (8.6, 1.2)	7.63 (7.4, 1.2)	7.58 m	7.57 m

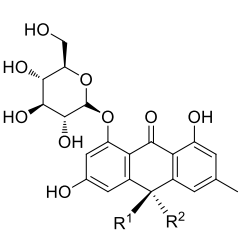
Table 5-3-74: ^{1}H NMR spectroscopic data of anthrone-type quinones **5-3-205**~**5-3-208**.

H	5-3-205	5-3-206	5-3-207	5-3-208
1	11.94 s(OH)	12.05 s(OH)		
2	6.89 br s	6.79 br s	6.15 d(2.4)	6.29 d(2.3)
3	2.43 s(Me)	2.42 s(Me)	2.42 t(0.6, Me)	1.78 br s(Me)
4	7.18 br s	7.30 br s	6.86 d(2.4)	6.88 d(2.3)
5	7.43 d(7.5)	7.35 d(7.6)	7.26 dd(1.6, 0.6)	6.96 dd(1.5, 0.5)
7	6.96 d(8.3)	7.07 d(8.3)	6.75 dd(1.6, 0.6)	6.47 dd(1.5, 0.7)
8	11.89 s(OH)	11.85 s(OH)		
1′	3.27 d(8.6)	3.30 m	5.85 d(1.06)	5.80 d(1.7)
2′	3.69 t(8.9)	3.68 t(8.9)	3.70~3.79 m	3.78 dd(3.4, 1.8)
3′	3.77 m	3.79 m	3.80~3.92 m	3.81~3.84 m
4′	5.18 br s	5.18 br s	3.80~3.92 m	3.81 t(8.3)
5′	3.77 m	3.79 m	3.70~3.79 m	3.65 dm(8.8)
	3.30 d(12.6)	3.30 m		
2″, 6″	7.56 m	7.56 m	7.87 dt(7.4, 1.3)	7.83 dt(7.0, 1.5)
3″, 5″	7.40 m	7.40 m	7.50 td(7.4, 1.3)	7.50 td(7.0, 1.5)
4″	7.56 m	7.56 m	7.51 (7.4, 1.3)	7.63 (7.4, 1.4)

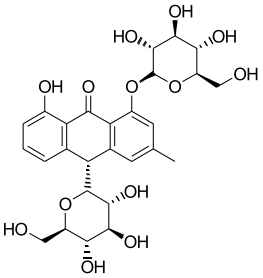
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Table 5-3-75: Cos, MFs, and TSs of anthrone-type quinones **5-3-209**~**5-3-215**.

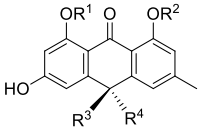
No.	Compounds	MFs	Test solvents	References
5-3-209	cascaroside E	$C_{27}H_{32}O_{14}$	CD_3OD	[152]
5-3-210	cascaroside F	$C_{27}H_{32}O_{14}$	CD_3OD	[152]
5-3-211	10*R*-chrysaloin 1-*O*-*β*-D-glucopyranoside	$C_{27}H_{32}O_{13}$	CD_3OD	[153]
5-3-212	picramnioside F	$C_{33}H_{34}O_{15}$	CD_3OD	[154]
5-3-213	mayoside C	$C_{33}H_{34}O_{16}$	CD_3OD	[154]
5-3-214	10-hydroxycascaroside C	$C_{27}H_{32}O_{14}$	CD_3OD	[153]
5-3-215	10-hydroxycascaroside D	$C_{27}H_{32}O_{14}$	CD_3OD	[153]



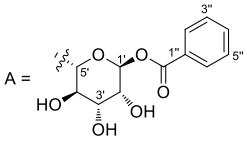
	R^1	R^2
5-3-209	Glc	H
5-3-210	H	Glc



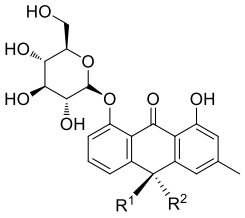
5-3-211



	R^1	R^2	R^3	R^4
5-3-212	H	Glc	H	A
5-3-213	Glc	H	A	OH



A =



	R^1	R^2
5-3-214	Glc	OH
5-3-215	OH	Glc

Table 5-3-76: ^{1}H NMR spectroscopic data of anthrone-type quinones **5-3-209**~**5-3-211**, **5-3-214**, and **5-3-215**.

H	5-3-209	5-3-210	5-3-211	5-3-214	5-3-215
2	6.64 br s	6.61 br s	7.25 br s	6.76 br s	6.71 br s
3	2.34 s(Me)	2.33 s(Me)	2.43 s(Me)	2.41 s(Me)	2.36 s(Me)
4	6.83 br s	6.79 br s	7.15 br s	7.20 br s	7.25 br s
5	6.65 d(2.3)	6.70 d(2.1)	7.05 d(8.0)	7.77 dd(8.0, 1.2)	7.61~7.65 m

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Table 5-3-76 (continued)

H	5-3-209	5-3-210	5-3-211	5-3-214	5-3-215
6			7.43 t(7.8)	7.64 t(8.0)	7.61~7.65 m
7	6.77 d(2.3)	6.81 d(2.1)	6.85 d(8.0)	7.46 dd(8.0, 1.2)	7.45 dd(8.0, 1.2)
10	4.41 d(2.1)	4.44 d(1.5)	4.56 s		
1′	3.35 dd(9.5, 2.1)	ov	3.35 d(9.7)	3.19 d(9.6)	3.19 d(9.6)
2′	3.00 dd(9.5, 9.2)	3.09 dd(9.2, 8.7)	3.00 t(9.2)	3.00 t(9.2)	3.01 t(9.6)
3′	3.28 dd(9.2, 8.4)	3.28 dd(9.5, 8.7)	3.28 t(8.8)	3.28 t(8.8)	3.27 t(8.5)
4′	2.86 dd(9.6, 8.4)	2.95 dd(9.5, 8.7)	2.83 t(9.6)	2.80 t(9.6)	2.82~2.93 m
5′	2.89~2.96 m	2.83~2.88 m	2.85~2.91 m	2.85~2.91 m	2.82~2.93 m
6′	3.55 dd(11.7, 2.6)	3.52 dd(11.9, 2.5)	3.34 dd(11.5, 4.7)	3.32 dd(11.5, 5.7)	3.37 dd(11.8, 4.9)
	3.36 dd(11.7, 5.4)	3.39 dd(11.9, 5.2)	3.53 d(11.5)	3.53 d(11.5)	3.52 d(11.8)
1″	4.86 d(7.4)	4.87 d(7.4)	4.95 d(7.6)	4.93 d(7.6)	4.93 d(7.7)
2″	3.60 dd(8.9, 7.4)	3.63 dd(8.9, 7.4)	3.62 dd(9.2, 7.6)	3.62 dd(9.2, 7.6)	3.65 t(7.8)
3″	3.43~3.52 m	3.43~3.50 m	3.52 t(9.2)	3.52 t(9.2)	3.44~3.50 m
4″	3.43~3.52 m	3.43~3.50 m	3.41 t(9.3)	3.43 t(8.8)	3.41~3.49 m
5″	3.43~3.52 m	3.43~3.50 m	3.47~3.52 m	3.44~3.50 m	3.45~3.51 m
6″	3.93 dd(12.0, 1.8)	3.95 br d(11.9)	3.72 dd(12.2, 5.8)	3.73 dd(12.1, 5.5)	3.73 dd(11.9, 5.0)
	3.76 dd(12.0, 4.7)	3.75 dd(11.9, 4.4)	3.94 dd(12.2, 2.2)	3.92 dd(12.1, 2.2)	3.92 d(11.9)

Table 5-3-77: ^{1}H NMR spectroscopic data of anthrone-type quinones **5-3-212** and **5-3-213**.

H	5-3-212	5-3-213	H	5-3-212	5-3-213
2	6.23 d(2.3)	6.74 d(2.4)	5′	3.98 dd(12.1, 2.3)	3.55~3.64 m
3	1.84 br s(Me)	2.42 s(Me)	2″, 6″	7.79 dm(7.9)	7.80 dm(8.0)
4	6.54 d(2.3)	6.97 d(2.4)	3″, 5″	7.48 tm(7.4)	7.47 tm(7.4)
5	6.82 s	7.18 br d(1)	4″	7.63 tt(7.4, 1.3)	7.61 tm(7.4)
7	7.09 s	6.73 br d(1)	1‴	4.97 d(7.5)	4.97 d(7.5)
10	4.48 d(2.3)		2‴	3.44~3.53 m	3.56~3.63 m
1′	5.82 s	5.80 d(1.2)	3‴	3.44~3.95 m	3.57~3.61 m
2′	3.75~3.95 m	3.76~3.80 m	4‴	3.75~3.53 m	3.43~3.50 m
3′	3.75~3.95 m	3.76~3.80 m	5‴	3.44~3.53 m	3.43~3.50 m
4′	3.75~3.95 m	3.58~3.66 m	6‴	3.75~3.53 m	3.97 m, 3.78 m

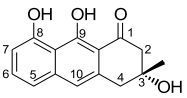
Table 5-3-78: Cos, MFs, and TSs of preanthraquinone-type quinones **5-3-216**~**5-3-228**.

No.	Compounds	MFs	Test solvents	References
5-3-216	(*R*)-prechrysophanol	$C_{15}H_{14}O_4$	CD_3COCD_3	[155]
5-3-217	torosachrysone	$C_{16}H_{16}O_5$	$CDCl_3$	[112]
5-3-218	atrochrysone	$C_{15}H_{14}O_5$	CD_3COCD_3	[156]
5-3-219	acetyltorosachrysone	$C_{18}H_{18}O_6$	$CDCl_3$	[157]
5-3-220	aloe barbendol	$C_{15}H_{14}O_4$	CD_3OD	[158]

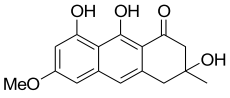
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Table 5-3-78 (continued)

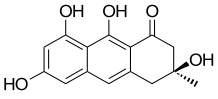
No.	Compounds	MFs	Test solvents	References
5-3-221	1-oxo-4(*S*),9-dihydroxy-8-methoxy-6-hydroxymethyl-1,2,3,4-tetrahydroanthracene	$C_{16}H_{16}O_5$	$CDCl_3$	[115]
5-3-222	aloesaponol III-8-methyl ether	$C_{16}H_{16}O_4$	$CDCl_3$	[99]
5-3-223	vismione H	$C_{22}H_{24}O_6$	CD_3COCD_3	[159]
5-3-224	6-*O*-prenylvismione E	$C_{26}H_{32}O_5$	$CDCl_3$	[157]
5-3-225	vismione D	$C_{25}H_{30}O_5$	$CDCl_3$	[119]
5-3-226	vismione L	$C_{25}H_{30}O_5$	$CDCl_3$	[160]
5-3-227	vismione M	$C_{26}H_{32}O_5$	$CDCl_3$	
5-3-228	asperflavin ribofuranoside	$C_{21}H_{24}O_9$	DMSO-d_6	[161]



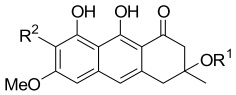
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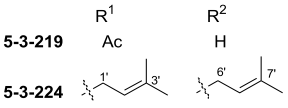


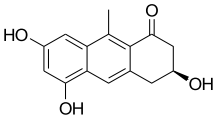
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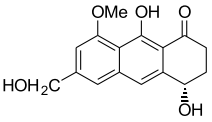
5-3-218



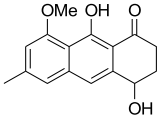




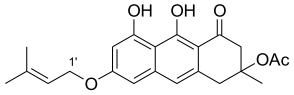
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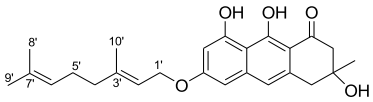
5-3-221



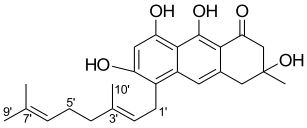
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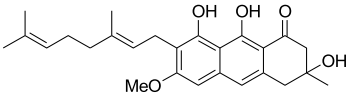
5-3-223



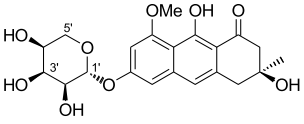
5-3-225



5-3-226



5-3-227



5-3-228

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Table 5-3-79: ^{1}H NMR spectroscopic data of preanthraquinone-type quinones **5-3-216**~**5-3-219**.

H	5-3-216	5-3-217	5-3-218	5-3-219
2	2.80 d(17.5) 2.73 d(17.5)	2.80 br s	ax 2.90 d(17.4) eq 2.77 dd(17.4, 2.0)	3.1-2.7 m
3	1.33 s(Me)	1.40 s(Me) 2.00 br s(OH)	1.40 s(Me) 4.02 br s(OH)	1.66 s(Me) 1.83 s(OAc)
4	3.03 d(17.5) 2.97 d(17.5)	3.00 br s	ax 3.08 d(15.9) eq 2.99 dd(15.9, 2.0)	3.72 d(16) 3.50 d(16)
5	7.08 dd(8.4, 2.0)	6.45 d(2.5)	6.48 d(2.2)	6.52 d(2)
6	7.39 t(8.4)	3.90 s(OMe)	9.16 s(OH)	3.78 s(OMe)
7	6.78 dd(8.4, 2.0)	6.55 d(2.5)	6.37 d(2.2)	6.32 d(2)
8	9.65 s(OH)	9.80 s(OH)	9.84 s(OH)	9.53 s(OH)
9	16.10 s(OH)	16.10 s(OH)	16.52 br s(OH)	16.00 s(OH)
10	6.95 s	6.85 s(OH)	6.83 br s	6.78 s

Table 5-3-80: ^{1}H NMR spectroscopic data of preanthraquinone-type quinones **5-3-220**~**5-3-222**.

H	5-3-220	5-3-221	5-3-222
2	ax 2.72 ddd(13.2, 7.6, 1.0) eq 2.93 m	2.63 m 2.94 m	2.68 m 3.04 m
3	4.32 tt(7.6, 3.6)	2.11 m	2.26 m
4	ax 2.97 m eq 3.19 ddd(15.6, 3.6, 1.0)	4.79 dd(6.5, 4.0)	4.92 dd(5.0, 4.0)
5		7.12 d(1.8)	7.15 or 6.68 d(2.0)
6	6.76 d(2.5)	4.31 s(CH_2)	2.43 s(Me)
7		6.82 d(1.8)	7.15 or 6.68 d(2.0)
8	6.74 br d(2.5)	4.01 s(OMe)	4.01 s(OMe)
9	2.84 s(Me)	15.17 s(OH)	15.15 s(OH)
10	6.85 s	7.14 s	

Table 5-3-81: ^{1}H NMR spectroscopic data of preanthraquinone-type quinones **5-3-223**~**5-3-225** and **5-3-228**.

H	5-3-223	5-3-224	5-3-225	5-3-228
2	3.10 br s	2.73 br s	2.82 br s	2.64 d(17.0), 2.86 d(17.0)
3		1.37 s(Me)	1.44 s(Me)	1.27 s(Me), 4.85 s(OH)
4	3.68 d(16), 3.20 d(16)	2.93 br s	3.03 br s	2.91 d(16.3), 3.02 d(16.3)
5	6.65 d(2)	6.37 s	6.44 d(2.3)	6.84 d(2.0)
6		3.81 s(OMe)		
7	6.33 s(2)		6.49 d(2.3)	6.58 d(2.0)
8	9.60 s(OH)	9.77 s(OH)	9.79 s(OH)	3.87 s(OMe)
9	16.1 s(OH)	16.0 br s(OH)	16.12 s(OH)	14.87 s(OH)
10	6.87 s	6.66 s	6.83 s	6.91 s

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Table 5-3-81 (continued)

H	5-3-223	5-3-224	5-3-225	5-3-228
1′	4.60 d(7)	4.55 d(7.5)	4.62 d(6.6)	5.75 d(4.5)
2′	5.45 t(7)	5.20 br t(7.5)	5.50 t(6.6)	4.11 m, 4.75 d(8.8, OH)
3′				3.95 m, 4.93 d(3.3, OH)
4′	1.77 or 1.68 s	1.8~1.7	2.11 m	4.01 m
5′	1.77 or 1.68 s	1.8~1.7	2.11 m	3.49 m, 4.82 t(5.6)
6′		3.37 d(7.5)	5.30 t(8.0)	
7′		5.20 br t(7.5)		
8′			1.69 s	
9′		1.8~1.7	1.60 s	
10′		1.8~1.7	1.75 s	
OAc	1.77 or 1.68 s			

Table 5-3-82: ^{1}H NMR spectroscopic data of preanthraquinone-type quinones **5-3-226** and **5-3-227**.

H	5-3-226	5-3-227	H	5-3-226	5-3-227
2	2.80 d(7.0)	2.76 d(7.0)	10	6.51 br s	6.74 br s
3	1.40 s(Me), 3.97 s(OH)	1.37 s(Me)	1′	3.47 br d(6.0)	3.46 br d(6.0)
4	2.90 br s	2.96 br s	2′	5.26 t(6.0)	5.25 t(6.0)
5		6.43 br s	4′	2.0~2.1	2.0~2.1
6	6.20 s(OH)	3.87 s(OMe)	5′	2.0~2.1	2.0~2.1
7	6.30 br s		6′	5.04 br t(6.0)	5.04 br t(6.0)
8	10.03 s(OH)	10.03 s(OH)	8′ ~10′	1.82 s, 1.70 s, 1.68 s	1.81 s, 1.70 s, 1.65 s
9	16.41 s(OH)	16.17 s(OH)			

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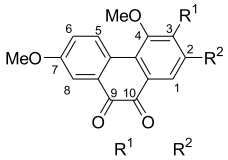
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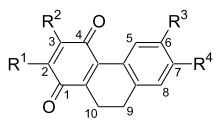
5.4 Phenanthrenequinone-type quinones

Table 5-4-1: Cos, MFs, and TSs of phenanthrenequinone-type quinones **5-4-1**~**5-4-11**.

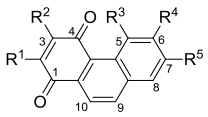
No.	Compounds	MFs	Test solvents	References
5-4-1	cypripediquinone A	$C_{17}H_{14}O_5$	$CDCl_3$	[162]
5-4-2	bulbophyllanthrone	$C_{17}H_{14}O_6$	$CDCl_3$	[163]
5-4-3	bauhinione	$C_{17}H_{16}O_4$	$CDCl_3$	[164]
5-4-4	ochrone A	$C_{15}H_{12}O_4$	CD_3COCD_3	[165]
5-4-5	ochrone A acetate	$C_{17}H_{14}O_5$	$CDCl_3$	[165]
5-4-6	stemanthraquinone	$C_{16}H_{14}O_4$	$CDCl_3$	[166]
5-4-7	ochrone B acetate	$C_{17}H_{12}O_5$	$CDCl_3$	[165]
5-4-8	dioscoreanone	$C_{16}H_{12}O_5$	$CDCl_3$-CD_3OD(1:1)	[167]
5-4-9	denbinobin	$C_{16}H_{12}O_5$	$CDCl_3$	[168]
5-4-10	7-hydroxy-5,6-dimethoxy-1,4-phenanthrenequinone	$C_{16}H_{12}O_5$	$CDCl_3$	[169]
5-4-11	moniliformin	$C_{16}H_{10}O_6$	$CDCl_3$	[168]



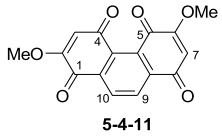
	R^1	R^2
5-4-1	H	OMe
5-4-2	OMe	OH



	R^1	R^2	R^3	R^4
5-4-3	OMe	Me	H	OMe
5-4-4	OH	H	H	OMe
5-4-5	OAc	H	H	OMe
5-4-6	H	OMe	Me	OH



	R^1	R^2	R^3	R^4	R^5
5-4-7	OAc	H	H	H	OMe
5-4-8	OMe	H	H	OMe	OH
5-4-9	H	OMe	OH	H	OMe
5-4-10	H	H	OMe	OMe	OH



5-4-11

Table 5-4-2: ^{1}H NMR spectroscopic data of phenanthrenequinone-type quinones **5-4-1**~**5-4-5**.

H	5-4-1	5-4-2	5-4-3	5-4-4	5-4-5
1	7.21 d(2.3)	7.56 s			
2	3.85 s(OMe)	5.85 br s(OH)	3.98 s(OMe)		2.31 s(OAc)
3	6.71 d(2.3)	4.10 s(OMe)	1.98 s(Me)	5.99 s	5.95 s
4	3.91 s(OMe)	3.91 s(OMe)			
5	8.58 d(9.1)	8.64 d(9)	7.13 d(8.4)	7.96 d(9.4)	8.10 d(9.0)
6	7.07 dd(9.1, 3.0)	7.18 dd(3, 9)	6.71 dd(8.4, 2.9)	6.77 q(9.4, 2.4)	7.00 q(9.0, 3.0)
7	3.85 s(OMe)	3.85 s(OMe)	3.79 s(OMe)	3.86 s(OMe)	3.83 s(OMe)
8	7.51 d(3.0)	7.60 d(3)	6.69 d(2.9)	6.77 d(2.4)	6.95 d(3.0)
9			3.01 m	2.73 m	2.75 m
10			2.78 m	2.61 m	2.70 m

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Table 5-4-3: ^{1}H NMR spectroscopic data of phenanthrenequinone-type quinones **5-4-6**~**5-4-11**.

H	5-4-6	5-4-7	5-4-8	5-4-9	5-4-10	5-4-11
2	5.91 s	2.38 s(OAc)	3.93 s(OMe)	6.16 s	6.83 d(10.1)	3.91 s(OMe)
3	3.85 s(OMe)	6.17 s	6.11 s	3.98 s(OMe)	7.06 d(10.1)	6.32 s
5	7.89 s	9.67 d(9.5)	9.13 s	10.99 s(OH)	3.91 s(OMe)	
6	2.27 s(Me)	7.46 q(9.5, 2.4)	4.12 s(OMe)	6.94 d(2.7)	4.06 s(OMe)	3.94 s(OMe)
7		3.93 s(OMe)		3.94 s(OMe)	6.29 s(OH)	6.16 s
8	6.66 s	7.65 d(2.4)	7.24 s	6.83 d(2.7)	7.12 s	
9	2.69 br s	8.23 d (8.5)	7.92 d(8.5)	8.07 d(8.6)	7.86 d(8.7)	8.37 d(8.4)
10	2.69 br s	8.08 d(8.5)	8.06 d(8.5)	8.14 d(8.6)	7.97 d(8.7)	8.41 d(8.4)

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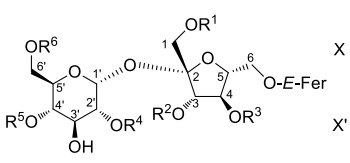
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6 Phenylpropanoids

6.1 Simple phenylpropanoids

Table 6-1-1: Cos, MFs, and TSs of simple phenylpropanoids **6-1-1**~**6-1-24**.

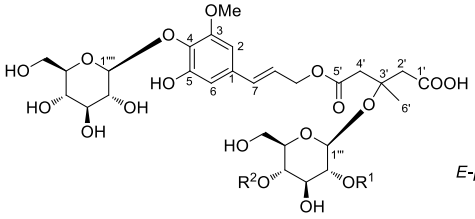
No.	Compounds	MFs	Test solvents	References
6-1-1	smilaside A	$C_{36}H_{42}O_{19}$	$CDCl_3$	[1]
6-1-2	smilaside B	$C_{34}H_{40}O_{18}$	$CDCl_3$	[1]
6-1-3	smilaside C	$C_{41}H_{44}O_{19}$	$CDCl_3$	[1]
6-1-4	smilaside D	$C_{43}H_{46}O_{20}$	$CDCl_3$	[1]
6-1-5	smilaside E	$C_{43}H_{46}O_{20}$	$CDCl_3$	[1]
6-1-6	smilaside F	$C_{44}H_{46}O_{20}$	$CDCl_3$	[1]
6-1-7	barbatoside A	$C_{28}H_{40}O_{18}$	CD_3OD	[2]
6-1-8	barbatoside B	$C_{38}H_{48}O_{20}$	CD_3OD	[2]
6-1-9	barbatoside C	$C_{37}H_{46}O_{20}$	CD_3OD	[2]
6-1-10	barbatoside D	$C_{37}H_{46}O_{20}$	CD_3OD	[2]
6-1-11	1-*O*-(*E*)-coumaroyl-3-galloyl-4,6-(*S*)-HHDP-*β*-D-glucopyranose	$C_{36}H_{28}O_{20}$	CD_3OD	[3]
6-1-12	1-*O*-(*E*)-coumaroyl-3,4,6-trigalloyl-*β*-D-glucopyranose	$C_{36}H_{30}O_{20}$	CD_3OD	[3]
6-1-13	1-*O*-(*E*)-caffeoyl-3,4,6-trigalloyl-*β*-D-glucopyranose	$C_{36}H_{30}O_{21}$	CD_3OD	[3]
6-1-14	1-*O*-(*E*)-cinnamoyl-3-galloyl-4,6-(*S*)-HHDP-*β*-D-glucopyranose	$C_{36}H_{28}O_{19}$	CD_3OD	[3]
6-1-15	1-*O*-(*E*)-cinnamoyl-4-galloyl-*β*-D-glucopyranose	$C_{22}H_{22}O_{11}$	CD_3OD	[3]
6-1-16	1-(4′-methoxyphenyl)-(1*S*,2*S*)-propan-1-ol 2-*O*-*β*-D-glucopyranoside	$C_{16}H_{24}O_8$	CD_3OD	[4]
6-1-17	1-(4′-methoxyphenyl)-(1*R*,2*R*)-propan-1-ol 2-*O*-*β*-D-glucopyranoside	$C_{16}H_{24}O_8$	CD_3COCD_3	[4]
6-1-18	oligandrumin E	$C_{16}H_{22}O_7$	C_5D_5N	[5]
6-1-19	tangshenoside V	$C_{21}H_{26}O_{12}$	CD_3OD	[6]
6-1-20	tangshenoside VI	$C_{38}H_{48}O_{20}$	CD_3OD	[6]
6-1-21	ficuscarpanoside A	$C_{16}H_{22}O_9$	CD_3OD	[7]
6-1-22	guaiacylglycerol 9-*O*-*β*-D-glucopyranoside	$C_{16}H_{24}O_{10}$	–	[7]
6-1-23	erythroguaiacylglycerol 9-*O*-*β*-D-glucopyranoside	$C_{16}H_{24}O_{10}$	–	[7]
6-1-24	4-methoxy guaiacylglycerol 7-*O*-*β*-D-glucopyranoside	$C_{17}H_{26}O_{10}$	–	[7]



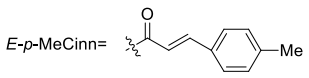
	R^1	R^2	R^3	R^4	R^5	R^6
6-1-1	H	X	H	H	Ac	Ac
6-1-2	H	X	H	Ac	H	H
6-1-3	X'	X	H	H	H	H
6-1-4	X'	X	Ac	H	H	H
6-1-5	X'	X	H	H	H	Ac
6-1-6	X'	X'	H	Ac	H	Ac

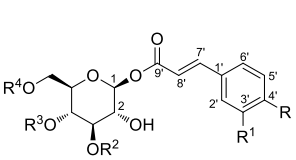
https://doi.org/10.1515/9783110631579-006

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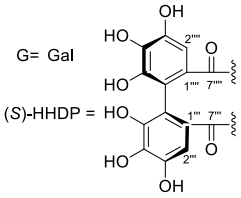
	R^1	R^2
6-1-7	H	H
6-1-8	*E*-*p*-MeCinn	H
6-1-9	H	*E*-Coum
6-1-10	H	*Z*-Coum

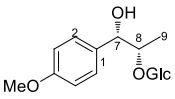




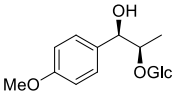
	R	R^1	R^2	R^3	R^4
6-1-11	OH	H	G	(*S*)-HHDP	
6-1-12	OH	H	G	G	G
6-1-13	OH	OH	G	G	G
6-1-14	H	H	G	(*S*)-HHDP	
6-1-15	H	H	H	G	H

G= Gal

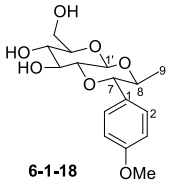




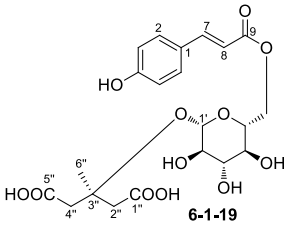
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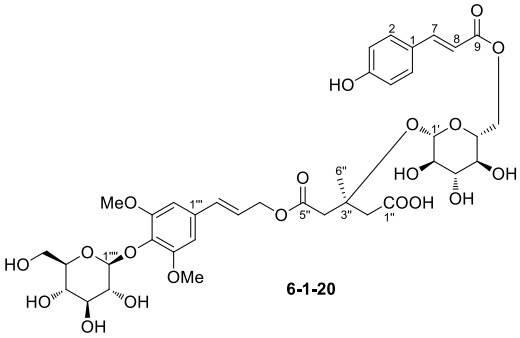
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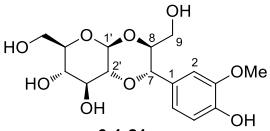
6-1-18



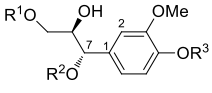
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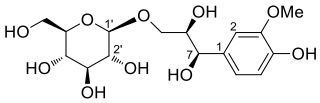
6-1-20



6-1-21



	R^1	R^2	R^3
6-1-22	Glc	H	H
6-1-24	H	Glc	Me



6-1-23

Table 6-1-2: ^{1}H NMR spectroscopic data of simple phenylpropanoids **6-1-1**~**6-1-3**.

H	6-1-1	6-1-2	6-1-3
1	3.68 d(12.0), 3.62 d(12.0)	3.63 d(12.0), 3.48 d(12.0)	4.37 m, 4.25 m
3	5.44 d(6.8)	5.54 d(8.0)	5.64 d(8.5)

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Table 6-1-2 (continued)

H	6-1-1	6-1-2	6-1-3
4	4.47 t(6.8)	4.43 t(6.8)	4.54 m
5	4.19 m	4.12 m	4.26 m
6	4.45 dd(12.0, 6.8), 4.55 dd(12.0, 4.0)	4.47 (ov)	4.58 (ov)
1′	5.51 d (4.0)	5.61d(4.0)	5.54 d(4.0)
2′	3.50 dd(10.0, 4.0)	4.58 dd(10.0, 5.0)	3.46 m
3′	3.70 t(10.0)	3.83 t(10.0)	3.70 t(10.0)
4′	4.71 t(10.0)	3.44 t(10.0)	3.45 m
5′	4.27 ddd(10.0, 6.0, 2.0)	3.94 m	4.02 m
6′	4.23 dd(12.0, 2.0), 4.07 dd(12.0, 6.0)	3.88 m, 3.76 dd(12.0, 6.0)	3.94 m, 3.85 m
1-acyl			
2″			7.37 d(8.5)
3″			6.74 d(8.5)
5″			6.74 d(8.5)
6″			7.37 d(8.5)
7″			7.63 d(16.0)
8″			6.32 d(16.0)
3-acyl			
2‴	7.26 d(2.0)	7.25 d(1.6)	7.16 s
5‴	6.82 d(8.4)	6.81 d(8.0)	6.81 d(8.5)
6‴	7.13 dd(8.4, 2.0)	7.12 dd(8.4, 2.0)	7.10 d(8.5)
7‴	7.70 d(16.0)	7.70 d(16.0)	7.72 d(16.0)
8‴	6.42 d(16.0)	6.47 d(16.0)	6.45 d(16.0)
6-acyl			
2⁗	7.18 d(2.0)	7.20 d(2.0)	7.14 s
5⁗	6.81 d(8.4)	6.81 d(8.4)	6.81 d(8.5)
6⁗	7.08 dd(8.4, 2.0)	7.10 dd(8.4, 2.0)	7.05 d(8.5)
7⁗	7.65 d(16.0)	7.66 d(16.0)	7.64 d(16.0)
8⁗	6.40 d(16.0)	6.40 d(16.0)	6.39 d(16.0)
3‴-OMe	3.90 s	3.90 s	3.86 s
3⁗-OMe	3.89 s	3.89 s	3.86 s
OAc	1.78 s(4′-OAc) 2.03 s(6′-OAc)	2.07 s(2′-OAc)	

Table 6-1-3: ^{1}H NMR spectroscopic data of simple phenylpropanoids **6-1-4**~**6-1-6**.

H	6-1-4	6-1-5	6-1-6
1	4.38 d(12.0), 4.28 d(12.0)	4.36 d(12.0), 4.31 d(12.0)	4.29 d(12.0), 4.17 d(21.0)
3	5.78 d(7.6)	5.62 d(8.4)	5.52 d(8.0)
4	5.71 d(7.6)	4.61 d(8.8)	4.56 t(8.0)
5	4.40 m	4.20 m	4.15 m
6	4.54 dd(12.0, 1.6), 4.56 m	4.57 (ov)	4.50 (ov)
1′	5.57 d(3.7)	5.56 d(4.0)	5.66 d(4.0)
2′	3.43 m	3.44 dd(10.0, 4.0)	4.62 dd(10.0, 3.6)
3′	3.70 t(10.0)	3.64 t(9.6)	3.84 t(10.0)
4′	3.46 t(9.6)	3.27 t (10.0)	3.34 t(10.0)

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Table 6-1-3 (continued)

H	6-1-4	6-1-5	6-1-6
5′	4.06 m	4.25 m	4.14 m
6′	3.94 dd(12.0, 2.4), 3.83 m	4.65 m, 4.15 m	4.51 m, 4.15 m
1-acyl			
2″	7.41 d(8.4)	7.40 d(8.4)	7.42 d(8.4)
3″	6.73 d(8.4)	6.76 d(8.4)	6.74 d(8.4)
5″	6.73 d(8.4)	6.76 d(8.4)	6.74 d(8.4)
6″	7.41 d(8.4)	7.40 d(8.4)	7.42 d(8.5)
7″	7.65 d(16.0)	7.65 d(16.0)	7.64 d(16.0)
8″	6.35 d(16.0)	6.35 d(16.0)	6.34 d(16.0)
3-acyl			
2‴	7.21 d(2.0)	7.22 d(2.0)	7.50 d(8.4)
3‴			6.81 d(8.4)
5‴	6.82 d(8.0)	6.82 d(8.4)	6.81 d(8.4)
6‴	7.11 dd(8.0, 2.0)	7.11 dd(8.4, 2.0)	7.50 d(8.4)
7‴	7.71 d(16.0)	7.72 d(16.0)	7.72 d(16.0)
8‴	6.42 d(16.0)	6.42 d(16.0)	6.45 d(16.0)
6-acyl			
2⁗	7.21 d(2.0)	7.19 d(2.0)	7.20 (s)
5⁗	6.81 d(8.0)	6.81 d(8.4)	6.80 dd(8.4, 1.6)
6⁗	7.09 dd(8.0, 2.0)	7.09 dd(8.4, 2.0)	7.07 d(8.4)
7⁗	7.65 d(16.0)	7.66 d(16.0)	7.64 d(16.0)
8⁗	6.41 d(16.0)	6.46 d(16.0)	6.41 d(16.0)
3‴-OMe	3.90 s	3.89 s	
3⁗-OMe	3.88 s	3.89 s	3.87 s
OAc	2.09 s(4-OAc)	2.10 s(6′-OAc)	2.06 s(6′-OAc)
			2.09 s(2′-OAc)

Table 6-1-4: ^{1}H NMR spectroscopic data of simple phenylpropanoids **6-1-7**~**6-1-10**.

H	6-1-7	6-1-8	6-1-9	6-1-10
2	6.61 d(3.0)	6.56 d(2.0)	6.63 d(1.5)	6.63 d(1.5)
6	6.61 d(3.0)	6.54 d(2.0)	6.61 d(1.5)	6.61 d(1.5)
7	6.55 d(16.0)	6.42 d(16.0)	6.57 d(16.0)	6.57 d(16.0)
8	6.23 dt(16.0, 6.5)	6.14 dt(16.0, 6.0)	6.26 dt(16.0, 6.5)	6.26 dt(16.0, 6.5)
9	4.71 d(6.5)	4.60 d(6.0)	4.73 d(6.5)	4.73 d(6.5)
2′	2.99 d(15.5), 2.85 d(6.5)	2.86 m	2.89 m	2.89 m
4′	2.91 d(15.5), 2.85 d(6.5)	2.86 m	2.98 m	2.98 m
6′	1.53 s	1.52 s	1.50 s	1.50 s
2″		7.50 d(8.5)	7.47 d(9.0)	7.67 d(9.0)
3″		6.90 d(8.5)	6.81 d(9.0)	6.75 d(9.0)
5″		6.90 d(8.5)	6.81 d(9.0)	6.75 d(9.0)

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Table 6-1-4 (continued)

H	6-1-7	6-1-8	6-1-9	6-1-10
6″		7.50 d(8.5)	7.47 d(9.0)	7.67 d(9.0)
7″		7.65 d(16.0)	7.66 d(16.0)	6.90 d(12.5)
8″		6.39 d(16.0)	6.36 d(16.0)	5.79 d(12.5)
1‴	4.60 d(8.0)	4.87 d(7.5)	4.68 d(8.0)	4.68 d(8.0)
2‴	3.17 dd(9.0, 8.0)	4.79 t(7.5)	–	
3‴	3.28 m	3.59 t(9.0)	3.65 t(9.5)	3.65 t(9.5)
4‴	3.28 m	–	4.81 m	4.81 m
5‴	3.39 m	–	–	
6‴	3.82 dd(12.0, 2.5)	3.85 dd(12.0, 2.0)	3.58 d(12.0)	3.58 d(12.0)
	3.63 dd(12.0, 4.5)	3.67 dd(12.0, 4.5)	–	
1⁗	4.68 d(8.0)	4.68 d(7.5)	4.68 d(8.0)	4.68 d(8.0)
2⁗	3.49 m	–	–	
3⁗	3.45 m	–	3.42 t(9.0)	3.42 t(9.0)
4⁗	3.43 m	–	–	
5⁗	3.28 m	–	–	
6⁗	3.82 d(12.0)	3.80 dd(12.0, 2.5)	3.79 dd(12.0, 2.5)	3.79 dd(12.0, 2.5)
	3.73 dd(12.0, 4.5)	3.72 dd(12.0, 4.5)	3.72 dd(12.0, 4.5)	3.72 dd(12.0, 4.5)
OMe	3.84 s	3.83 s, 3.80 s	3.85 s	3.85 s

Table 6-1-5: ^{1}H NMR spectroscopic data of simple phenylpropanoids **6-1-11**~**6-1-14**.

H	6-1-11	6-1-12	6-1-13	6-1-14
1	5.75 d(8.2)	5.83 d(8.2)	5.83 d(8.2)	5.78 d(8.1)
2	3.83 br t(8.2)	3.88 br t(8.2)	3.89 t(8.2)	3.88 t(8.1)
3	5.43 t(9.4)	5.56 t(9.4)	5.53 t(9.4)	5.44 t(9.5)
4	5.08 t(10.0)	5.44 t(9.4)	5.44 t(9.4)	5.08 t(10.0)
5	4.24 br dd(6.2, 10.0)	4.42 br d(9.4)	4.12 m	4.26 br dd(6.2, 10.0)
6	5.30 dd(6.2, 13.2)	4.46 br d(12.3)	4.49 br d(12.2)	5.32 dd(6.2, 13.2)
	3.85 d(13.2)	4.30 dd(4.9, 12.3)	4.23 dd(4.8, 12.2)	3.88 br d(13.2)
2′	7.49 d(8.4)	7.40 d(8.2)	7.04 d(1.7)	7.62 m
3′	6.82 d(8.4)	6.80 d(8.2)		7.42 m
4′				7.42 m
5′	6.82 d(8.4)	6.80 d(8.2)	6.77 d(8.2)	7.42 m
6′	7.49 d(8.4)	7.40 d(8.2)	6.83 dd(1.7, 8.2)	7.62 m
7′	7.75 d(15.9)	7.72 d(16.0)	7.66 d(15.9)	7.83 d(16.0)
8′	6.38 d(15.9)	6.30 d(16.0)	6.27 d(15.9)	6.58 d(16.0)
2″, 6″	7.02 s	6.99 s	7.01 s	7.05 s
2‴	6.45 s	6.94 s	6.95 s	6.48 s
6‴		6.94 s	6.95 s	
2⁗	6.60 s	7.07 s	7.07 s	6.59 s
6⁗		7.07 s	7.07 s	

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Table 6-1-6: ^{1}H NMR spectroscopic data of simple phenylpropanoids **6-1-15**~**6-1-19**.

H	6-1-15	6-1-16	6-1-17	6-1-18	6-1-19
1	5.69 d(8.2)				
2	3.57 t(8.2)	7.26 d(8.3)	7.31 d(6.8)	7.01 d(8.8)	7.42 d(8.6)
3	3.79 t(9.4)	6.86 d(8.3)	6.92 d(6.8)	7.40 d(8.8)	6.78 d(8.6)
4	5.02 t(9.4)				
5	3.72 ddd(2.0, 5.4, 8.2)	6.86 d(8.3)	6.92 d(6.8)	7.40 d(8.8)	6.78 d(8.6)
6	3.65 br dd(2.0, 12.1)	7.26 d(8.3)	7.31 d(6.8)	7.01 d(8.8)	7.42 d(8.6)
	3.54 dd(4.7, 12.0)				
7		4.43 d(7.7)	4.10 d(8.8)	4.32 d(9.3)	7.62 d(15.9)
8		3.85 m	3.80 m	3.95 m	6.33 d(15.9)
9		0.99 d(5.7)	0.95 d(6.9)	1.00 d(6.6)	
1′		4.54 d(7.5)	4.50 d(9.2)	4.90 d(7.3)	4.65 d(7.7)
2′	7.64 m	3.30 m	3.04 m	4.00 m	3.22 t(8.9)
3′	7.42 m	3.45 t(6.0)	3.57 m	4.25 m	3.42 t(3.9)
4′	7.42 m	3.30 m	3.48 m	4.25 m	3.30~3.34 m
5′	7.42 m	3.30 m	3.48 m	4.00 m	3.53~3.56 m
6′	7.64 m	3.85 m	3.87 m	4.60 dd(11.8, 2.3)	4.48 dd(11.8, 2.0)
		3.67 m	3.72 m	4.40 dd(11.8, 5.4)	4.28 dd(11.8, 6.8)
7′	7.82 d(16.0)				
8′	6.59 d(16.0)				
2″	7.10 s				2.80~2.92 m
4″					2.80~2.92 m
6″	7.10 s				1.49 s
4-OMe		3.73 s	3.79 s	3.80 s	

Table 6-1-7: ^{1}H NMR spectroscopic data of simple phenylpropanoids **6-1-20**~**6-1-22**.

H	6-1-20	6-1-21	6-1-22
2	7.39 d(8.2)	6.98 d(2.0)	6.98 d(1.6)
3	6.78 d(8.2)		
5	6.78 d(8.2)	6.77 d(8.4)	6.73 d(8.2)
6	7.39 d(8.2)	6.85 dd(8.4, 2.0)	6.79 dd(8.2, 1.6)
7	7.60 d(15.9)	4.43 d(9.6)	4.55 d(6.4)
8	6.29 d(15.9)	3.83 m	3.63 m
9		3.45 br d(11.4), 3.38 dd(11.4, 5.2)	3.44 dd(11.4, 4.1), 3.32(ov)
1′	4.65 d(7.7)	4.58 d(7.6)	4.19 d(7.6)
2′	3.22~3.49 m	3.14 dd(9.6, 7.6)	3.19 t-like(9.0)
3′	3.22~3.49 m	3.68 t(9.6)	3.20~3.36 m
4′	3.22~3.49 m	3.40 (ov)	3.20~3.36 m
5′	3.22~3.49 m	3.47 m	3.20~3.36 m
6′	4.48 dd(11.4, 2.0),	3.90 dd(11.6, 1.6), 3.71 dd(11.6, 5.9)	3.86 (ov), 3.64 dd(11.8, 4.6)
	4.28 dd(11.4, 6.8)		
2″	2.80~2.92 m		
4″	2.80~2.92 m		
6″	1.50 s		
2‴	6.71 s		

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Table 6-1-7 (continued)

H	6-1-20	6-1-21	6-1-22
6‴	6.71 s		
7‴	6.56 d(16.0)		
8‴	6.23 ddd(16.0, 6.5, 6.5)		
9‴	4.65 d(6.5)		
1⁗	4.86 d(7.4)		
2⁗	3.22~3.49 m		
3⁗	3.22~3.49 m		
4⁗	3.22~3.49 m		
5⁗	3.22~3.49 m		
6⁗	3.79 dd(12.0, 2.0), 3.67 dd(12.0, 4.9)		
OMe	3.83 s (3‴, 5‴-OMe)	3.85 s (3′, 5′-OMe)	3.85 s (3-OMe)

Table 6-1-8: ^{1}H NMR spectroscopic data of simple phenylpropanoids **6-1-23** and **6-1-24**.

H	6-1-23	6-1-24	H	6-1-23	6-1-24
2	6.99 d(1.6)	6.99 d(1.6)	2′	3.19 t-like(9.0)	3.16 dd(9.0, 7.2)
5	6.75 d(8.4)	6.75 d(8.4)	3′	3.20~3.36 m	3.31 (ov)
6	6.81 dd(8.4, 1.6)	6.80 dd(8.4, 1.6)	4′	3.20~3.36 m	3.28 br d(9.0)
7	4.56 d(6.0)	4.65 d(7.2)	5′	3.20~3.36 m	–
8	3.71 m	3.77 m	6′	3.86 (ov)	3.86 (ov)
				3.64 dd(11.8, 4.6)	3.64 dd(12.1, 4.8)
9	3.66 dd(11.6, 4.1)	3.65 dd(11.0, 4.3)	3-OMe	3.85 s	3.85 s
	3.56 dd(11.6, 6.8)	3.53 dd(11.0, 6.5)			
1′	4.28 d(7.6)	4.40 d(7.6)	4-OMe		3.84 s

Table 6-1-9: Cos, MFs, and TSs of simple phenylpropanoids **6-1-25**~**6-1-93**.

No.	Compounds	MFs	Test solvents	References
6-1-25	3,4,*α*-trihydroxy-butyl phenylpropionate	$C_{13}H_{18}O_5$	DMSO-d_6	[8]
6-1-26	–	$C_{21}H_{26}O_8$	$CDCl_3$	[9]
6-1-27	–	$C_{31}H_{42}O_{13}$	$CDCl_3$	[9]
6-1-28	–	$C_{26}H_{34}O_{11}$	$CDCl_3$	[9]
6-1-29	nothoapiole	$C_{13}H_{16}O_5$	$CDCl_3$	[10]
6-1-30	1-(3′-methoxypropanoyl)-2,4,5-trimethoxybenzene	$C_{13}H_{18}O_5$	$CDCl_3$	[11]
6-1-31	4-(2-propenyl)-phenyl angelate	$C_{14}H_{16}O_2$	$CDCl_3$	[12]
6-1-32	*threo*-3-chloro-1-(4-hydroxy-3-methoxyphenyl)propane-1,2-diol	$C_{10}H_{13}ClO_4$	CD_3COCD_3	[13]
6-1-33	3-(4-hydroxy-3-methoxy-phenyl)propane-1,2-diol	$C_{10}H_{14}O_4$	CD_3COCD_3	[13]

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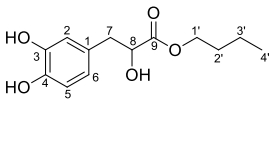
Table 6-1-9 (continued)

No.	Compounds	MFs	Test solvents	References
6-1-34	3-(4-acetoxy-3,5-dimethoxy)-phenyl-2*E*-propenyl-β-D-glucopyranoside	$C_{19}H_{26}O_{10}$	CD_3OD	[14]
6-1-35	taraxafolin	$C_{11}H_{14}O_5$	$CDCl_3$	[15]
6-1-36	boropinol A	$C_{15}H_{20}O_3$	$CDCl_3$	[16]
6-1-37	boropinol B	$C_{13}H_{18}O_4$	$CDCl_3$	[16]
6-1-38	boropinol C	$C_{16}H_{22}O_4$	$CDCl_3$	[16]
6-1-39	boropinal A	$C_{14}H_{14}O_2$	$CDCl_3$	[16]
6-1-40	boropinal B	$C_{13}H_{12}O_3$	CD_3COCD_3	[16]
6-1-41	boropinal C	$C_{15}H_{18}O_3$	$CDCl_3$	[16]
6-1-42	boropinic acid	$C_{15}H_{18}O_4$	$CDCl_3$	[16]
6-1-43	–	$C_{11}H_{14}O_5$	$CDCl_3$	[17]
6-1-44	neohelmanthicin A	$C_{26}H_{34}O_{10}$	$CDCl_3$	[17]
6-1-45	neohelmanthicin B	$C_{29}H_{42}O_{10}$	$CDCl_3$	[17]
6-1-46	neohelmanthicin C	$C_{27}H_{38}O_{10}$	$CDCl_3$	[17]
6-1-47	neohelmanthicin D	$C_{25}H_{34}O_{10}$	$CDCl_3$	[17]
6-1-48	lenisin A	$C_{16}H_{24}O_5$	C_5D_5N	[18]
6-1-49	lenisin B	$C_{16}H_{22}O_4$	C_5D_5N	[18]
6-1-50	lenisin C	$C_{18}H_{28}O_5$	C_5D_5N	[18]
6-1-51	*E*-docosyl-*p*-coumarate	$C_{31}H_{52}O_3$	$CDCl_3$	[19]
6-1-52	*Z*-docosyl-*p*-coumarate	$C_{31}H_{52}O_3$	$CDCl_3$	[19]
6-1-53	*erythro*-1′-(4-methoxyphenyl)-propan-1′,2′-diol	$C_{10}H_{14}O_3$	CD_3OD	[20]
6-1-54	*erythro*-1′-[4-(*sec*-butyl)-phenyl]-propan-1′,2′-diol	$C_{13}H_{20}O_2$	CD_3OD	[20]
6-1-55	7,8-*erythro*-dihydroxy-3,4,5-trimethoxy-phenyl-propane 8-*O*-β-glucopyranoside	$C_{18}H_{28}O_{10}$	DMSO-d_6	[21]
6-1-56	2,3,5-trimethoxy-6-(1-propenyl)-2,5-cyclohexadiene-1,4-dione	$C_{12}H_{14}O_5$	$CDCl_3$	[22]
6-1-57	2,3-dimethoxy-5-(1-propenyl)phenol	$C_{11}H_{14}O_3$	$CDCl_3$	[22]
6-1-58	2,3,6-trimethoxy-5-(1-propenyl)phenol	$C_{12}H_{16}O_4$	$CDCl_3$	[22]
6-1-59	methyl psilalate	$C_{11}H_{10}O_4$	$CDCl_3$	[23]
6-1-60	–	$C_{18}H_{22}O_7$	$CDCl_3$	[24]
6-1-61	–	$C_{21}H_{26}O_8$	$CDCl_3$	[24]
6-1-62	–	$C_{21}H_{26}O_8$	$CDCl_3$	[24]
6-1-63	–	$C_{26}H_{36}O_{10}$	$CDCl_3$	[24]
6-1-64	–	$C_{26}H_{36}O_{10}$	$CDCl_3$	[24]
6-1-65	*Z*-venusol	$C_{15}H_{16}O_8$	CD_3COCD_3	[25]
6-1-66	*E*-venusol	$C_{15}H_{16}O_8$	CD_3COCD_3	[25]
6-1-67	*Z*-methyl lespedezate	$C_{16}H_{20}O_9$	DMSO-d_6	[25]
6-1-68	1′-isovaleroyloxy-4-*O*-isobutyryleugenol	$C_{19}H_{26}O_5$	$CDCl_3$	[26]
6-1-69	fukanedone A	$C_{25}H_{34}O_5$	$CDCl_3$	[27]
6-1-70	fukanedone B	$C_{24}H_{32}O_5$	$CDCl_3$	[27]
6-1-71	fukanedone C	$C_{24}H_{30}O_6$	$CDCl_3$	[27]
6-1-72	fukanedone D	$C_{24}H_{30}O_6$	$CDCl_3$	[27]
6-1-73	fukanedone E	$C_{25}H_{30}O_6$	$CDCl_3$	[27]

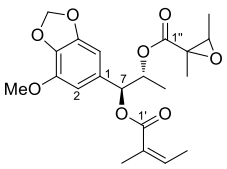
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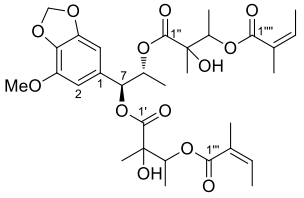
No.	Compounds	MFs	Test solvents	References
6-1-74	fukaneketoester A	$C_{12}H_{14}O_5$	$CDCl_3$	[27]
6-1-75	*threo*-1-(1-methoxy-2-hydroxypropyl)-2-methoxy-4,5-methylenedioxybenzene	$C_{12}H_{16}O_5$	$CDCl_3$	[28]
6-1-76	*erythro*-1-(1-methoxy-2-hydroxypropyl)-2-methoxy-4,5-methylenedioxybenzene	$C_{12}H_{16}O_5$	$CDCl_3$	[28]
6-1-77	5,9-dimethoxyl-7-(α-methyl)-butanoxyl-phenyl-2*E*-propenol-(α-methyl)-butanoate	$C_{21}H_{30}O_6$	$CDCl_3$	[29]
6-1-78	tichocarpol A	$C_9H_{10}O_7S$	D_2O	[30]
6-1-79	4-allyl-2-(3-methylbut-2-en-1-yl)phenol	$C_{14}H_{18}O$	C_6D_6	[31]
6-1-80	4-allyl-2-(2-methylbut-3-en-2-yl)phenol	$C_{14}H_{18}O$	$CDCl_3$	[31]
6-1-81	guaiacylglycerol	$C_{10}H_{14}O_5$	–	[7]
6-1-82	*erythro*-guaiacylglycerol	$C_{10}H_{14}O_5$	–	[7]
6-1-83	3-(4-hydroxy-3-methoxyphenyl) propan-1,2-diol	$C_{10}H_{14}O_4$	–	[7]
6-1-84	katsumadin	$C_{15}H_{14}O_6$	CD_3OD	[32]
6-1-85	clinopodic acid A	$C_{18}H_{16}O_7$	CD_3COCD_3	[33]
6-1-86	clinopodic acid B	$C_{19}H_{18}O_8$	CD_3COCD_3	[33]
6-1-87	clinopodic acid C	$C_{27}H_{22}O_{12}$	CD_3COCD_3	[33]
6-1-88	clinopodic acid D	$C_{28}H_{24}O_{12}$	CD_3OD	[33]
6-1-89	clinopodic acid E	$C_{27}H_{22}O_{12}$	CD_3COCD_3	[33]
6-1-90	clinopodic acid F	$C_{28}H_{24}O_{12}$	CD_3COCD_3	[33]
6-1-91	clinopodic acid G	$C_{29}H_{24}O_{12}$	CD_3COCD_3	[33]
6-1-92	clinopodic acid H	$C_{29}H_{26}O_{12}$	CD_3COCD_3	[33]
6-1-93	clinopodic acid I	$C_{36}H_{30}O_{16}$	CD_3COCD_3	[33]



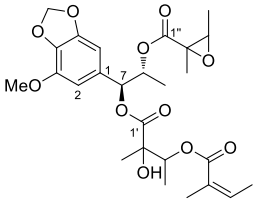
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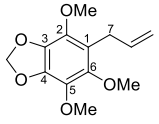
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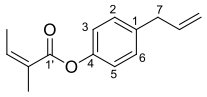
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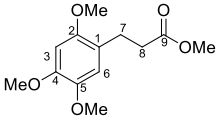
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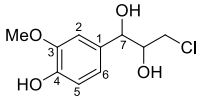
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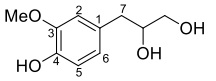


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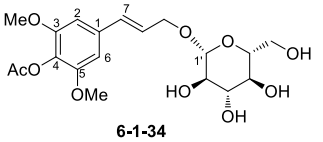


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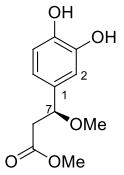
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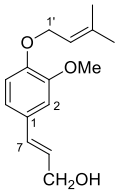
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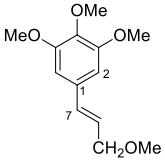
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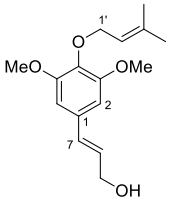
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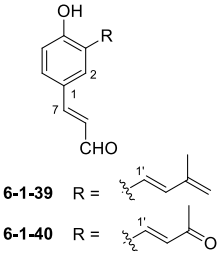
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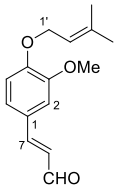


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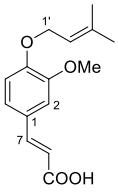


6-1-39 R =

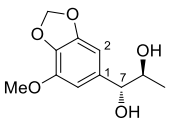
6-1-40 R =



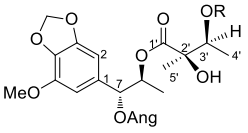
6-1-41



6-1-42



6-1-43

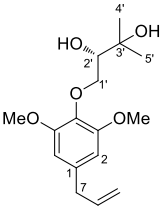


6-1-44 R = Ang

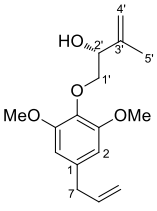
6-1-45 R = octanoyl

6-1-46 R = acetyl

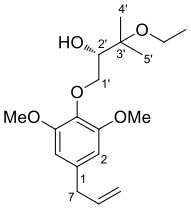
6-1-47 R = butanoyl



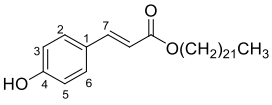
6-1-48



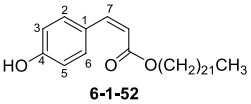
6-1-49



6-1-50

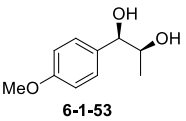


6-1-51

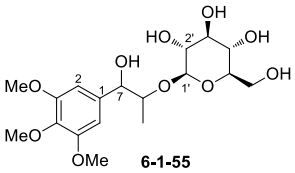


6-1-52

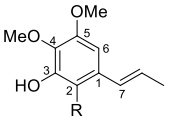
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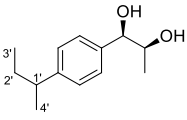
6-1-53



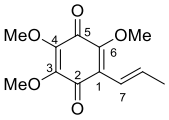
6-1-55



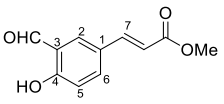
6-1-57 R = H
6-1-58 R = OMe



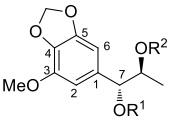
6-1-54

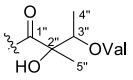
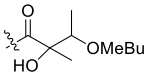


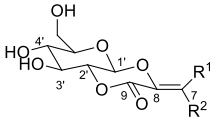
6-1-56

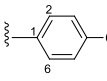
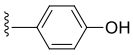


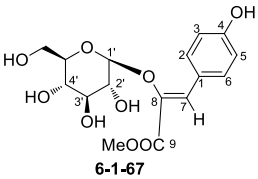
6-1-59



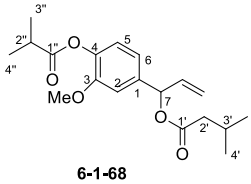
	R^1	R^2
6-1-60	Ac	Ang
6-1-61	Ang	EpoAng
6-1-62	Sen	EpoAng
6-1-63	Sen	
6-1-64	Ang	



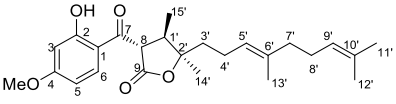
	R^1	R^2
11-1-65		H
11-1-66	H	



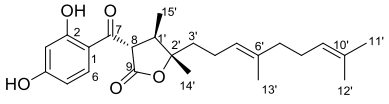
6-1-67



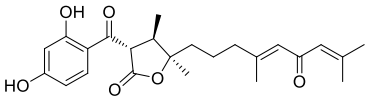
6-1-68



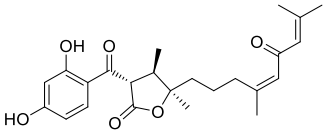
6-1-69



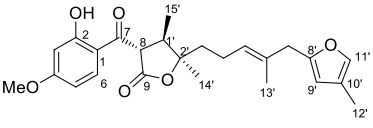
6-1-70



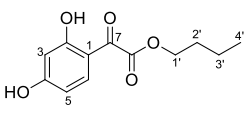
6-1-71



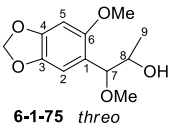
6-1-72



6-1-73

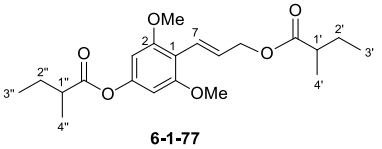


6-1-74

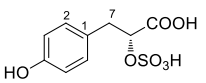


6-1-75 *threo*
7-1-76 *erythro*

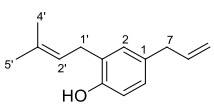
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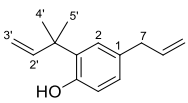
6-1-77



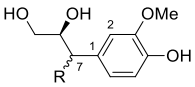
6-1-78



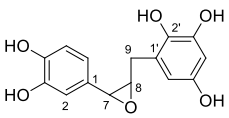
6-1-79



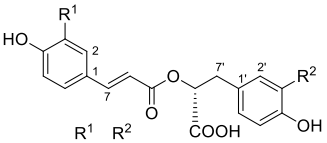
6-1-80



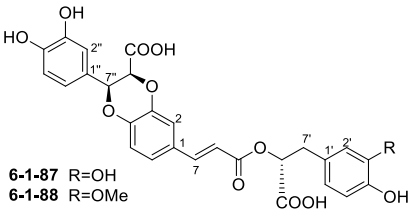
6-1-81 R = α -OH
6-1-82 R = β -OH
6-1-83 R = H



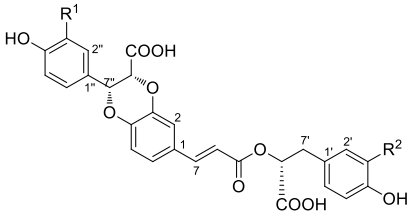
6-1-84



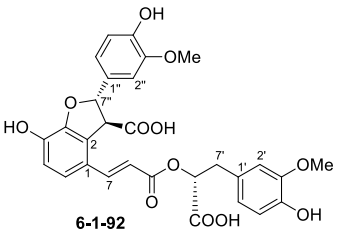
6-1-85 H OH
6-1-86 OH OMe



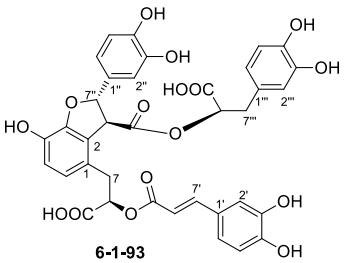
6-1-87 R=OH
6-1-88 R=OMe



	R^1	R^2
6-1-89	OH	OH
6-1-90	OH	OMe
6-1-91	OMe	OMe



6-1-92



6-1-93

Table 6-1-10: ^{1}H NMR spectroscopic data of simple phenylpropanoids **6-1-25**~**6-1-28**.

H	6-1-25	6-1-26	6-1-27	6-1-28
2	6.57 d(2.0)	6.60 d(1.5)	6.43 s	6.49 d(1.5)
5	6.58 d(8.0)			
6	6.41 dd(8.0, 2.0)	6.58 d(1.5)	6.43 s	6.47 d(1.5)
7	2.64 m, 2.73 m	5.86 d(4.9)	5.86 d(4.6)	5.82 d(5.4)

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Table 6-1-10 (continued)

H	6-1-25	6-1-26	6-1-27	6-1-28
8	4.09 m	5.31 qd(6.5, 4.9)	5.10 qd(6.2, 4.6)	5.33 qd(6.4, 5.4)
9		1.28 d(6.5)	1.27 d(6.2)	1.27 d(6.4)
1′	3.98 t(6.0)			
2′	1.48 m			
3′	1.26 m	6.14 qq(7.2, 1.5)	5.12 q(6.4)	5.10 q(6.3)
4′	0.85 t	2.02 dq(7.2, 1.5)	1.45 d(6.5)	1.30 d(6.3)
5′		1.96 m	1.45 s	1.46 s
3″		3.00 q(5.4)	5.04 q(6.5)	3.01 q(5.4)
4″		1.23 d(5.4)	1.27 d(6.5)	1.20 d(5.4)
5″		1.50 s	1.31 s	1.50 s
3‴			5.90 qq(7.3, 1.4)	5.91 qq(7.3, 1.5)
4‴			1.83 dq(7.3, 1.4)	1.83 dq(7.3, 1.5)
5‴			1.50 m	1.50 m
3⁗			6.06 qq(7.3, 1.4)	
4⁗			1.95 dq(7.3, 1.4)	
5⁗			1.80 m	
OMe		3.91 s	3.88 s	3.90 s
OCH_2O		5.97 s	5.93 d(1.5), 5.92 d(1.5)	5.93 d(1.5), 5.92 d(1.5)
OH				3.20 s

Table 6-1-11: ^{1}H NMR spectroscopic data of simple phenylpropanoids **6-1-29**~**6-1-32**.

H	6-1-29	6-1-30	6-1-31	6-1-32
2			7.20 d(8.1)	7.04 d(2.0)
3		6.66 s	7.04 d(8.1)	
5			7.04 d(8.1)	6.79 d(8.0)
6		6.80 s	7.20 d(8.1)	6.85 dd(2.0, 8.0)
7	3.33 dt(1.6, 6)	2.81 t(7.7)	3.39 d(6.7)	4.64 dd(4.5, 5.0)
8	5.95 m	2.52 t(7.7)	5.50 m	3.81 m
9	4.97 m		5.08 dd(8.4, 17.5)	3.37 dd(6.5, 11.5), 3.62 dd(4.5, 11.5)
3′			6.24 q(6.8)	
4′			2.07 d(7.2)	
5′			2.04 s	
OMe	3.77 s(2-OMe)	3.81 s(2-OMe)		3.84 s(3-OMe)
	3.94 s(5-OMe)	3.81 s(4-OMe)		
	3.89 s(6-OMe)	3.73 s(5-OMe)		
COOMe		3.61 s		
4-OH				7.55 s
7-OH				4.45 d(4.5)
8-OH				4.32 d(5.0)
OCH_2O	5.90 s			

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Table 6-1-12: ^{1}H NMR spectroscopic data of simple phenylpropanoids **6-1-33**~**6-1-36**.

H	6-1-33	6-1-34	6-1-35	6-1-36
2	6.85 d(2.0)	6.74 s	6.82 d(2.0)	6.92 d(1.8)
5	6.72 d(8.0)		6.80 d(8.0)	6.80 d(8.4)
6	6.67 dd(2.0, 8.0)	6.75 s	6.68 dd(8.0, 2.0)	6.88 dd(8.4, 1.8)
7	2.59 dd(4.4, 13.2), 2.70 dd(3.4, 13.2)	6.57 d(15.0)	4.45 dd(9.2, 4.8)	6.53 d(15.8)
8	3.80 m	6.36 dt(15.0, 5.54)	2.69 dd(15.2, 9.2) 2.50 dd(15.2, 4.8)	6.22 dt(15.8, 5.9)
9	3.43 ddd(5.8, 5.8, 10.8) 3.51 ddd(4.4, 6.0, 10.8)	4.22 d(2.0)		4.29 d(5.9)
1′		4.86 d(7.2)		4.56 d(6.6)
2′		3.38 t(7.2)		5.49 m
3′		3.38 t(7.8)		
4′		3.41 dd(7.0, 4.3)		1.75 s
5′		3.44 m		1.71 s
6′		3.82 dd(7.5, 11.5)		
OMe	3.83 s(3-OMe)		3.61 s, 3.12 s	3.86 s(3-OMe)
OH	7.31 s(4-OH)		7.85 br s	
OAc		1.88 s		

Table 6-1-13: ^{1}H NMR spectroscopic data of simple phenylpropanoids **6-1-37**~**6-1-40**.

H	6-1-37	6-1-38	6-1-39	6-1-40
2	6.62 s	6.54 s	7.65 d(2.0)	8.02 d(2.4)
5			6.87 d(8.4)	7.04 d(8.7)
6	6.62 s	6.54 s	7.35 dd(8.4, 2.0)	7.61 dd(8.7, 2.4)
7	6.53 d(15.8)	6.47 d(15.8)	7.44 d(15.8)	7.57 d(15.8)
8	6.20 dt(15.8, 5.9)	6.22 dt(15.8, 5.9)	6.64 dd(15.8, 7.7)	6.68 dd(15.8, 7.7)
9	4.08 d(5.9)	4.25 d(5.9)	9.65 d(7.7)	9.61 d(7.7)
1′		4.42 d(7.0)	6.92 d(16.1)	7.84 d(16.5)
2′		5.49 m	6.75 d(16.1)	6.94 d(16.5)
4′		1.67 s	5.16 br s, 5.13 br s	2.28 s
5′		1.60 s	2.00 s	
3, 5-OMe	3.86 s	3.79 s		
4-OMe	3.84 s			
9-OMe	3.39 s			
4-OH			6.27 br s	

Table 6-1-14: ^{1}H NMR spectroscopic data of simple phenylpropanoids **6-1-41**~**6-1-44**.

H	6-1-41	6-1-42	6-1-43	6-1-44
2	7.08 br s	7.07 d(1.8)	6.55 s	6.51 d(1.5) or 6.52 d(1.5)
5	6.90 d(8.4)	6.88 d(8.4)		
6	7.14 br d(8.4)	7.11 dd(8.4, 1.8)	6.55 s	6.52 d(1.5) or 6.51 d(1.5)

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Table 6-1-14 (continued)

H	6-1-41	6-1-42	6-1-43	6-1-44
7	7.41 d(15.8)	7.73 d(15.7)	3.95 dq(6.6, 4.5)	5.83 d(5.1)
8	6.61 dd(15.8, 7.7)	6.31 d(15.7)	4.55 d(4.5)	5.21 dq(6.6, 5.1)
9	9.66 d(7.7)		1.02 d(6.6)	1.19 d(6.3)
1′	4.64 d(6.6)	4.63 d(6.6)		
2′	5.51 m	5.51 m		
3′				5.11 q(6.6)
4′	1.79 s	1.78 s		1.29 d(6.6)
5′	1.75 s	1.75 s		1.24 s
3″				6.15 qq(7.2, 1.5)
4″				2.00 dq(7.2, 1.5)
5″				1.94 q(1.5)
3‴				6.05 qq(7.2, 1.5)
4‴				1.95 dq(7.2)
5‴				1.80 q(1.5)
OMe	3.91 s(3-OMe)	3.91 s(3-OMe)	3.90 s	3.89 s
OCH_2O			5.95 s	5.95 br s

Table 6-1-15: ^{1}H NMR spectroscopic data of simple phenylpropanoids **6-1-45**~**6-1-48**.

H	6-1-45	6-1-46	6-1-47	6-1-48
2	6.51 d(1.5)①	6.51 d(1.5)①	6.51 d(1.5)①	6.59 s
6	6.53 d(1.5)①	6.53 d(1.5)①	6.52 d(1.5)①	6.59 s
7	5.86 d(4.8)	5.83 d(5.1)	5.86 d(4.8)	3.37 d(6.7)
8	5.21 dq(6.3, 4.8)	5.21 dq(6.6, 5.1)	5.21 dq(6.6, 5.1)	6.07 m
9	1.19 d(6.3)	1.19 d(5.1)	1.19 d(6.3)	5.18 m
1′				4.86 dd(10.0, 3.2)
				4.43 dd(10.0, 8.2)
2′				4.28 dd(8.2, 3.2)
3′	5.04 q(6.6)	5.04 q(6.6)	5.11 q(6.3)	
4′	1.21 d(6.6)	1.24 d(6.6)	1.24 d(6.6)	1.52 s
5′	1.25 s	1.22 s	1.22 s	1.54 s
3″	6.14 qq(7.2, 1.5)	6.12 qq(7.5, 1.5)	6.15 qq(7.2, 1.5)	
4″	2.00 dq(7.5, 1.5)	2.00 dq(7.2, 1.5)	1.99 dq(7.2, 1.5)	
5″	1.95 q(1.5)	1.94 q(1.5)	1.95 q(1.5)	
2‴	2.22 m(14.5, 7.7, 7.6)	2.23 m(14.5, 7.7, 7.6)	2.21 m(14.5, 7.7, 7.6)	
	2.18 m(14.5, 8.4, 8.3)	2.18 m(14.5, 8.4, 8.3)	2.18 m(14.5, 8.4, 8.3)	
3‴	1.55 m(8.4, 8.3, 7.7, 7.6)	1.55 m(8.4, 8.3, 7.7, 7.6)	1.58 m(8.4, 7.7, 7.3)	
4‴	1.23 m	1.27 m	0.90 t(7.4, 7.3)	
5‴	1.23 m	1.27 m		
6‴	1.23 m	0.87 t(6.9)		
7‴	1.23 m			
8‴	0.88 t(6.9)			
OMe	3.88 s	3.89 s	3.89 s	3.72 s
OCH_2O	5.96 d(1.5)	5.96 d(1.5)	5.95 br s	
	5.95 d(1.5)	5.95 d(1.5)		

① Assignments may be exchanged in the same column.

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Table 6-1-16: ^{1}H NMR spectroscopic data of simple phenylpropanoids **6-1-49**~**6-1-52**.

H	6-1-49	6-1-50	6-1-51	6-1-52
2, 6	6.40 s	6.39 s	7.44 d(8.7)	7.64 d(8.6)
3, 5			6.82 d(8.7)	6.87 d(8.6)
7	3.33 d(6.7)	3.32 d(6.7)	7.63 d(16.0)	5.86 d(12.8)
8	5.96 m	5.96 m	6.31 d(16.0)	6.82 d(12.8)
9	5.11 m	5.11 m		
1′	4.29 t(10.0)	4.46 dd(10.5, 2.4), 3.69 dd(10.5, 7.0)	4.20 t	4.15 t
2′	3.67 t(10.0)	3.80 dd(7.0, 2.4)		
4′	4.90 s, 5.07 s	1.15 s		
5′	1.72 s	1.20 s		
1″		3.46 q(6.9)		
2″		1.12 t(6.9)		
OMe	3.84 s	3.83 s		
CH_2			1.27~1.70 m	1.27~1.31 m
Me			0.89 t	0.89 t

Table 6-1-17: ^{1}H NMR spectroscopic data of simple phenylpropanoids **6-1-53**~**6-1-56**.

H	6-1-53	6-1-54	6-1-55	6-1-56
2, 6	7.53 d(8.5)	7.06 d(8.5)	6.75 br s	
3, 5	6.93 d(8.5)	7.44 d(8.5)		
7	4.54 d(5.3)	4.52 d(5.3)	4.46 d(4.1)	6.36 dq(16.0, 1.7)
8	3.92 dq(5.3, 7.0)	3.89 dq(5.3, 7.0)	3.80 m	6.87 dq(16.0, 6.9)
9	1.33 d(6.26)	1.31 d(7.0)	0.90 d(6.3)	1.92 dd(6.9, 1.7)
1′		2.67 m	4.38 d(7.8)	
2′		1.95 m, 1.55 m	3.00 m	
3′		1.07 t(7.5)	3.10 m	
4′		1.24 d(6.3)	3.06 m	
5′			3.14 m	
6′			3.44 m	
			3.68 m	
OMe	3.73 s		3.75 s(3,5-OMe)	3.98 s, 3.99 s
			3.60 s(6-OMe)	4.00 s

Table 6-1-18: ^{1}H NMR spectroscopic data of simple phenylpropanoids **6-1-57**~**6-1-60**.

H	6-1-57	6-1-58	6-1-59	6-1-60
2	6.60 d(1.9)		7.70 d(2)	6.47 d(3.0)
5			7.03 d(8.8)	
6	6.44 d(1.9)	6.49 s	7.72 dd(8.8)	6.49 d (3.0)
7	6.28 dq(15.7, 1.7)	6.61 dq(15.8, 1.7)	7.66 d(16)	5.76 d(4.6)
8	6.13 dq(15.7, 6.5)	6.18 dq(15.8, 6.5)	6.37 d(16)	5.17 qd(6.5, 4.6)
9	1.86 dd(6.5, 1.7)	1.90 dd(6.6, 1.7)		1.16 d(6.6)

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Table 6-1-18 (continued)

H	6-1-57	6-1-58	6-1-59	6-1-60
3′				5.95 qq (7.2, 1.4)
4′				1.75 dq(7.2, 1.4)
5′				1.85 dq(1.4, 1.4)
OMe	3.87 s (3-OMe)	3.79 s (6-OMe)	3.80 s	3.80 s
	3.88 s (2-OMe)	3.85 s (3-OMe)		
		3.90 s (2-OMe)		
OH	5.71 s	5.70 s		
CHO			9.95 s	
OAc				2.10 s
OCH_2O				5.86 s

Table 6-1-19: ^{1}H NMR spectroscopic data of simple phenylpropanoids **6-1-61**~**6-1-64**.

H	6-1-61	6-1-62	6-1-63	6-1-64
2	6.51 s	6.59 s	6.52 s	6.54 s
6	6.52 s	6.59 s	6.55 s	6.55 s
7	5.80 d(4.8)	5.75 d(5.1)	5.81 d(5.2)	5.91 d(4.8)
8	5.20 qd(6.5, 4.8)	5.28 qd(6.2, 5.1)	5.19 qd(6.4, 5.2)	5.22 qd(6.4, 4.8)
9	1.20 d(6.5)	1.26 d(6.2)	1.19 d(6.4)	1.15 d(6.4)
2′		5.71 qq(1.1, 1.1)	5.75 dq(1.1, 1.1)	
3′	6.06 qq(7.2, 1.4)			6.16 qq(7.4, 1.5)
4′	1.80 dq(7.2, 1.4)	1.92 d (1.1)	1.93 d(1.2)	1.92 dq(7.4, 1.5)
5′	1.93 dq(1.4, 1.4)	2.16 d (1.1)	2.16 d (1.2)	1.98 dq(1.5, 1.5)
3″	2.94 q		5.06 q(6.4)	5.05 q(6.4)
4″	1.10 d(5.5)		1.22 d(6.4)	1.24 d(6.4)
5″	1.40 s		1.24 s	1.30 s
2‴			2.10 m	2.29 m
3‴			2.16 m	1.60 m
4‴			0.90 d(6.4)	1.23 d(7.4)
5‴			0.92 d(6.4)	0.87 t(7.4)
OMe	3.80 s	3.90 s	3.90 s	3.91 s
OCH_2O	5.95 s	5.96 s	5.95 s	5.97 s

Table 6-1-20: ^{1}H NMR spectroscopic data of simple phenylpropanoids **6-1-65**~**6-1-68**.

H	6-1-65	6-1-66	6-1-67	6-1-68
2	7.71 d(8.8)	7.55 d(8.8)	7.72 d(8.7)	6.93 d(2)
3	6.89 d(8.8)	6.81 d(8.8)	6.75 d(8.7)	
5	6.89 d(8.8)	6.81 d(8.8)	6.75 d(8.7)	6.99 d(8.5)
6	7.71 d(8.8)	7.55 d(8.8)	7.72 d(8.7)	6.92 dd(8.5, 2.5)
7	6.79 s	6.67 s	6.77 s	6.27 dt(6, 1.5)

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Table 6-1-20 (continued)

H	6-1-65	6-1-66	6-1-67	6-1-68
8				5.98 ddd(17, 10.5, 6)
9				5.30 dt(17, 1.1), 5.25 dt(17, 1.1)
1′	5.23 d(7.8)	5.10 d(7.8)	5.04 d(7.5)	
2′	4.08 dd(9.4, 7.8)	4.03 dd(9.6, 7.8)	3.17~3.24 m	2.25 d(7)
3′	3.82 m	3.82 m	3.17~3.24 m	2.12 m(7)
4′	*ca.* 3.60 m	*ca.* 3.58 m	3.10 m	0.95 d(7)
5′	*ca.* 3.63 m	*ca.* 3.58 m	3.06 m	0.94 d(7)
6′	3.97 dd(12, 14), 3.82 m	3.90 m, 3.78 m	3.58 m	
2″				2.83 d(7)
3″				1.31 d(7)
4″				1.31 d(7)
OMe			3.73 s	3.81 s

Table 6-1-21: ^{1}H NMR spectroscopic data of simple phenylpropanoids **6-1-69**~**6-1-72**.

H	6-1-69	6-1-70	6-1-71	6-1-72
3	6.43 d(2.3)	6.33 br s(ov)	6.37 br s(ov)	6.40 m(ov)
5	6.49 dd(2.3, 8.8)	6.33 br dd(ov)	6.39 br dd(ov)	6.40 m(ov)
6	7.66 d(8.8)	7.56 d(8.8)	7.59 d(9.4)	7.59 d(9.5)
8	4.25 d(12.0)	4.25 d(11.7)	4.23 d(12.0)	4.24 d(11.9)
1′	3.09 m	3.15 m	3.10 m	3.06 m
3′	1.57 m	1.82 m	1.56 m	1.65 m(ov)
4′	2.18 m	2.18 m	1.68 m	1.65 m(ov)
5′	5.09 m(ov)	5.09 m(ov)	2.18 m	2.60 m, 2.78 m
7′	2.0 m	2.0 m	6.06 br s	6.08 s
8′	2.07 m	2.06 m		
9′	5.09 m(ov)	5.09 m(ov)	6.09 br s	6.11 s
11′	1.69 s	1.68 s	1.91 s	1.91 s
12′	1.61 s	1.60 s	2.19 s	2.16 s
13′	1.63 s	1.63 s	2.16 s	1.92 s
14′	1.52 s	1.36 s	1.51 s	1.49 s
15′	1.09 d (7.0)	1.07 d(6.7)	1.06 d(6.7)	1.04 d(7.0)
OMe	3.85 s			
3-OH	12.45 s	12.35 s	12.31 s	12.36 s

Table 6-1-22: ^{1}H NMR spectroscopic data of simple phenylpropanoids **6-1-73**~**6-1-76**.

H	6-1-73	6-1-74	6-1-75	6-1-76
3	6.43 d(2.3)	6.41 br s	6.52 s	6.53 s
5	6.49 dd(2.3, 9.1)	6.42 dd		
6	7.66 d(9.1)	7.60 d(9.1)	6.76 s	6.85 s

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Table 6-1-22 (continued)

H	6-1-73	6-1-74	6-1-75	6-1-76
7			4.38 d(7.8)	4.58 d(4.2)
8	4.25 d(12.0)		3.74 m	3.94 m
9			0.98 d(6.2)	1.04 d(6.6)
1′	3.09 m	4.37 t(6.7, 13.5)		
2′		1.74 m		
3′	1.62 m	1.44 m		
4′	2.23 m	0.96 t(7.3, 14.7)		
5′	5.20 t(7.0)			
7′	3.24 s			
9′	5.89 s			
11′	7.07 br s			
12′	1.99 s			
13′	1.64 s			
14′	1.51 s			
15′	1.08 d(6.7)			
OMe	3.85 s		3.74 s(2-OMe)	3.75 s(2-OMe)
			3.20 s(7-OMe)	3.27 s(7-OMe)
OCH_2O			5.93 d(1.4)	5.94 d(1.3)
			5.90 d(1.4)	5.91 d(1.3)
OH	12.43 s	11.62 s		

Table 6-1-23: ^{1}H NMR spectroscopic data of simple phenylpropanoids **6-1-77**~**6-1-79**.

H	6-1-77	6-1-78	6-1-79
2		7.19 d(8.8)	6.96 d(2.2)
3	6.62 br s	6.84 d(8.8)	
5	6.62 br s	6.84 d(8.8)	6.50 d(8.1)
6		7.19 d(8.8)	6.85 dd(8.1, 2.2)
7	6.55 d(16.0)	3.07 dd(5.4, 14.2), 2.99 dd(6.8, 14.2)	3.20 dd(6.6, 1.8)
8	6.27 dt(16.0, 6.5)	4.69 dd(5.4, 6.8)	5.91 ddt(16.8, 10.2, 6.6)
9	4.72 d(6.5)		4.99 dt(10.2, 1.8),
			5.02 dt(16.8, 1.8)
1′	2.42 m		3.32 d(7.3)
2′	1.53 m		5.34 tq(7.3, 1.5)
3′	0.92 t(7.3)		
4′	1.17 d(7.3)		1.56 br s
5′			1.56 br s
1″	2.68 m		
2″	1.85 m		
3″	1.04 t(7.3)		
4″	1.30 d(7.3)		
2,6-OMe	3.80 s		

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Table 6-1-24: ^{1}H NMR spectroscopic data of simple phenylpropanoids **6-1-80**~**6-1-83**.

H	6-1-80	6-1-81	6-1-82	6-1-83
2	7.05 d(2.2)	6.96 d(2.0)	6.98 d(2.0)	6.81 d(2.0)
5	6.77 d(8.4)	6.71 d(8.0)	6.73 d(8.0)	6.71 d(8.0)
6	6.99 dd(8.4, 2.2)	6.77 dd(8.0, 2.0)	6.80 dd(8.0, 2.0)	6.65 dd(8.0, 2.0)
7	3.33 d(7.0)	4.50 d(6.8)	4.51 d(6.0)	2.72 dd(13.6, 5.6)
				2.59 dd(13.6, 7.2)
8	5.97 ddt(16.8, 10.3, 7.0)	3.64 m	3.72 m	3.67 m
9	5.06 dd(16.8, 1.3)	3.45 dd(11.6, 4.0)	3.67 dd(11.6, 4.2)	3.49 dd(11.0, 4.4)
	5.08 dd(10.3, 1.3)	3.33 dd(11.6, 6.0)	3.56 dd(11.6, 6.8)	3.42 dd(11.0, 6.4)
2′	6.19 dd(17.6, 10.6)			
3′	5.32 dd(17.6, 0.7)			
	5.32 dd(10.6, 0.7)			
4′	1.40 s			
5′	1.40 s			
3-OMe		3.84 s	3.84 s	3.85 s
OH	5.70 s			

Table 6-1-25: ^{1}H NMR spectroscopic data of simple phenylpropanoids **6-1-84**~**6-1-87**.

H	6-1-84	6-1-85	6-1-86	6-1-87
2	6.83 d(1.9)	7.54 d(8.0)	7.16 d(2.0)	7.33 d(2.0)
3		6.90 d(8.0)		
5	6.75 d(8.2)	6.90 d(8.0)	6.87 d(8.0)	6.97 d(8.0)
6	6.72 dd(1.9, 8.2)	7.54 d(8.0)	7.03 dd(8.0, 2.0)	7.24 dd(8.0, 2.0)
7	4.55 d(7.5)	7.63 d(15.5)	7.58 d(16.0)	7.63 d(16.0)
8	3.96 m	6.36 d(15.5)	6.30 d(16.0)	6.45 d(16.0)
9	2.50 dd(8.1, 16.1)			
	2.84 dd(5.4, 16.1)			
2′		6.85 d(2.0)	6.97 d(2.0)	6.87 d(2.0)
4′	5.84 d(2.3)			
5′		6.75 d(8.0)	6.76 d(8.0)	6.76 d(8.0)
6′	5.91 d(2.3)	6.68 dd(8.0, 2.0)	6.79 dd(8.0, 2.0)	6.69 dd(8.0, 2.0)
7′		3.04 dd(13.5, 8.0)	3.09 dd(14.0, 9,0)	3.05 dd(13.5, 4.0)
		3.14 dd(13.5, 4.0)	3.19 dd(14.0, 4.0)	3.14 dd(13.5, 4.0)
8′		5.24 dd(8.0, 4.0)	5.26 dd(9.0, 4.0)	5.25 dd(8.0, 4.0)
2″				6.96 d(2.0)
5″				6.81 d(8.0)
6″				6.84 dd(8.0, 2.0)
7″				5.48 d(3.5)
8″				5.10 d(3.5)
OMe			3.83 s	

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Table 6-1-26: ^{1}H NMR spectroscopic data of simple phenylpropanoids **6-1-88**~**6-1-90**.

H	6-1-88	6-1-89	6-1-90
2	7.27 d(2.0)	7.29 d(2.0)	7.29 d(2.0)
5	6.93 d(8.5)	6.96 d(8.0)	6.96 d(8.0)
6	7.15 dd(8.5, 2.0)	7.24 dd(8.0, 2.0)	7.22 dd(8.0, 2.0)
7	7.62 d(16.0)	7.62 d(15.5)	7.63 d(15.0)
8	6.39 d(16.0)	6.44 d(15.5)	6.46 d(15.0)
2′	6.88 br s	6.86 d(2.0)	6.97 br s
5′	6.74 (ov)	6.75 d(8.0)	6.76 d(8.0)
6′	6.73 (ov)	6.68 dd(8.0, 2.0)	6.80 dd(8.0, 2.0)
7′	3.09 dd(1.5, 8.0)	3.04 dd(13.5, 8.0)	3.10 dd(14.0, 8.0)
	3.17 dd(14.5, 4.5)	3.14 dd(13.5, 4.0)	3.20 dd(14.0, 3.5)
8′	5.25 dd(8.0, 4.5)	5.24 dd(8.0, 4.0)	5.27 dd(8.0, 3.5)
2″	6.83 d(1.5)	6.97 br s	6.97 br s
5″	6.70 d(8.0)	6.84 br s	6.84 br s
6″	6.71 (ov)	6.84 br s	6.84 br s
7″	5.45 d(3.0)	5.32 d(5.0)	5.31 d(4.5)
8″	4.95 d(3.0)	4.99 d(5.0)	4.98 d(4.5)
OMe	3.83 s		3.84 s

Table 6-1-27: ^{1}H NMR spectroscopic data of simple phenylpropanoids **6-1-91**~**6-1-93**.

H	6-1-91	6-1-92	6-1-93
2	7.29 d(2.0)		7.07 d(2.0)
5	6.98 d(8.0)	6.89 d(8.5)	6.88 d(8.0)
6	7.23 dd(8.0, 2.0)	7.27 d(8.5)	6.94 dd(8.0, 2.0)
7	7.62 d(16.0)	7.85 d(16.0)	7.53 d(16.0)
8	6.45 d(16.0)	6.39 d(16.0)	6.12 d(16.0)
2′	6.98 d(2.0)	6.92 d(2.0)	
5′	6.76 d(8.0)	6.75 d(8.0)	6.75 d(8.0)
6′	6.80 dd(8.0, 2.0)	6.79 dd(8.0, 2.0)	6.70 d(8.0)
7′	3.09 dd(14.0, 8.5)	3.08 dd(14.5, 8.5)	3.01 dd(14.5, 7.0)
	3.20 dd(14.0, 4.0)	3.16 dd(14.5, 4.0)	3.10 dd(14.5, 4.5)
8′	5.27 dd(8.5, 4.0)	5.24 dd(8.5, 4.0)	5.28 dd(7.0, 4.5)
2″	7.13 d(2.0)	7.09 d(2.0)	6.90 d(2.0)
5″	6.83 d(8.0)	6.84 d(8.0)	6.82 d(8.0)
6″	6.95 dd(8.0, 2.0)	6.91 dd(8.0, 2.0)	6.74 dd(8.0, 2.0)
7″	5.35 d(5.0)	6.02 d(5.0)	5.78 d(5.0)
8″	5.05 d(5.0)	4.57 d(5.0)	4.53 d(5.0)
2‴			6.79 d(2.0)
5‴			6.72 d(8.0)
6‴			6.57 dd(8.0, 2.0)
7‴			3.02 dd(14.5, 8.0)
8‴			5.33 dd(8.0, 4.5)
OMe	3.84 s, 3.83 s	3.80 s, 3.82 s	

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Bibliography

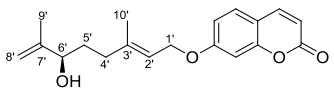
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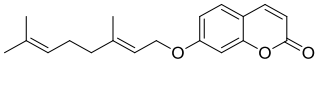
6.2 Coumarins

Table 6-2-1: Compounds, MFs, and test solvents of coumarins **6-2-1**~**6-2-26**.

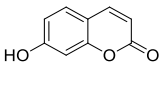
No.	Compounds	MFs	Test solvents	References
6-2-1	7-(6′*R*-hydroxy-3′,7′-dimethyl-2′*E*,7′-octadienyloxy)-coumarin	$C_{19}H_{22}O_4$	CD_3OD	[34]
6-2-2	auraptene	$C_{19}H_{22}O_3$	CD_3OD	[34]
6-2-3	umbelliferone	$C_9H_6O_3$	CD_3OD	[34]
6-2-4	ferulagol A	$C_{19}H_{23}O_4$	$CDCl_3$	[35]
6-2-5	phellodenol D	$C_{17}H_{18}O_5$	$CDCl_3$	[36]
6-2-6	3″,4″-dihydrocapnolactone	$C_{19}H_{20}O_5$	$CDCl_3$	[37]
6-2-7	2′,3′-epoxyisocapnolactone	$C_{19}H_{18}O_6$	$CDCl_3$	[37]
6-2-8	*O*-[*β*-D-xylopyranosyl(1→6)*β*-D-glucopyranosyl]-7-hydroxycoumarin	$C_{20}H_{24}O_{12}$	D_2O	[38]
6-2-9	szowitsiacoumarin A	$C_{24}H_{30}O_4$	$CDCl_3$	[39]
6-2-10	szowitsiacoumarin B	$C_{24}H_{30}O_4$	$CDCl_3$	[39]
6-2-11	isofeterin	$C_{26}H_{32}O_6$	$CDCl_3$	[40]
6-2-12	sinkianone	$C_{24}H_{30}O_4$	$CDCl_3$	[40]
6-2-13	excavatin A	$C_{19}H_{22}O_5$	$CDCl_3$	[41]
6-2-14	excavatin B	$C_{19}H_{22}O_5$	$CDCl_3$	[41]
6-2-15	excavatin C	$C_{19}H_{22}O_5$	$CDCl_3$	[41]
6-2-16	excavatin D	$C_{19}H_{18}O_5$	$CDCl_3$	[41]
6-2-17	excavatin E	$C_{19}H_{18}O_6$	DMSO-d_6	[41]
6-2-18	excavatin F	$C_{19}H_{18}O_6$	$CDCl_3$	[41]
6-2-19	excavatin G	$C_{19}H_{20}O_5$	$CDCl_3$	[41]
6-2-20	excavatin H	$C_{19}H_{20}O_6$	$CDCl_3$	[41]
6-2-21	excavatin I	$C_{19}H_{20}O_6$	$CDCl_3$	[41]
6-2-22	excavatin J	$C_{19}H_{20}O_7$	CD_3OD	[41]
6-2-23	excavatin K	$C_{19}H_{18}O_6$	$CDCl_3$	[41]
6-2-24	excavatin M	$C_{19}H_{20}O_7$	$CDCl_3$	[41]
6-2-25	5′-acetoxy-8′-hydroxyumbelliprenin	$C_{26}H_{32}O_6$	$CDCl_3$	[42]
6-2-26	10′*R*-acetoxy-11′-hydroxyumbelliprenin	$C_{26}H_{34}O_6$	$CDCl_3$	[42]



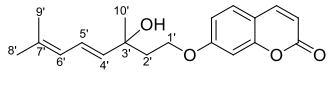
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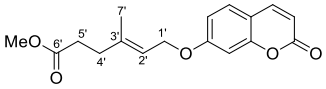
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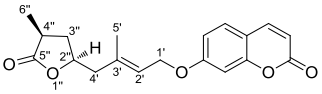
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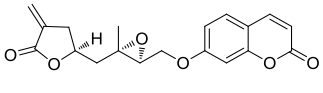
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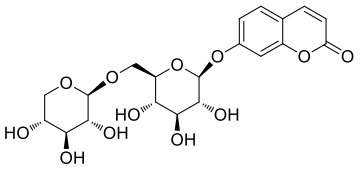


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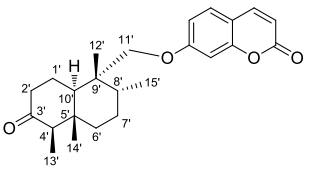


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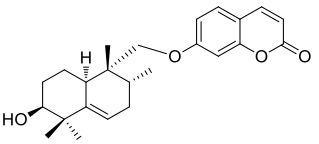
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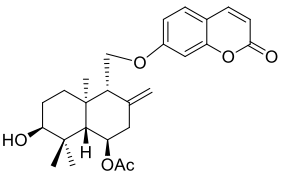
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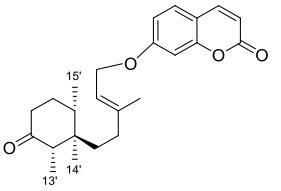
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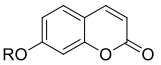
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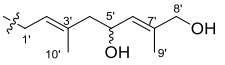
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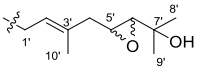
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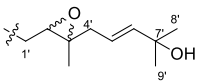
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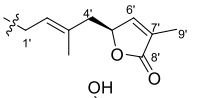
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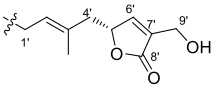
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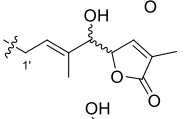
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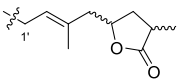
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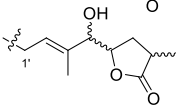
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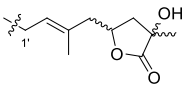
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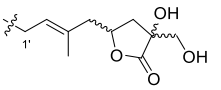
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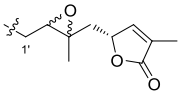
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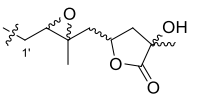
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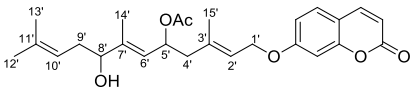


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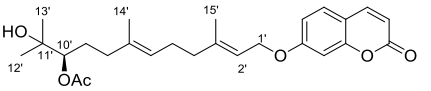


6-2-24 R=





6-2-25



6-2-26

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Table 6-2-2: ^{1}H NMR spectroscopic data of coumarins **6-2-1**~**6-2-4**.

H	6-2-1	6-2-2	6-2-3	6-2-4
3	6.23 d(9.5)	6.22 d(9.4)	6.15 d(9.5)	6.24 d(9.5)
4	7.67 d(9.5)	7.86 d(9.4)	7.85 d(9.5)	7.63 d(9.5)
5	7.51 d(8.6)	7.51 d(8.3)	7.50 d(8.4)	7.35 d(8.5)
6	6.90 dd(8.6, 2.4)	6.90 dd(8.3, 2.3)	6.90 dd(8.3, 2.3)	6.83 dd(8.5, 2.5)
8	6.89 d(2.4)	6.88 d(2.3)	6.88 d(2.3)	6.80 d(2.5)
1′	4.66 d(6.7)	4.65 d(6.6)		4.21 m, 4.19 m
2′	5.49 br t(6.7)	5.46 br t(6.6)		2.19 m, 2.03 m
4′	2.09~2.12 m	2.10 m		5.65 d(15.3)
5′	1.60~1.67 m	2.10 m		6.49 dd(15.3, 10.7)
6′	3.97 br t(6.4)	5.07 m		5.85 d(10.7)
8′	4.89 br s, 4.80 br s	1.61 s		1.77 s
9′	1.70 s	1.77 s		1.74 s
10′	1.78 s	1.58 s		1.39 s

Table 6-2-3: ^{1}H NMR spectroscopic data of coumarins **6-2-5**~**6-2-8**.

H	6-2-5	6-2-6	6-2-7	6-2-8
3	6.24 d(9.6)	6.25 d(9.5)	6.28 d(9.5)	6.35 d(9)
4	7.63 d(9.6)	7.64 d(9.5)	7.64 d(9.5)	7.93 d(9)
5	7.35 d(8.8)	7.37 d(8.4)	7.40 d(8.6)	7.58 d(9)
6	6.83 dd(8.8, 2.4)	6.85 dd(8.4, 2.4)	6.90 dd(8.6, 2.3)	7.10 dd(2, 9)
8	6.80 d(2.4)	6.81 d(2.4)	6.87 d(2.3)	7.12 d(2)
1′	4.59 d(6.4)	4.62 d(6.3)	4.36 dd(11.2, 3.5) 4.08 dd(11.2, 6.5)	5.22 d(7)
2′	5.48 br t(6.4)	5.59 m	3.21 dd(6.4, 3.4)	
4′	2.40~2.44 m	2.52 m, 2.39 m	1.93 m	
5′	2.45~2.50 m	1.83 s	1.49 s	
6′				3.94 dd(5, 12)
7′	1.77 s			
1″				4.43 d(7)
2″		4.50 m	4.78 m	
3″		2.50 m, 1.56 dd(12.3, 1.8)	3.16 qt, 2.68 dddd	
4″		2.68 m		
5″				4.18 dd(5, 15)
6″		1.27 d(7.1)	6.27 t(2.8), 5.68 t(2.8)	
OAc	3.66 s			

Table 6-2-4: ^{1}H NMR spectroscopic data of coumarins **6-2-9**~**6-2-12**.

H	6-2-9	6-2-10	6-2-11	6-2-12
3	6.25 d(9.4)	6.24 d(9.4)	6.24 d(9.5)	6.25 d(9.5)
4	7.63 d(9.4)	7.63 d(9.4)	7.62 d(9.5)	7.64 d(9.5)
5	7.37 d(8.4)	7.34 d(8.4)	7.35 d(8.0)	7.37 d(8.5)

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Table 6-2-4 (continued)

H	6-2-9	6-2-10	6-2-11	6-2-12
6	6.86 dd(8.4, 2.4)	6.85 dd(8.4, 2.4)	6.83 dd(8.0, 2.5)	6.85 dd(8.5, 2.0)
8	6.82 d(2.4)	6.82 d(2.4)	6.82 d(2.5)	6.82 d(2.0)
1′	*β* 1.86 m, *α* 1.83 m	*α* 1.67 m, *β* 1.45 m	ax 1.94(ov), eq 1.47 m	ax 1.64 m, eq 1.86 m
2′	*β* 2.37 m, *α* 2.46 m	*α* 1.98 m, *β* 1.74 m	ax 1.94(ov), eq 1.69 m	ax 2.34 m, eq 2.36 m
3′		3.47 t(2.4)	3.39 br s	
4′	2.36 q(6.6)			2.48 q(7.0)
5′			1.97 d(11.5)	
6′	*α* 1.54, *β* 1.47	5.5 br t(3.3)	ax 5.15 td(11.0, 5.0)	ax 1.50 td(14.0, 3.5)
				eq 1.43 td(13.0, 3.0)
7′	*β* 1.97 m, *α* 1.41 m	*β* 2.22 m, *α* 1.81 m	ax 2.18 dd(12.0, 11.0)	ax 1.96 td(13.0, 4.5)
			eq 2.76 dd(13.0, 5.0)	eq 2.11 td(13.5, 4.5)
8′	1.90 m	1.88 m		
9′			2.40 br s	5.50 t(6.5)
10′	2.09 dd(11.1, 4.5)	2.35 dd(11.8, 3.9)		2.02 m
11′	3.80 d(9.0)	3.83 d(8.8)	4.16 dd(9.5, 7.5)	4.64 d(6.5)
	3.77 d(9.0)	3.88 d(8.8)	4.24 dd(9.5, 4.5)	
12′	1.13 s	1.10 s	4.67 s, 4.99 s	1.80 s
13′	0.93 d(6.6)	1.10 s	1.12 s	0.94 d(7.0)
14′	0.82 s	1.06 s	0.94 s	0.61 s
15′	1.03 d(7.0)	0.95 d(6.6)	0.94 s	0.90 d(7.0)
2″			2.06 s	

Table 6-2-5: ^{1}H NMR spectroscopic data of coumarins **6-2-13**~**6-2-16**.

H	6-2-13	6-2-14	6-2-15	6-2-16
3	6.25 d(9.5)	6.26 d(9.5)	6.27 d(9.5)	6.25 d(9.5)
4	7.64 d(9.5)	7.64 d(9.45)	7.65 d(9.5)	7.65 d(9.5)
5	7.37 d(8.6)	7.37 d(8.6)	7.39 d(8.6)	7.38 d(8.6)
6	6.84 d(8.6, 2.1)	6.85 dd(8.6, 1.9)	6.89 dd(8.6, 2.4)	6.84 dd(8.6, 2.4)
8	6.81 d(2.1)	6.82 d(1.9)	6.85 d(2.4)	6.80 d(2.4)
1′	4.62 d(6.4)	4.63 d(6.5)	4.26 dd(10.9, 4.0)	4.63 d(12.6, 6.4)
			4.10 dd(10.9, 6.3)	4.62 dd(12.6, 6.4)
2′	5.58 t(6.4)	5.60 t(6.5)	3.19 dd(6.3, 4.0)	5.62 ttq(6.4, 1.0)
4′	2.34 dd(13.5, 8.6)	2.33 d(5.7)	2.38 ddd(14.1, 7.3, 1.1)	2.44 d(14.3, 6.0)
	2.26 dd(13.5, 4.6)			2.42 dd(14.3, 7.5)
5′	4.60 m	3.14 td(5.7, 2.0)	5.63 ddd(15.6, 7.2, 6.7)	5.30 dddq(7.5, 6.0, 1.7, 1.9)
6′	5.48 d(8.4)	2.75 d(2.0)	5.75 dt(15.6, 1.2)	7.05 dq(1.6, 1.6)
8′	4.02 s	1.31 s	1.33 s	
9′	1.73 s	1.24 s	1.33 s	1.92 dd(1.9, 1.6)
10′	1.83 d	1.84 s	1.84 s	1.85 br s(1.3)

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Table 6-2-6: ^{1}H NMR spectroscopic data of coumarins **6-2-17**~**6-2-20**.

H	6-2-17	6-2-18	6-2-19	6-2-20
3	6.26 d(9.5)	6.26 d(9.5)	6.26 d(9.5)	6.26 d(9.5)
4	7.65 d(9.5)	7.65 d(9.5)	7.65 d(9.5)	7.65 d(9.5)
5	7.60 d(8.6)	7.38 d(8.6)	7.38 d(8.6)	7.38 d(8.6)
6	6.94 dd(8.6, 2.4)	6.85 dd(8.6, 2.5)	6.85 dd(8.6, 2.3)	6.85 dd(8.6, 2.4)
8	6.98 d(2.4)	6.80 d(2.5)	6.81 d(2.3)	6.79 d(2.5)
1′	4.68 d(6.5)	4.59 m	4.62 d(6.2)	4.67 m
2′	5.56 tq(6.5, 1.3)	5.89 tdq(6.5, 1.3)	5.58 m	5.92 tdq(6.2, 1.3)
4′	2.53 dd(14.3, 4.8)	4.28 br d(5.4)	2.50 dd(14.5, 7.6)	4.43 br d(4.0)
	2.27 dd(14.3, 8.4)		2.34 dd(14.5, 6.3)	
5′	5.23 m	4.95 ddq(5.4, 1.6, 1.9)	4.70 m	4.50 ddd(10.0, 6.1, 4.0)
6′	7.42 dt(1.7, 1.7)	7.10 dq(1.6, 1.6)	2.17 ddd(12.9, 9.0, 4.8)	2.25 ddd(15.2, 9.1, 6.1)
			2.02 ddd(12.9, 7.6, 7.6)	1.89 m
7′			2.71 m	2.69 ddq(11.7, 9.1, 7.1)
9′	4.11 m	1.94 dd(1.9, 1.6)	1.29 d(7.4)	1.28 d(7.1)
10′	1.79 d(1.3)	1.87 d(1.3)	1.83 s	1.80 d(1.3)

Table 6-2-7: ^{1}H NMR spectroscopic data of coumarins **6-2-21**~**6-2-23**.

H	6-2-21	6-2-22	6-2-23
3	6.26 d(9.5)	6.23 d(9.5)	6.28 d(9.5)
4	7.64 d(9.5)	7.87 d(9.5)	7.65 d(9.5)
5	7.38 d(8.5)	7.52 d(8.6)	7.40 d(8.6)
6	6.85 dd(8.5, 1.9)	6.92 dd(8.6, 2.4)	6.90 dd(8.6, 2.4)
8	6.81 d(2.4)	6.89 d(2.4)	6.28 d(2.4)
1′	4.62 d(6.2)	4.69 d(6.4)	4.34 dd(11.1, 3.7)
			4.09 dd(11.1, 6.4)
2′	5.60 t(6.2)	5.62 tq(6.4, 1.3)	3.20 dd(6.4, 3.7)
4′	2.37 dd(14.2, 5.3), 2.53 dd(14.2, 7.8)	2.53 dd(14.2, 7.6)	1.92 dd(14.3, 5.0)
		2.43 dd(14.2, 5.7)	1.85 dd(14.3, 8.8)
5′	4.81 m	4.82 m	5.12 m
6′	1.82 dd(13.6, 9.3), 2.46 dd(13.6, 5.7)	2.21 m	7.11 dq(1.6, 1.6)
9′	1.52 s	3.74 d(10.9), 3.50 d(10.9)	1.94 dd(2.0, 1.7)
10′	1.83 s	1.85 d(1.3)	1.52 s

Table 6-2-8: ^{1}H NMR spectroscopic data of coumarins **6-2-24**~**6-2-26**.

H	6-2-24	6-2-25	6-2-26
3	6.27 d(9.5)	6.24 d(9.4)	6.23 d(9.4)
4	7.64 d(9.5)	7.63 d(9.4)	7.63 d(9.4)
5	7.39 d(8.6)	7.35 d(8.4)	7.35 d(8.4)
6	6.90 dd(8.6, 2.4)	6.82 dd(8.4, 2.4)	6.82 dd(8.4, 2.4)

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Table 6-2-8 (continued)

H	6-2-24	6-2-25	6-2-26
8	6.86 d(2.4)	6.79 d(2.4)	6.79 d(2.4)
1′	4.34 dd(11.2, 8.7), 4.08 dd(11.2, 6.3)	4.57 d(6.2)	4.59 d(6.4)
2′	3.21 dd(6.3, 3.7)	5.50 br t(6.2)	5.45 br t(6.4)
4′	1.90 dd(14.4, 8.6), 2.93 dd(14.4, 4.7)	2.28 d(6.0), 2.45 br dd(13.6, 7.6)	2.06~2.14 m
5′	4.87 m	5.70 m	2.06~2.14 m
6′	2.53 dd(13.6, 5.7), 1.84 dd(13.6, 9.3)	5.41 d(8.8)	5.09 br t(6.2)
8′		3.99 br t(6.4)	1.93 m
9′	1.52 s	2.23 m	1.68 m
10′	1.47 s	5.08 br t(6.4)	4.77 dd(10.0, 2.8)
12′		1.62 br s	1.17 br s
13′		1.71 br s	1.18 br s
14′		1.72 br s	1.58 br s
15′		1.81 s	1.74 br s
OAc		1.99 s	2.10 s

Table 6-2-9: Cos, MFs, and TSs of coumarins **6-2-27**~**6-2-82**.

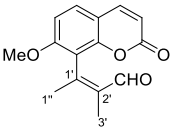
No.	Compounds	MFs	Test solvents	References
6-2-27	murralonginal	$C_{15}H_{14}O_4$	$CDCl_3$	[43]
6-2-28	(+)-7-methoxy-6-(2′*R*-methoxy-3′-hydroxy-3′-methyl butyl) coumarin	$C_{16}H_{20}O_5$	$CDCl_3$	[44]
6-2-29	praeroside VI	$C_{20}H_{26}O_{10}$	CD_3OD	[45]
6-2-30	osthole	$C_{15}H_{16}O_3$	$CDCl_3$	[46]
6-2-31	scuteflorin A	$C_{19}H_{18}O_6$	CD_3OD	[47]
6-2-32	scuteflorin B	$C_{19}H_{18}O_6$	CD_3OD	[47]
6-2-33	hyuganin A	$C_{24}H_{28}O_7$	$CDCl_3$	[48]
6-2-34	hyuganin B	$C_{23}H_{26}O_7$	$CDCl_3$	[48]
6-2-35	hyuganin C	$C_{21}H_{24}O_7$	$CDCl_3$	[48]
6-2-36	hyuganin D	$C_{20}H_{22}O_7$	$CDCl_3$	[48]
6-2-37	hydroxylomatin	$C_{14}H_{14}O_5$	$CDCl_3$	[49]
6-2-38	(+)-peujaponisin	$C_{24}H_{28}O_7$	$CDCl_3$	[50]
6-2-39	multivittan A	$C_{24}H_{32}O_6$	$CDCl_3$	[50]
6-2-40	multivittan B	$C_{26}H_{36}O_6$	$CDCl_3$	[50]
6-2-41	multivittan C	$C_{28}H_{40}O_6$	$CDCl_3$	[50]
6-2-42	multivittan D	$C_{22}H_{28}O_6$	$CDCl_3$	[50]
6-2-43	peucedanone	$C_{14}H_{14}O_5$	CD_3OD	[51]
6-2-44	7-{[(2*R**)-3,3-dimethyloxiran-2-yl]methoxy}-8-[(2*R**,3*R**)-3-isopropenyloxiran-2-yl]-2*H*-chromen-2-one	$C_{19}H_{20}O_5$	$CDCl_3$	[52]
6-2-45	7-methoxy-8-(4-methyl-3-furyl)-2*H*-chromen-2-one	$C_{15}H_{12}O_4$	$CDCl_3$	[52]

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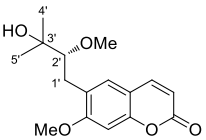
Table 6-2-9 (continued)

No.	Compounds	MFs	Test solvents	References
6-2-46	2-(7-methoxy-2-oxo-2*H*-chromen-8-yl)-3-methylbut-2-enal(murralongin)	$C_{15}H_{14}O_4$	$CDCl_3$	[52]
6-2-47	4′-acetyl-3′-senecioyl 3′-hydroxymarmesin	$C_{21}H_{22}O_7$	$CDCl_3$	[53]
6-2-48	4′-acetyl-3′-isobutyryl-3′-hydroxymarmesin	$C_{20}H_{22}O_7$	$CDCl_3$	[53]
6-2-49	3′(*R*)-angeloyloxy-4′(*R*)-isovaleryloxy-3′,4′-dihydroseselin	$C_{24}H_{28}O_7$	$CDCl_3$	[54]
6-2-50	(2′*S*, 7′*S*)-*O*-2-methylbutanoyl-columbianetin	$C_{19}H_{22}O_5$	$CDCl_3$	[55]
6-2-51	(2′*S*)-columbianetin-3′-sulfate	$C_{14}H_{14}O_7S$	CD_3OD	[55]
6-2-52	(2′*S*)-columbianetin	$C_{14}H_{14}O_4$	$CDCl_3$	[55]
6-2-53	libanoridin	$C_{16}H_{16}O_5$	$CDCl_3$	[55]
6-2-54	cnidiadin	$C_{18}H_{20}O_5$	$CDCl_3$	[55]
6-2-55	(2′*S*)-columbianetin-*O*-*β*-D-glucopyranoside	$C_{20}H_{24}O_9$	CD_3OD	[55]
6-2-56	(+)-hexanoyllomatin	$C_{20}H_{24}O_5$	$CDCl_3$	[56]
6-2-57	(+)-octanoyllomatin	$C_{22}H_{28}O_5$	$CDCl_3$	[56]
6-2-58	(+)-decanoyllomatin	$C_{24}H_{32}O_5$	$CDCl_3$	[56]
6-2-59	(+)-dodecanoyllomatin	$C_{26}H_{36}O_5$	$CDCl_3$	[56]
6-2-60	(+)-4′-decanoyl-*cis*-khellactone	$C_{24}H_{32}O_6$	$CDCl_3$	[56]
6-2-61	(+)-3′-decanoyl-*cis*-khellactone	$C_{24}H_{32}O_6$	$CDCl_3$	[56]
6-2-62	devenyol	$C_{14}H_{16}O_5$	CD_3OD	[56]
6-2-63	devenyoside A	$C_{20}H_{26}O_{10}$	CD_3OD	[56]
6-2-64	devenyoside B	$C_{20}H_{26}O_{10}$	CD_3OD	[56]
6-2-65	devenyoside C	$C_{26}H_{36}O_{15}$	CD_3OD	[56]
6-2-66	isophellodenol C	$C_{14}H_{14}O_4$	CD_3COCD_3	[57]
6-2-67	decursinol angelate	$C_{19}H_{20}O_5$	$CDCl_3$	[58]
6-2-68	decursin	$C_{19}H_{20}O_5$	$CDCl_3$	[58]
6-2-69	nodakenetin	$C_{14}H_{14}O_4$	$CDCl_3$	[58]
6-2-70	nodakenin	$C_{20}H_{26}O_9$	DMSO-d_6	[58]
6-2-71	omphalocarpinol	$C_{16}H_{16}O_7$	$CDCl_3$	[59]
6-2-72	7-methoxy-8-[1′-ethoxy-2′-hydroxy-3′-methyl-but-3′-enyl]-coumarin	$C_{17}H_{20}O_5$	$CDCl_3$	[60]
6-2-73	minumicroline acetonide	$C_{18}H_{20}O_5$	$CDCl_3$	[61]
6-2-74	epimurpaniculol senecioate	$C_{20}H_{22}O_6$	$CDCl_3$	[61]
6-2-75	*cis*-casegravol	$C_{15}H_{16}O_5$	$CDCl_3$	[62]
6-2-76	casegravol	$C_{15}H_{16}O_5$	DMSO-d_6	[62]
6-2-77	albiflorin-3	$C_{16}H_{16}O_5$	$CDCl_3$	[62]
6-2-78	6-[(1*S*,2*R*)-2,3-dihydroxy-l-methoxy-3-methyl-butyl]-7-methoxycoumarin	$C_{16}H_{20}O_6$	$CDCl_3$	[63]
6-2-79	angelol I	$C_{20}H_{26}O_7$	$CDCl_3$	[63]
6-2-80	angelol H	$C_{20}H_{26}O_7$	$CDCl_3$	[63]
6-2-81	1′-*O*-*β*-D-glucopyranosyl-(2′*S*)-marmesin	$C_{20}H_{24}O_9$	C_5D_5N	[64]
6-2-82	1′-*O*-*β*-D-glucopyranosyl-(2′*S*,3′*R*)-3′-hydroxy-marmesin	$C_{20}H_{24}O_{10}$	C_5D_5N	[64]

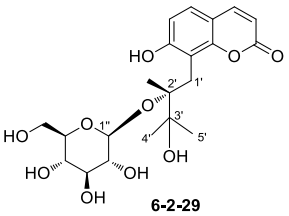
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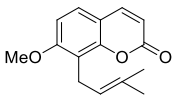
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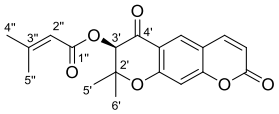
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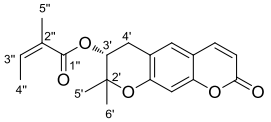
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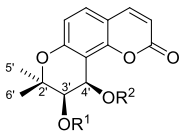
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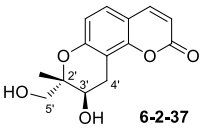
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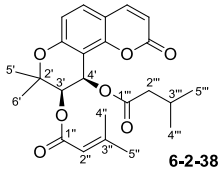
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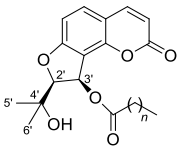
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6-2-36	Ac	*i*But



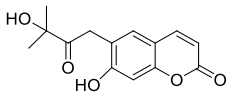
6-2-37



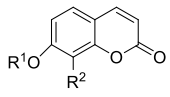
6-2-38

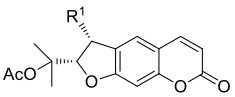


6-2-39 *n* = 8
6-2-40 *n* = 10
6-2-41 *n* = 12
6-2-42 *n* = 6

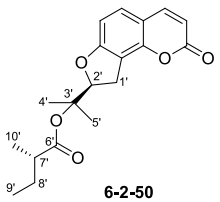


6-2-43

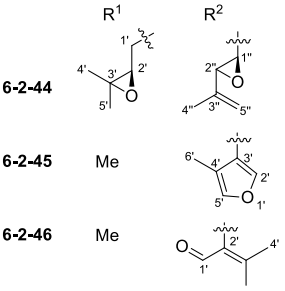




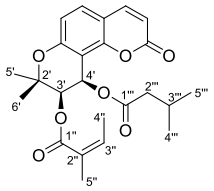
6-2-47 R = OSen
6-2-48 R = O*i*But



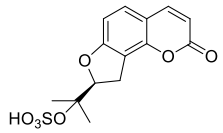
6-2-50



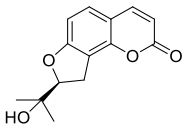
6-2-44
6-2-45 Me
6-2-46 Me



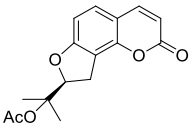
6-2-49



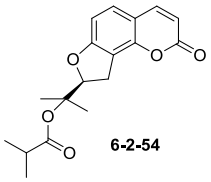
6-2-51



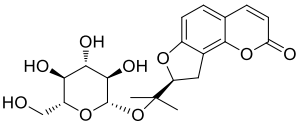
6-2-52



6-2-53

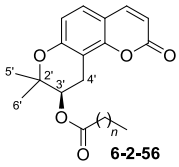


6-2-54

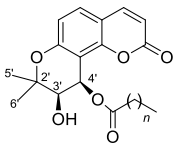


6-2-55

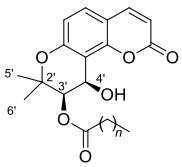
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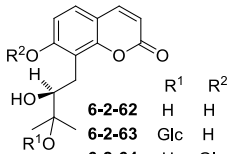
6-2-56 *n* = 4
6-2-57 *n* = 6
6-2-58 *n* = 8
6-2-59 *n* = 10



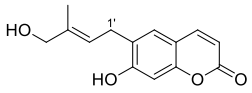
6-2-60 *n* = 8



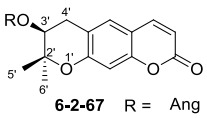
6-2-61 *n* = 8



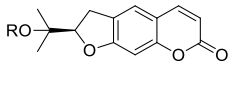
	R^1	R^2
6-2-62	H	H
6-2-63	Glc	H
6-2-64	H	Glc
6-2-65	Glc	Glc



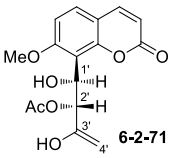
6-2-66



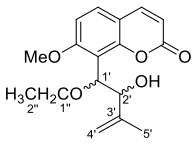
6-2-67 R = Ang
6-2-68 R = Sen



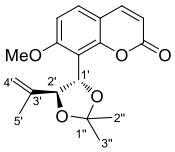
6-2-69 R = H
6-2-70 R = Glc



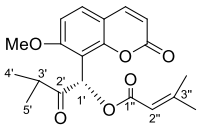
6-2-71



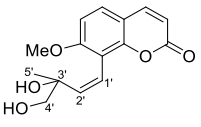
6-2-72



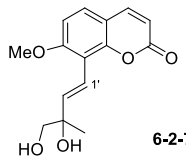
6-2-73



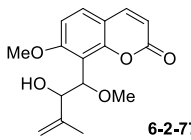
6-2-74



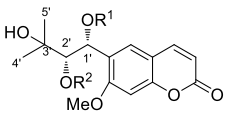
6-2-75



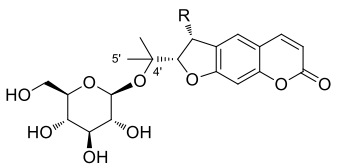
6-2-76



6-2-77



	R^1	R^2
6-2-78	Me	H
6-2-79	H	Val
6-2-80	Val	H



6-2-81 R = H
6-2-82 R = OH

Table 6-2-10: ^{1}H NMR spectroscopic data of coumarins **6-2-27**~**6-2-30**.

H	6-2-27	6-2-28	6-2-29	6-2-30
3	6.19 d(9.4)	6.20 d(9.4)	6.17 d(9.5)	6.23 d(9.6)
4	7.61 d(9.4)	7.60 d(9.4)	7.81 d(9.5)	7.62 d(9.6)
5	7.42 d(8.6)	7.34 s	7.34 d(8.5)	7.29 d(8.4)
6	6.87 d(8.6)	6.78 s	6.81 d(8.3)	6.84 d(8.4)
1′		2.46 dd(14.0, 1.6) 2.95 dd(14.0, 10.2)	3.14 dd(14.2, 5.2) 3.18 dd(14.5, 7.3)	3.49 d(7.2)

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Table 6-2-10 (continued)

H	6-2-27	6-2-28	6-2-29	6-2-30
2′		3.70 dd(1.6, 10.2)	4.06 dd(6.7, 5.5)	5.22 m
3′	1.76 s			
4′		1.25 s	1.22 s	1.84 s
5′		1.20 s	1.31 s	1.67 s
1″	2.40 s		4.15 d(7.3)	
2″			3.15 dd(9.2, 7.4)	
3″			3.18 dd(9.2, 8.6)	
4″			3.26 dd(9.2, 9.0)	
5″			3.10~3.15 m	
6″			3.61 dd(12.1, 5.7)	
			3.76 dd(11.9, 2.4)	
OMe	3.80 s	3.88 s, 3.25 s		3.92 s
CHO	10.19 s			

Table 6-2-11: ^{1}H NMR spectroscopic data of coumarins **6-2-31**~**6-2-34**.

H	6-2-31	6-2-32	6-2-33	6-2-34
3	6.36 d(9.6)	6.35 d(9.6)	6.22 d(9.6)	6.21 d(9.5)
4	8.04 d(9.6)	8.04 d(9.6)	7.61 d(9.6)	7.59 d(9.5)
5	8.11 s	8.11 s	7.37 d(8.6)	7.35 d(8.5)
6			6.81 d(8.6)	6.80 d(8.5)
8	6.90 s	6.91 s		
3′	5.71 s	5.78 s	5.40 d(4.9)	5.42 d(4.9)
4′			6.61 d(4.9)	6.59 d(4.9)
5′	1.58 s	1.59 s	1.45 s	1.44 s
6′	1.39 s	1.41 s	1.48 s	1.47 s
2″	5.85 br s			
3″		6.27 qq(8.4, 1.5)	6.12 qq(1.3, 7.3)	6.12 qq(1.5, 7.3)
4″	1.97 d(1.2)	1.95 p(1.5)①	1.98 qd(1.7, 7.3)	1.96 qd(1.5, 7.3)
5″	2.20 d(1.2)	2.00 dq(7.2, 1.5)	1.88 dq(1.3, 1.7)	1.87 qd(1.5, 1.5)
2‴			2.38 ddq(6.9, 6.9, 6.9)	2.57 qq(7.0, 7.0)
3‴			1.72 dqd(6.9, 7.6, 14.3)	1.16 d(7.0)
4‴			0.90 t(7.6)	1.20 d(7.0)
5‴			1.19 d(6.9)	

① The exact same data to the original literature.

Table 6-2-12: ^{1}H NMR spectroscopic data of coumarins **6-2-35**~**6-2-38**.

H	6-2-35	6-2-36	6-2-37	6-2-38
3	6.22 d(9.5)	6.22 d(9.6)	6.16 d(9.6)	6.22 d(9.5)
4	7.60 d(9.5)	7.60 d(9.6)	7.83 d(9.6)	7.59 d(9.5)
5	7.36 d(8.7)	7.36 d(8.7)	7.38 d(8.4)	7.35 d(8.7)

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Table 6-2-12 (continued)

H	6-2-35	6-2-36	6-2-37	6-2-38
6	6.80 d(8.7)	6.80 d(8.7)	6.77 d(8.4)	6.80 d(8.7)
3′	5.31 d(4.9)	5.31 d(5.0)	5.02 t(9.4)	5.35 d(5.0)
4′	6.52 d(4.9)	6.53 d(5.0)	3.34 m	6.59 d(5.0)
5′	1.42 s	1.42 s	3.53 d(11.0), 3.72 d(11.0)	1.45 s
6′	1.45 s	1.45 s		1.42 s
2″	2.10 s	2.09 s		5.67 m
4″				1.90 d(1.3)
5″				2.18 d(1.3)
2‴	2.42 ddq(7.0, 7.0, 7.0)	2.61 qq(7.0, 7.0)		2.30 dd(14.9, 6.9), 2.20 dd(14.9, 6.9)
3‴	1.73 dqd(7.0, 7.6, 14.3)	1.20 d(7.0)		2.14 ddqq(6.9, 6.9, 6.6, 6.6)
4‴	0.95 t(7.6)	1.23 d(7.0)		0.98 d(6.6)
5‴	1.22 d(7.0)			0.97 d(6.6)

Table 6-2-13: ^{1}H NMR spectroscopic data of coumarins **6-2-39**~**6-2-42**.

H	6-2-39	6-2-40	6-2-41	6-2-42
3	6.24 d(9.6)	6.24 d(9.6)	6.24 d(9.6)	6.24 d(9.6)
4	7.63 d(9.6)	7.63 d(9.6)	7.63 d(9.6)	7.64 d(9.6)
5	7.43 d(8.5)	7.43 d(8.5)	7.43 d(8.5)	7.44 d(8.5)
6	6.88 d(8.5)	6.88 d(8.5)	6.88 d(8.5)	6.88 d(8.5)
2′	4.55 d(6.6)	4.54 d(6.6)	4.54 d(6.6)	4.55 d(6.6)
3′	6.98 d(6.6)	6.98 d(6.6)	6.99 d(6.6)	6.99 d(6.6)
5′	1.41 s	1.41 s	1.41 s	1.41 s
6′	1.42 s	1.42 s	1.42 s	1.42 s
2″	2.32 dt(15.7, 7.5)	2.31 dt(15.7, 7.5)	2.32 dt(15.7, 7.5)	2.32 dt(15.7, 7.5)
	2.37 dt(15.7, 7.3)	2.37 dt(15.7, 7.3)	2.37 dt(15.7, 7.3)	2.38 dt(15.7, 7.3)
3″	1.65 m	1.65 m	1.65 m	1.66 m
4″	1.21~1.33 m	1.22~1.33 m	1.22~1.33 m	1.22~1.34 m
5″	1.21~1.33 m	1.22~1.33 m	1.22~1.33 m	1.22~1.34 m
6″	1.21~1.33 m	1.22~1.33 m	1.22~1.33 m	1.22~1.34 m
7″	1.21~1.33 m	1.22~1.33 m	1.22~1.33 m	1.22~1.34 m
8″	1.21~1.33 m	1.22~1.33 m	1.22~1.33 m	0.86 t(7.0)
9″	1.21~1.33 m	1.22~1.33 m	1.22~1.33 m	
10″	0.87 t(7.1)	1.22~1.33 m	1.22~1.33 m	
11″		1.22~1.33 m	1.22~1.33 m	
12″		0.88 t(7.1)	1.22~1.33 m	
13″			1.22~1.33 m	
14″			0.88 t(7.1)	
4′-OH	2.60 br s	2.60 br s	2.58 br s	2.59 br s

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Table 6-2-14: ^{1}H NMR spectroscopic data of coumarins **6-2-43**~**6-2-46**.

H	6-2-43	6-2-44	6-2-45	6-2-46
3	6.18 d(9.51)	6.27 d(9.8)	6.25 d(10.0)	6.22 d(9.6)
4	7.84 d(9.51)	7.61 d(9.8)	7.61 d(10.0)	7.68 d(9.6)
5	7.30 s	7.40 d(8.7)	7.45 d(8.5)	7.44 d(8.7)
6		6.93 d(8.7)	6.94 d(8.5)	6.90 d(8.7)
8	6.71 s			
1′	4.01 s	4.17~4.34 m		10.20 s
2′		3.18 m	7.48 d(1.2)	
4′	1.38 s	1.38 s		1.78 s
5′	1.38 s	1.40 s	7.34 br s	2.42 s
6′			1.89 d(0.5)	
1″		4.02 dd(10.9, 2.1)		
2″		3.92 m		
4″		1.85 s		
5″		5.08 s, 5.29 d(7.8)		
OMe			3.88 s	

Table 6-2-15: ^{1}H NMR spectroscopic data of coumarins **6-2-47**~**6-2-50**.

H	6-2-47	6-2-48	6-2-49	6-2-50
3	6.22 d(9.56)	6.26 d(9.60)	6.20 d(9.6)	6.18 d(9.4)
4	7.63 d(9.56)	7.62 d(9.60)	7.59 d(9.6)	7.60 d(9.4)
5	7.51 s	7.52 s	7.34 d(8.8)	7.23 d(8.3)
6			6.78 d(8.8)	6.71 d(8.3)
8	6.82 s	6.86 s		
1′				3.36 dd(16.5, 9.5)
				3.28 dd(16.5, 7.7)
2′	5.13 d(6.62)	5.16 d(6.62)		5.07 dd(9.5, 7.7)
3′	6.40 d(6.62)	6.35 d(6.62)	5.36 d(4.8)	
4′			6.59 d(4.8)	1.56 s
5′	1.71 s	1.74 s	1.46 s	1.51 s
6′	1.65 s	1.68 s	1.42 s	
7′				2.20 m
8′				1.50 m, 1.35 m
9′				0.85 t(7.2)
10′				1.01 d(7.2)
2″	5.57 s	2.51 sept(7.3)		
3″		1.17 d(7.3)	6.10 m	
4″	2.21 s	1.14 d(7.3)	2.02 br d	
5″	1.89 s		1.85 br s	
2‴			2.20 m	
3‴			1.14 m	
4‴			0.97 d(6.0)	
5‴			0.93 d(6.0)	
Ac	2.00 s	2.03 s		

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Table 6-2-16: ^{1}H NMR spectroscopic data of coumarins **6-2-51**~**6-2-54**.

H	6-2-51	6-2-52	6-2-53	6-2-54
3	6.17 d(9.5)	6.20 d(9.5)	6.18 d(9.6)	6.18 d(9.6)
4	7.84 d(9.5)	7.61 d(9.5)	7.60 d(9.6)	7.60 d(9.6)
5	7.38 d(8.4)	7.26 d(8.3)	7.24 d(8.3)	7.24 d(8.3)
6	6.75 d(8.4)	6.73 d(8.3)	6.72 d(8.3)	6.71 d(8.3)
1′	3.42 m	3.31 dd(9.0, 4.8)	3.35 dd(16.5, 9.6)	3.36 dd(16.4, 9.5)
			3.26 dd(16.5, 7.8)	3.28 dd(16.4, 7.7)
2′	5.03 dd(9.6, 7.7)	4.97 t(9.0)	5.12 dd(9.6, 7.8)	5.08 dd(9.5, 7.7)
4′	1.64 s	1.37 s	1.55 s	1.50 s
5′	1.53 s	1.24 s	1.50 s	1.56 s
7′			1.97 s	2.04 m
8′				1.04 d(7.2)
9′				1.03 d(7.2)

Table 6-2-17: ^{1}H NMR spectroscopic data of coumarins **6-2-55**~**6-2-58**.

H	6-2-55	6-2-56	6-2-57	6-2-58
3	6.18 d(9.5)	6.24 d(9.5)	6.24 d(9.5)	6.24 d(9.5)
4	7.85 d(9.5)	7.63 d(9.5)	7.63 d(9.5)	7.63 d(9.5)
5	7.38 d(8.4)	7.26 d(8.6)	7.26 d(8.6)	7.26 d(8.6)
6	6.75 d(8.4)	6.79 d(8.6)	6.79 d(8.6)	6.79 d(8.6)
1′	3.34 m			
2′	4.92 t(9.9)			
3′		5.13 t(5.0)	5.13 t(5.0)	5.13 t(5.0)
4′	1.37 s	3.19 dd(15.1, 5.0)	3.19 dd(15.1, 5.0)	3.19 dd(15.1, 5.0)
		2.97 dd(15.1, 5.0)	2.97 dd(15.1, 5.0)	2.97 dd(15.1, 5.0)
5′	1.36 s		1.37 s	1.37 s
6′			1.34 s	1.34 s
1″	4.57 br s			
2″	3.11 m	2.30 t(7.5)	2.30 t(7.5)	2.30 t(7.5)
3″	3.14 m	1.59 q(7.5)	1.59 quint(7.5)	1.59 quint(7.5)
4″	3.33 m	1.24 m	1.24 m	1.24 m
5″	3.36 m	1.24 m	1.24 m	1.24 m
6″	3.48 m	0.86 t(7.0)	1.24 m	1.24 m
7″			1.24 m	1.24 m
8″			0.86 t(7)	1.24 m
9″				1.24 m
10″				0.86 t(7)

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Table 6-2-18: ^{1}H NMR spectroscopic data of coumarins **6-2-59**~**6-2-62**.

H	6-2-59	6-2-60	6-2-61	6-2-62
3	6.24 d(9.5)	6.23 d(9.6)	6.25 d(9.6)	6.19 d(9.3)
4	7.63 d(9.5)	7.60 d(9.5)	7.64 d(9.5)	7.86 d(9.3)
5	7.26 d(8.6)	7.35 d(8.6)	7.33 d(8.6)	7.23 d(8.5)
6	6.79 d(8.6)	6.79 d(8.6)	6.79 d(8.6)	6.72 d(8.5)
1′				2.93 dd(13.8, 10.1)
2′				3.68 dd(10.1, 1.5)
3′	5.13 t(5.0)	4.02 d(4.9)	5.17 d(4.9)	
4′	3.19 dd(15.1, 5.0)	6.41 d(4.9)	5.41 d(4.9)	1.29 s
	2.97 dd(15.1, 5.0)			
5′	1.37 s	1.46 s	1.47 s	1.30 s
6′	1.34 s	1.43 s	1.39 s	
2″	2.30 t(7.5)	2.43 m	2.35 m	
3″	1.59 quint(7.5)	1.67 m	1.67 m	
4″	1.24 m	1.25 br s	1.25 br s	
5″	1.24 m	1.25 br s	1.25 br s	
6″	1.24 m	1.25 br s	1.25 br s	
7″	1.24 m	1.25 br s	1.25 br s	
8″	1.24 m	1.25 br s	1.25 br s	
9″	1.24 m	1.25 br s	1.25 br s	
10″	1.24 m	0.86 t(7)	0.86 t(7)	
11″	1.24 m			
12″	0.86 t(7)			

Table 6-2-19: ^{1}H NMR spectroscopic data of coumarins **6-2-63**~**6-2-66**.

H	6-2-63	6-2-64	6-2-65	6-2-66
3	6.02 d(9.3)	6.29 d(9.5)	6.29 d(9.6)	6.13 d(9.4)
4	7.76 d(9.3)	7.91 d(9.5)	7.91 d(9.6)	7.82 d(9.4)
5	7.23 d(8.5)	7.49 d(8.6)	7.49 d(8.7)	7.37 s
6	6.72 d(8.5)	7.26 d(8.6)	7.24 d(8.7)	
8				6.78 s
1′	2.96 dd(13.8, 10.1)	3.12 m	3.12 m	3.40 br d(7.6)
2′	3.13 dd(13.8, 1.5)	3.63 dd(9.4, 4.1)	3.81 dd(9.0, 3.8)	5.63 t(7.6)
4′	1.36 s	1.302 s	1.40 s	3.98 br s
5′	1.40 s	1.305 s	1.43 s	1.74 s
1″	4.58 d(7.7)	4.96 d(7.6)	4.59 d(7.7)	
2″	3.23 dd(8.5, 7.7)	3.56 t(9.0, 7.6)	3.21 dd(9.0, 7.7)	
3″	3.41 t(8.5)	3.47 t(9.0)	3.39 t(9.0)	
4″	3.32 t(8.5)	3.39 t(9.0)	3.32 t(9.0)	
5″	3.29 m	3.49 m	3.29 m	
6″	3.80 dd(12.0, 2.0)	3.93 dd(12.0, 2.2)	3.79 dd(12.0, 2.0)	
	3.62 dd(12.0, 5.2)	3.71 dd(12.0, 5.8)	3.65 dd(12.2, 5.4)	
1‴			4.98 d(7.6)	

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Table 6-2-19 (continued)

H	6-2-63	6-2-64	6-2-65	6-2-66
2‴			3.56 dd(8.9, 7.6)	
3‴			3.48 t(8.9)	
4‴			3.39 t(9.0)	
5‴			3.49 m	
6‴			3.94 dd(12.2, 2.2)	
			3.71 dd(12.2, 5.8)	

Table 6-2-20: ^{1}H NMR spectroscopic data of coumarins **6-2-67**~**6-2-70**.

H	6-2-67	6-2-68	6-2-69	6-2-70
3	6.23 d(9.5)	6.20 d(9.5)	6.24 d(9.5)	6.20 d(9.5)
4	7.59 d(9.5)	7.58 d(9.5)	7.61 d(9.5)	7.91 d(9.5)
5	7.17 s	7.15 s	7.24 s	7.46 s
8	6.79 s	6.77 s	6.77 s	6.78 s
2′			4.76 t(8.7)	4.85 m
3′	5.14 t(4.9)	5.07 t(4.8)	3.24 m	3.19 m
4′	3.24 dd(17.0, 4.9)	3.18 dd(17.1, 4.7)		
	2.90 dd(17.0, 4.9)	2.90 dd(17.1, 4.7)		
5′	1.41 s or 1.39 s	1.37 s	1.40 s	1.25 s
6′	1.41 s or 1.39 s	1.35 s	1.26 s	1.22 s
1″				4.40 d(7.7)
2″		5.65 s		
3″	6.11 q(7.2)			
4″	1.89 d(7.2)	2.13 s		
5″	1.85 s	1.86 s		

Table 6-2-21: ^{1}H NMR spectroscopic data of coumarins **6-2-71**~**6-2-74**.

H	6-2-71	6-2-72	6-2-73	6-2-74
3	6.21 d(9.6)	6.23 d(9.5)	6.24 d(9.6)	6.25 d(9.6)
4	7.59 d(9.6)	7.62 d(9.5)	7.60 d(9.6)	7.62 d(9.6)
5	7.37 d(8.8)	7.38 d(8.5)	7.41 d(8.8)	7.46 d(8.8)
6	6.85 d(8.8)	6.85 d(8.5)	6.87 d(8.8)	6.87 d(8.8)
1′	5.71 d(8.0)	5.12 d(9.1)	5.56 d(8.8)	7.02 s
2′	5.49 d(8.0)	4.89 d(9.1)	5.01 d(8.8)	
3′				2.95 sept(7.2)
4′	4.73 s, 4.70 s	4.66 s, 4.60 s	4.95 d(2.2), 4.84 d(2.2)	1.03 d(7.2)
5′		1.67 s	1.53 s	1.19 d(7.2)
1″		3.47 m		
2″		1.16 t(7.2)	1.73 s	5.79 s
3″			1.69 s	

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Table 6-2-21 (continued)

H	6-2-71	6-2-72	6-2-73	6-2-74
4″				2.18 d(1.2)
5″				1.88 d(1.2)
OMe	3.96 s	3.90 s	3.92 s	3.90 s
Ac	2.09 s			
2′-OH		3.14 br s		

Table 6-2-22: ^{1}H NMR spectroscopic data of coumarins **6-2-75**~**6-2-78**.

H	6-2-75	6-2-76	6-2-77	6-2-78
3	6.26 d(9)	6.30 d(9)	6.26 d(9)	6.19 d(9.4)
4	7.63 d(9)	7.99 d(9)	7.61 d(9)	7.62 d(9.4)
5	7.38 d(8)	7.57 d(9)	7.39 d(9)	7.42 s
6	6.87 d(8)	7.10 d(9)	6.86 d(9)	
8				6.75 s
1′	6.29 d(13)	6.94 d(16)	5.05 d(9)	4.88 d(1.2)
2′	5.95 d(13)	6.90 d(16)	4.92 d(9)	3.28 dd(7.9, 1.2)
4′	3.36 d(11), 3.53 d(11)	3.28(ov), 3.30 m	4.63 m, 4.70 m	
5′	1.24 s	1.24 s	1.69 dd(1, 2)	
OMe	3.93 s	3.93 s	3.93 s(7-OMe)	3.82 s(7-OMe)
1′-OAc			3.32 s	3.24 s

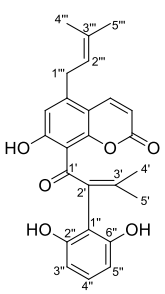
Table 6-2-23: ^{1}H NMR spectroscopic data of coumarins **6-2-79**~**6-2-82**..

H	6-2-79	6-2-80	6-2-81	6-2-82
3	6.30 d(9.4)	6.18 d(9.4)	6.28 d(9.5)	6.25 d(9.5)
4	7.70 d(9.4)	7.59 d(9.4)	7.64 d(9.5)	7.62 d(9.5)
5	7.69 s	7.52 s	7.05 s	7.55 s
8	6.82 s	6.76 s	6.77 s	6.82 s
1′	5.68 br s	6.22 d(5.8)		
2′	5.17 br s	3.81 d(5.8)	4.95 t(8.7)	4.71 d(6.8)
3′			3.15 dd(8.7, 16.1)	4.60 br s
			3.54 dd(8.7, 16.1)	
4′	1.30 s	1.26 s		
5′	1.02 s	1.21 s	1.55 s	1.90 s
6′			1.53 s	1.90 s
1″			5.15 d(7.7)	5.32 d(7.8)
2″	1.85~2.08 m	1.88~2.19 m	3.96 t(8.0)	3.91 (ov)
3″	1.85~2.08 m	1.88~2.19 m	4.26 (ov)	4.25 (ov)
4″	0.79 d(6.4)	0.87 d(6.4)	3.90 m	4.21 (ov)
5″	0.69 d(6.4)	0.87 d(6.4)	4.24 (ov)	3.88 (ov)
6″			4.29 br s	4.28 (ov)
OMe	3.99 s	3.92 s		

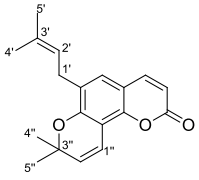
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Table 6-2-24: Cos, MFs, and TSs of coumarins **6-2-83**~**6-2-92**.

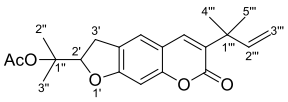
No.	Compounds	MFs	Test solvents	References
6-2-83	sinensin A	$C_{25}H_{24}O_6$	DMSO-d_6	[65]
6-2-84	6-(3,3-dimethylallil)seselin	$C_{19}H_{20}O_3$	$CDCl_3$	[66]
6-2-85	*S*-(+)-chalepin acetate	$C_{21}H_{24}O_5$	$CDCl_3$	[67]
6-2-86	anisocoumarin A	$C_{17}H_{18}O_4$	$CDCl_3$	[68]
6-2-87	–	$C_{17}H_{20}O_4$	$CDCl_3$	[68]
6-2-88	swietenocoumarin I	$C_{21}H_{26}O_5$	$CDCl_3$	[68]
6-2-89	anisocoumarin C	$C_{19}H_{22}O_5$	$CDCl_3$	[68]
6-2-90	anisocoumarin D	$C_{19}H_{24}O_6$	$CDCl_3$	[68]
6-2-91	–	$C_{23}H_{28}O_8$	$CDCl_3$	[68]
6-2-92	pachyrhizin	$C_{19}H_{12}O_6$	$CDCl_3$	[69]



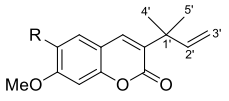
6-2-83



6-2-84



6-2-85



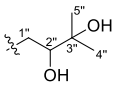
6-2-86 R =

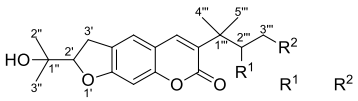


6-2-87 R =

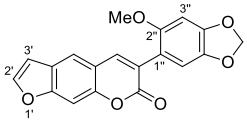


6-2-88 R =





	R^1	R^2
6-2-89	-O-	
6-2-90	OH	OH
6-2-91	OAc	OAc



6-2-92

Table 6-2-25: ^{1}H NMR spectroscopic data of coumarins **6-2-83**~**6-2-87**.

H	6-2-83	6-2-84	6-2-85	6-2-86	6-2-87
3	5.72 d(2.0)	6.16 d(9.6)			
4	6.84 d(2.0)	7.54 d(9.6)	7.29 s	7.50 s	7.53 s
5		7.02 s	7.20 s	7.22 s	7.28 s
6	6.12 s				
8			6.73 s	6.80 s	6.79 s
1′		3.24 d(7.2)			
2′		5.22 t(7.2)	5.05 m	6.15 dd(18, 10)	6.20 dd(18, 10)
3′			3.20 m	5.08 dd(10, 1)	5.10 dd(18.0, 1)
				5.02 dd(18, 1)	5.07 dd(10, 1)

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Table 6-2-25 (continued)

H	6-2-83	6-2-84	6-2-85	6-2-86	6-2-87
4′	1.72 s or 1.86 s	1.70 s		1.45 s	1.48 s
5′	1.72 s or 1.86 s	1.72 s		1.45 s	1.48 s
1″		6.84 d(10.2)		3.80 br s	2.90 br t(8)
2″		5.68 d(10.2)	1.57 s	9.67 br s	3.85 br s
3″	6.37 d(8.0)		1.75 s		
4″	6.97 t(8.0)	1.44 s			
5″	6.37 d(8.0)	1.44 s			
1‴	3.11 d(8.2)				
2‴	5.14 m		6.17 dd(17.0, 10.0)		
3‴			5.09 m, 5.17 m		
4‴	1.61 s		1.48 s		
5‴	1.67 s		1.48 s		
OAc			1.99 s		
OMe				3.87 s	3.90 s
7-OH	12.18 br s				

Table 6-2-26: ^{1}H NMR spectroscopic data of coumarins **6-2-88**~**6-2-92**.

H	6-2-88	6-2-89	6-2-90	6-2-91	6-2-92
3					
4	7.50 s	7.56 s	7.65 s	7.47 s	7.69 s
5	7.27 s	7.22 s	7.45 s	7.19 s	7.67 s
8	6.74 s	6.70 s	6.71 s	6.67 s	7.49 br s
2′	6.13 dd(18.0, 10.1)	4.72 t(9.0)	4.66 t(8.6)	4.70 t(8.8)	7.69 d(2.2)
3′	5.06 dd(10.1, 1.1) 5.04 dd(18.0, 1.1)	3.20 d(9.0)	3.15 d(8.6)	3.18 d(8.8)	6.85 dd(2.2, 1)
4′	1.44 s				
5′	1.44 s				
1″	2.97 dd(13.8, 2.0) 2.51 dd(13.8, 10.3)				
2″	3.60 ddd(10.3, 3.7, 2.0)				
3″					6.62 s
4″	1.28 s				
5″	1.25 s				
6″					6.89 s
2‴		3.30 br m	4.19 br dt(7.7, 5.4)	6.02 dd(8.0, 3.4)	
3‴		2.90 dd(3.0, 5.0)	3.32 dd(11.4, 7.7)	4.16 dd(11.8, 3.4)	
		2.78 dd(4.0, 5.0)	3.20 br d(11.4)	4.00 dd(11.8, 8.0)	
OAc				2.00 s, 1.92 s	
OMe	3.85 s				3.77 s
OCH_2O					5.96 s
Me		1.35 s, 1.31 s 1.27 s, 1.21 s	1.23 s, 1.20 s 1.12 s, 1.12 s	1.39 s, 1.34 s 1.33 s, 1.20 s	

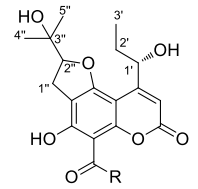
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Table 6-2-27: Cos, MFs, and TSs of coumarins **6-2-93**~**6-2-132**.

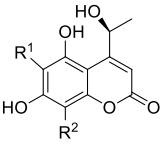
No.	Compounds	MFs	Test solvents	References
6-2-93	siamenol A	$C_{21}H_{26}O_7$	$CDCl_3$	[70]
6-2-94	siamenol B	$C_{21}H_{26}O_7$	$CDCl_3$	[70]
6-2-95	kayeassamin C	$C_{27}H_{36}O_6$	$CDCl_3$	[71]
6-2-96	kayeassamin D	$C_{27}H_{36}O_6$	$CDCl_3$	[71]
6-2-97	kayeassamin E	$C_{21}H_{26}O_6$	$CDCl_3$	[71]
6-2-98	kayeassamin F	$C_{22}H_{28}O_6$	$CDCl_3$	[71]
6-2-99	kayeassamin H	$C_{21}H_{24}O_5$	–	[71]
6-2-100	kayeassamin I	$C_{26}H_{32}O_6$	–	[71]
6-2-101	disparacetylfuran A	$C_{24}H_{20}O_6$	$CDCl_3$	[72]
6-2-102	mammea A/AA methoxycyclo F	$C_{26}H_{28}O_7$	$CDCl_3$	[72]
6-2-103	mammea A/BA cyclo F	$C_{25}H_{26}O_6$	$CDCl_3$	[72]
6-2-104	isodisparfuran A	$C_{22}H_{18}O_5$	$CDCl_3$	[72]
6-2-105	mammea E/BA cyclo D	$C_{24}H_{28}O_7$	$CDCl_3$	[73]
6-2-106	mammea E/BC cyclo D	$C_{23}H_{26}O_7$	$CDCl_3$	[73]
6-2-107	mammea E/AC cyclo D	$C_{23}H_{26}O_7$	$CDCl_3$	[73]
6-2-108	epoxybergamottin	$C_{21}H_{22}O_5$	$CDCl_3$	[74]
6-2-109	5-hydroxy-8,8-dimethyl-4-phenyl-9,10-dihydro-8*H*-pyrano-[2,3-*f*]chromen-2-one	$C_{20}H_{18}O_4$	$CDCl_3$	[75]
6-2-110	5-hydroxy-8,8-dimethyl-4-phenyl-6-propionyl-9,10-dihydro-8*H*-pyrano-[2,3-*f*]chromen-2-one	$C_{23}H_{22}O_5$	$CDCl_3$	[75]
6-2-111	dipetaline	$C_{20}H_{22}O_4$	$CDCl_3$	[76]
6-2-112	alloxanthoxyletin	$C_{15}H_{14}O_4$	$CDCl_3$	[76]
6-2-113	xanthoxyletin	$C_{15}H_{14}O_4$	$CDCl_3$	[76]
6-2-114	7,2′,4′-trihydroxy-5-methoxy-3-arylcou-marin	$C_{16}H_{12}O_6$	CD_3COCD_3	[77]
6-2-115	brasimarin A	$C_{24}H_{22}O_5$	$CDCl_3$	[78]
6-2-116	brasimarin C	$C_{25}H_{24}O_5$	$CDCl_3$	[78]
6-2-117	theraphin D	$C_{21}H_{24}O_6$	$CDCl_3$	[79]
6-2-118	theraphin A	$C_{21}H_{26}O_6$	$CDCl_3$	[79]
6-2-119	theraphin B	$C_{22}H_{28}O_6$	$CDCl_3$	[79]
6-2-120	theraphin C	$C_{22}H_{28}O_6$	$CDCl_3$	[79]
6-2-121	mammea B/BA hydroxycyclo F	$C_{22}H_{28}O_7$	$CDCl_3$	[80]
6-2-122	mammea E/BC	$C_{23}H_{28}O_7$	$CDCl_3$	[80]
6-2-123	mammea E/BD	$C_{23}H_{28}O_7$	$CDCl_3$	[80]
6-2-124	feroniellamin	$C_{21}H_{24}O_7$	$CDCl_3$	[81]
6-2-125	bergapten	$C_{12}H_8O_4$	$CDCl_3$	[58]
6-2-126	oxypeucedanine	$C_{16}H_{14}O_5$	$CDCl_3$	[82]
6-2-127	isodispar B①	$C_{20}H_{18}O_5$	$CDCl_3$	[83]
6-2-128	disparinol D	$C_{24}H_{24}O_6$	$CDCl_3$	[83]
6-2-129	disparpropylinol B	$C_{22}H_{28}O_6$	$CDCl_3$	[83]
6-2-130	dispardiol B	$C_{25}H_{28}O_7$	$CDCl_3$	[83]
6-2-131	mammea A/AB cyclo E	$C_{25}H_{26}O_6$	$CDCl_3$	[83]
6-2-132	mammea A/AB dioxalanocyclo F	$C_{25}H_{24}O_7$	$CDCl_3$	[83]

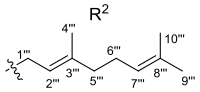
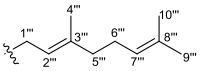
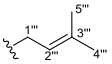
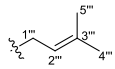
① Typographic errors exist in the literature, giving the name of isodispar A in the main body of the paper, while isodispar B in the experimental section.

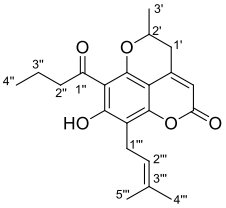
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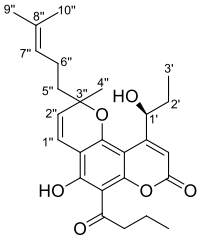
6-2-93 R = $CH(CH_3)_2$
6-2-94 R = $CH_2CH_2CH_3$



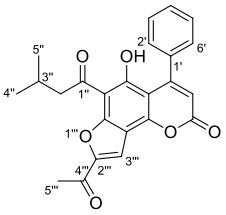
	R^1	R^2
6-2-95	MeBu	
6-2-96	Val	
6-2-97		
6-2-98	MeBu	



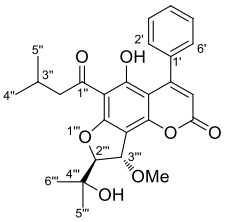
6-2-99



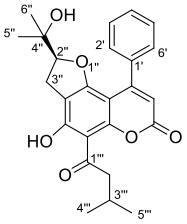
6-2-100



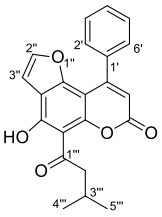
6-2-101



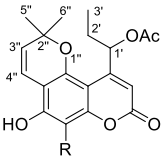
6-2-102



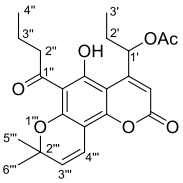
6-2-103



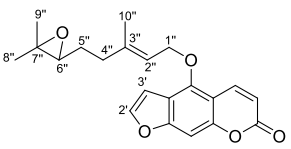
6-2-104



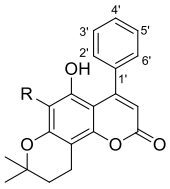
6-2-105 R = Val
6-2-106 R = But



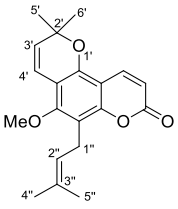
6-2-107



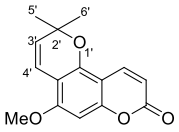
6-2-108



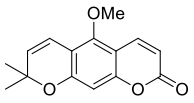
6-2-109 R = H
6-2-110 R = Propionyl



6-2-111

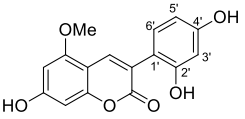


6-2-112

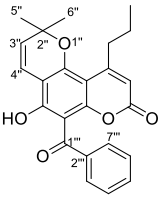


6-2-113

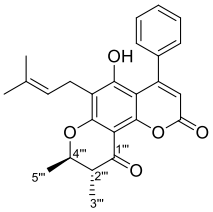
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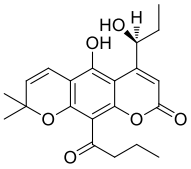
6-2-114



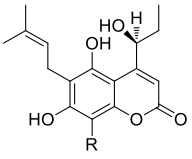
6-2-115



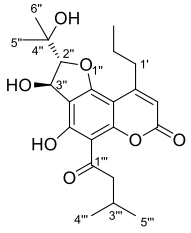
6-2-116



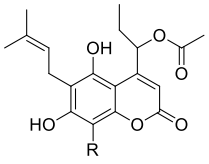
6-2-117



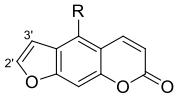
6-2-118 R = But
6-2-119 R = MeBu
6-2-120 R = Val



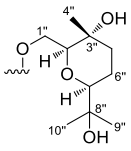
6-2-121



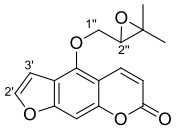
6-2-122 R = But
6-2-123 R = ^{i}But



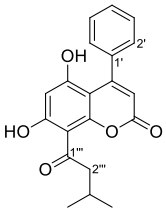
6-2-124 R =



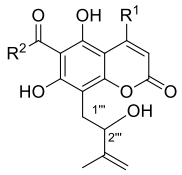
6-2-125 R = OMe



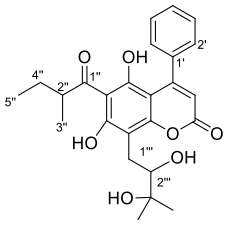
6-2-126



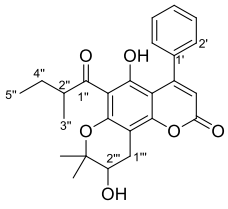
6-2-127



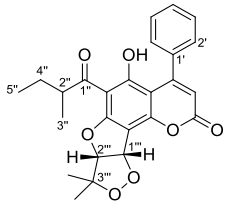
	R^1	R^2
6-2-128	Ph	$CH(CH_3)_2$
6-2-129	$CH_2CH_2CH_3$	$CHCH_3CH_2CH_3$



6-2-130



6-2-131



6-2-132

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Table 6-2-28: ^{1}H NMR spectroscopic data of coumarins **6-2-93**~**6-2-96**.

H	6-2-93	6-2-94	6-2-95	6-2-96
3	6.42 s	6.37 s	6.14 s	6.09 s
1′	5.16 dd(8.2, 2.0)	5.14 br dd(8.1, 1.5)	4.78 t(6.4)	4.75 t(7.8)
2′	1.46 m, 1.81 m	1.39 m, 1.74 m	1.76 m, 1.94 m	1.78 m, 1.92 m
3′	1.09 t(7.3)	1.08 t(7.3)	1.02 t(7.3)	1.02 t(7.6)
1″	3.13 dd(15.4, 9.9) 3.27 dd(15.4, 8.7)	3.12 dd(15.4, 9.9) 3.29 dd(15.4, 8.6)		
2″	4.86 t(9.0)	4.87 t(9.0)	3.78 dd(6.6, 13.2)	2.99 dd(6.6, 15.7) 3.07 dd(6.6, 15.7)
3″			1.23 d(6.6)	2.23 m
4″	1.25 s	1.28 s	1.44 m, 1.85 m	1.00 d(4.5)
5″	1.51 s	1.53 s	0.96 t(7.3)	1.00 d(4.5)
1‴			3.42 t(6.5)	3.40 t(7.3)
2‴	3.80 sept(6.7)	2.93 dt(18.0, 7.5) 3.02 dt(18.0, 7.5)	5.22 t(6.5)	5.20 t(7.3)
3‴	1.14 d(6.7)	1.68 m		
4‴	1.20 d(6.7)	1.00 t(7.4)	1.81 s	1.81 s
5‴			1.99 m	1.99 m
6‴			2.06 m	2.04 m
7‴			5.06 t(6.8)	5.06 t(7.1)
9‴			1.65 s	1.64 s
10‴			1.57 s	1.57 s
5-OH			10.51 br s	10.58 br s
7-OH			14.27 br s	14.42 br s

Table 6-2-29: ^{1}H NMR spectroscopic data of coumarins **6-2-97**~**6-2-100**.

H	6-2-97	6-2-98	6-2-99	6-2-100
3	6.01 s	6.14 s	5.88 s	6.61 s
1′	4.61 t(7.8)	4.78 t(7.3)	2.84 m	5.43 d(8.1)
2′	1.74 m, 1.98 m	1.76 m, 1.92 m	4.41 m	1.50 m, 1.97 m
3′	1.00 t(7.6)	1.03 t(7.3)	1.59 d(6.4)	1.13 t(7.4)
1″				6.79 d(10.0)
2″	3.00 m	3.82 dd(6.6, 12.9)	3.06 t(6.9)	5.54 d(10.0)
3″	1.71 m	1.23 d(6.6)	1.72 m	
4″	1.00 t(7.6)	1.45 m, 1.85 m	1.01 t(7.5)	1.51 s
5″		0.96 t(7.3)		1.90 m
6″				2.09 m
7″				5.07 t(7.1)
9″				1.64 s
10″				1.55 s
1‴	3.34 m	3.42 t(7.0)	3.44 d(7.3)	
2‴	5.15 t(6.8)	5.22 t(7.0)	5.23 t(7.3)	3.27 t(7.1)
3‴				1.79 m
4‴	1.67 s	1.71 s	1.67 s	1.05 m
5‴	1.79 s	1.81 s	1.83 s	
OH	5.38 br s, 11.41 br s 14.32 s	3.71 br s, 10.39 br s 14.28 s		

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Table 6-2-30: ^{1}H NMR spectroscopic data of coumarins **6-2-101**~**6-2-104**.

H	6-2-101	6-2-102	6-2-103	6-2-104
3	6.22 s	5.99 s	6.08 s	6.22 s
2′	7.37 m	7.31 m	7.32 m	7.42 m
3′	7.45 m	7.40 m	7.44 m	7.50 m
4′	7.45 m	7.40 m	7.44 m	7.50 m
5′	7.45 m	7.40 m	7.44 m	7.50 m
6′	7.37 m	7.31 m	7.32 m	7.42 m
2″	3.18 d(6.5)	2.81 dd(7.0, 15.0)	4.52 t(9.0)	7.31 d(2.0)
		3.00 dd(7.0, 15.0)		
3″	2.29 m	2.21 m	3.08 dd(10.0, 15.5)	6.96 d(2.0)
			2.93 dd(8.5, 15.5)	
4″	1.07 d(6.5)	0.96 d(7.0)		
5″	1.07 d(6.5)	0.96 d(7.0)	1.02 s	
6″			0.94 s	
2‴		4.65 d(3.0)	3.19 d(7.0)	3.30 d(7.0)
3‴	7.83 s	5.23 d(3.0)	2.32 m	2.37 m
4‴			1.08 d(6.5)	1.09 d(7.0)
5‴	2.63 s	1.35 s	1.08 d(6.5)	1.09 d(7.0)
6‴		1.39 s		
OMe		3.64 s		

Table 6-2-31: ^{1}H NMR spectroscopic data of coumarins **6-2-105**~**6-2-107**.

H	6-2-105	6-2-106	6-2-107
3	6.30 s	6.30 s	6.20 br s
1′	6.60 dd(8.8, 2.8)	6.59 dd(8.9, 2.9)	6.53 dd(8.4, 2.6)
2′	1.99 ddq(14.5, 7.3, 2.8)	1.99 ddq(14.5, 7.1, 2.9)	2.01 ddq(14.4, 7.3, 2.6)
	1.67 ddq(14.5, 7.3, 8.8)	1.65 ddq(14.5, 7.1, 8.9)	1.65 ddq(14.4, 7.3, 8.4)
3′	1.05 t(7.3)	1.06 t(7.1)	1.04 t(7.3)
2″			3.09 br t(7.4)
3″	5.61 d(10.0)	5.61 d(10.0)	1.75 sext(7.4)
4″	6.74 d(10.0)	6.73 d(10.0)	1.03 t(7.4)
5″	1.56 s	1.56 s	
6″	1.59 s	1.59 s	
2‴	3.12 dd(15.5, 6.6)	3.26 t(7.3)	
	3.15 dd(15.5, 6.6)		
3‴	2.27 m	1.78 sext(7.3)	5.61 d(10.0)
4‴	1.03 d(6.7)	1.03 t(7.3)	6.82 d(10.0)
5‴	1.03 d(6.7)		1.56 s
6‴			1.55 s
OAc	2.18 s	2.18 s	2.16 s
7-OH	14.54 s	14.51 s	
5-OH			15.60 s

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Table 6-2-32: ^{1}H NMR spectroscopic data of coumarins **6-2-108**~**6-2-112**.

H	6-2-108	6-2-109	6-2-110	6-2-111	6-2-112
3	6.28 d(9.9)	5.94 s	5.96 s	6.23 d(9.8)	6.16 d(9.8)
4	8.16 d(9.9)			8.00 d(9.8)	7.96 d(9.8)
6		6.18 s			
8	7.16 s				6.36 s
2′	6.96 d(2.4)	7.45 m	7.31 m		
3′	7.60 d(2.6)	7.54 m	7.38 m	5.62 d(10.0)	5.55 d(10.0)
4′		7.54 m	7.38 m	6.55 d(10.0)	6.62 d(10.0)
5′		7.54 m	7.38 m	1.48 s	1.47 s
6′		7.45 m	7.31 m	1.48 s	1.47 s
1″	4.96 d(6.8)			3.50 d(7.2)	
2″	5.60 t(6.8)		3.06 q(7.3)	5.33 t(7.2)	
3″			1.15 t(7.3)		
4″	1.67 m			1.72 s	
5″	2.24 m			1.83 s	
6″	2.70 t(5.7)				
8″	1.29 d(6.8)				
9″	1.29 d(6.8)				
10″	1.73 s				
1‴		2.86 t(6.8)	2.87 t(6.8)		
2‴		1.85 t(6.8)	1.89 t(6.8)		
4‴		1.37 s	1.45 s		
5‴		1.37 s	1.45 s		
OMe				3.85 s	3.87 s
5-OH		5.11 s	14.72 s		

Table 6-2-33: ^{1}H NMR spectroscopic data of coumarins **6-2-113**~**6-2-117**.

H	6-2-113	6-2-114	6-2-115	6-2-116	6-2-117
3	6.21 d(9.8)		5.89 s	6.04 s	6.62 s
4	7.85 d(9.8)	8.03 s			
6		6.45 d(1.6)			
8	6.57 s	6.42 d(1.6)			
1′			2.89 t(7.6)		5.43 d(7.2)
2′			1.66 sext(7.6)	7.42 m	1.92 d
					1.47 ddd(15.2, 8.1, 4.1)
3′	5.71 d(10.0)	6.47 d(2.4)	1.04 t(7.6)	7.57 m	1.12 t(7.3)
4′	6.58 d(10.0)			7.57 m	
5′	1.47 s	6.44 dd(2.4, 8.3)		7.57 m	
6′	1.47 s	7.19 d(8.3)		7.42 m	
1″				3.27 d(7.0)	
2″				5.08 m	
3″			5.62 d(10.1)		5.59 d(10.0)
4″			6.77 d(10.1)	1.71 s	6.74 d(10.0)
5″			1.57 s	1.66 s	1.52 s
6″			1.57 s		1.57 s

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Table 6-2-33 (continued)

H	6-2-113	6-2-114	6-2-115	6-2-116	6-2-117
2‴				2.57 dq(6.9, 11.0)	3.27 t(7.2)
3‴			7.61 d(7.6)	1.25 d(6.9)	1.78 d
4‴			7.44 t(7.6)	4.30 dq(6.2, 11.0)	1.04 t(7.4)
5‴			7.56 t(7.6)	1.55 d(6.2)	
6‴			7.44 t(7.6)		
7‴			7.61 d(7.6)		
OMe	3.87 s	3.94 s			
OH			12.26 s(7-OH)	5.87 s(5-OH)	

Table 6-2-34: ^{1}H NMR spectroscopic data of coumarins **6-2-118**~**6-2-121**.

H	6-2-118	6-2-119	6-2-120	6-2-121
3	5.95 s	6.07 s	5.95 s	6.06 br t(0.7)
1′	4.59 t(7.0)	4.71 t(7.7)	4.60 t(7.4)	2.89 br t(7.2)
2′	1.74 d	1.82 d	1.76 d	1.71 m
	2.00 ddd(14.5, 7.5, 3.8)	1.99 ddd(14.5, 7.1, 3.5)	1.99 ddd(14.2, 7.4, 3.4)	1.71 m
3′	1.00 t(7.4)	1.04 t(7.4)	0.96~1.00 m	1.07 t(7.5)
1″	3.30 dd(14.3, 6.6)	3.41 t(7.5)	3.38 dd(14.2, 7.3)	
	3.36 dd(14.3, 6.6)		3.32 dd(14.2, 7.3)	
2″	5.15 t(6.8)	5.21 t(6.9)	5.17 t(6.9)	4.59 d(6.3)
3″				5.66 d(6.3)
4″	1.68 s	1.72 s	1.72 s	
5″	1.79 s	1.82 s	1.82 s	1.42 s
6″				1.40 s
2‴	2.93 ddd(14.7, 7.3, 7.3)	3.69 dd(6.6, 6.4)	2.79 dd(15.8, 6.8)	3.17 d(6.9)
	3.01 ddd(14.7, 7.3, 7.3)		2.97 dd(15.8, 6.8)	
3‴	1.70 m	1.85 d	2.16 ddd(13.3, 6.7, 3.4)	2.29 m
		1.43 ddd(14.0, 6.9, 3.5)		
4‴	0.99 t(7.3)	0.96 t(7.3)	0.96~1.00 d	1.06 d(6.6)
5‴		1.21 d(6.6)	0.96~1.99 d	1.06 d(6.6)
7-OH	14.32 s	14.32 s	14.37 s	14.51 s

Table 6-2-35: ^{1}H NMR spectroscopic data of coumarins **6-2-122**~**6-2-125**.

H	6-2-122	6-2-123	6-2-124	6-2-125
3	6.29 br d(0.7)	6.29 br d(0.7)	6.22 d(10.0)	6.30 d(9.8)
4			8.11 d(10.4)	8.18 d(9.8)
7				
8			7.11 s	7.17 s
1′	6.49 dd(8.0, 2.5)	6.50 dd(8.0, 2.5)		
2′	1.96 ddq(14.5, 7.5, 3.0)	1.96 ddq(14.5, 7.5, 3.0)	7.54 d(2.4)	7.62 d(2.4)
	1.69 ddq(14.5, 7.5, 7.5)	1.69 ddq(14.5, 7.5, 6.0)		

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Table 6-2-35 (continued)

H	6-2-122	6-2-123	6-2-124	6-2-125
3′	1.01 t(7.5)	1.01 t(7.5)	6.95 d(2.6)	7.05 d(2.4)
1″	3.55 dd(17.0, 7.0)	3.55 dd(17.0, 7.0)	4.31 dd(8.0, 10.4)	
	3.44 dd(17.0, 7.0)	3.44 dd(17.0, 7.0)	4.74 dd(2.4, 10.0)	
2″	5.24 t(7.0)	5.24 t(7.0)	3.64 dd(2.0, 7.6)	
4″	1.83 s	1.83 s	1.20 s	
5″	1.87 s	1.88 s	α 1.71 m, β 1.93 m	
6″			1.61 m	
7″			3.22 dd(2.0, 11.2)	
9″			1.13 s	
10″			1.10 s	
2‴	3.29 t(7.0)	4.06 sept(6.5)		
3‴	1.79 sext(7.0)	1.26 d(6.5)		
4‴	1.04 t(7.0)	1.27 d(6.5)		
OMe				4.30 s
OAc	2.17 s	2.17 s		
5-OH	7.11 s	7.11 s		
7-OH	14.67 s	14.59 s		

Table 6-2-36: ^{1}H NMR spectroscopic data of coumarins **6-2-126**~**6-2-128**.

H	6-2-126	6-2-127	6-2-128	H	6-2-126	6-2-127	6-2-128
3	6.29 d(9.6)	6.02 s	5.97 s	4″	1.741 s	1.07 d(6.5)	
4	8.13 d(9.6)			5″	1.705 s	1.07 d(6.5)	
6		6.26 s		1‴			3.05 dd(8.0, 15.5)
8	7.10 s						3.32 dd(2.0, 15.0)
2′	7.625 d(2.0)	7.43 m	7.33 m	2‴			4.51 d(7.5)
3′	6.997 d(2.0)	7.56 m	7.42 m				
4′		7.56 m	7.42 m	3‴			
5′		7.56 m	7.42 m	4‴			4.94 s
6′		7.43 m	7.33 m				5.03 s
1″	4.852 d(7.2)			5‴			1.95 s
2″	3.661 t(7.2)	3.19 d(6.5)	3.99 h(7.0)	5-OH			14.29 s
3″		2.31 m	1.16 d(7.0)	7-OH		14.77 s	10.20 s

Table 6-2-37: ^{1}H NMR spectroscopic data of coumarins **6-2-129**~**6-2-132**.

H	6-2-129	6-2-130	6-2-131	6-2-132
3	5.94 s	5.97 s	5.96 s	6.01 s
2′	2.97 m	7.32 m	7.33 m	7.30 m
3′	1.65 m	7.41 m	7.41 m	7.42 m
4′	1.02 t(7.0)	7.41 m	7.41 m	7.42 m
5′		7.41 m	7.41 m	7.42 m

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Table 6-2-37 (continued)

H	6-2-129	6-2-130	6-2-131	6-2-132
6′		7.32 m	7.33 m	7.30 m
2″	3.90 m	3.84 m	3.64 m	3.58 m
3″	1.19 d(7.0)	1.15 d(6.5)	1.16 d(6.5)	1.17 d(7.0)
4″	1.44 m, 1.87 m	1.40 m, 1.80 m	1.41 m, 1.81 m	1.43 m, 1.79 m
5″	0.93 t(7.5)	0.90 t(7.5)	0.93 t(7.0)	0.91 t(7.0)
1‴	2.95~3.00 m 3.26 dd(2.0, 15.0)	2.61 dd(10.0, 15.0) 3.37 d(15.0)	3.35 m	6.22 d(6.0)
2‴	4.46 t(8.5)	3.74 dd(7.0, 8.0)	5.25 d(8.5)	5.48 d(6.0)
4‴	4.90 s, 5.00 s	1.36 s	1.36 s	1.48 s
5‴	1.91 s	1.49 s	1.36 s	1.50 s
5-OH	15.23 s	14.29 s	14.67 s	14.96 s
7-OH	10.00 s	10.26 s		

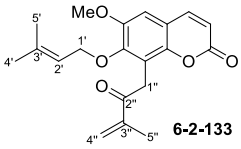
Table 6-2-38: Cos, MFs, and TSs of coumarins **6-2-133**~**6-2-162**.

No.	Compounds	MFs	Test solvents	References
6-2-133	–	$C_{20}H_{22}O_5$	$CDCl_3$	[84]
6-2-134	braylin	$C_{15}H_{14}O_4$	$CDCl_3$	[85]
6-2-135	brayleyanin	$C_{20}H_{24}O_4$	$CDCl_3$	[84]
6-2-136	6-hydroxy-7-(5′-hydroxy-3′,7′-dimethylocta-2′,6′-dien)-oxycoumarin	$C_{19}H_{22}O_5$	$CDCl_3$	[86]
6-2-137	6-hydroxy-7-(7′-hydroxy-3′,7′-dimethylocta-2′,5′-dien)-oxycoumarin	$C_{19}H_{22}O_5$	$CDCl_3$	[86]
6-2-138	isocedrelopsin	$C_{15}H_{16}O_4$	CD_3OD	[87]
6-2-139	microfolicoumarin	$C_{16}H_{18}O_4$	CD_3OD	[88]
6-2-140	3′,4′-dihydrobraylin	$C_{15}H_{16}O_4$	CD_3OD	[87]
6-2-141	cedrecoumarin A	$C_{14}H_{12}O_4$	CD_3OD	[89]
6-2-142	7-hydroxy-6-methoxy-3,8-bis (3-methyl-2-but-enyl) coumarin	$C_{20}H_{24}O_4$	$CDCl_3$	[90]
6-2-143	7-hydroxy-6-methoxy-3-(3-methyl-2-butenyl) coumarin	$C_{15}H_{16}O_4$	$CDCl_3$	[90]
6-2-144	cedrelopsin	$C_{15}H_{16}O_4$	DMSO-d_6	[91]
6-2-145	isovirgatenol	$C_{15}H_{16}O_5$	$CDCl_3$	[92]
6-2-146	3′-deoxyobtusinin	$C_{15}H_{18}O_5$	$CDCl_3$	[92]
6-2-147	6-methoxy-7-(2-hydroxyethoxy)-coumarin	$C_{12}H_{12}O_5$	$CDCl_3$	[92]
6-2-148	6-hydroxy-7-[(*E*,*E*)-3′,7′-dimethyl-2′,4′,7′-octatrienyloxy] coumarin	$C_{19}H_{20}O_4$	$CDCl_3$	[93]
6-2-149	scopoletin	$C_{10}H_8O_4$	$CDCl_3$	[63]
6-2-150	7-*O*-[4′-*O*-(3″,4″-dihydroxycinnamyl)-*β*-D-glucopyranosyl]-6-methoxycoumarin	$C_{25}H_{24}O_{12}$	DMSO-d_6	[94]
6-2-151	aesculetin-6-*O*-*β*-D-apiofuranosyl-(1→6)-*O*-*β*-D-glucopyranoside	$C_{20}H_{24}O_{13}$	CD_3OD	[95]
6-2-152	isobaisseoside	$C_{21}H_{26}O_{13}$	C_5D_5N	[96]
6-2-153	isobaisseoside-4′-*p*-coumarate	$C_{30}H_{32}O_{15}$	CD_3OD	[96]

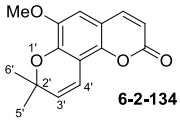
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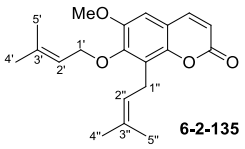
No.	Compounds	MFs	Test solvents	References
6-2-154	prionanthoside	$C_{17}H_{18}O_{10}$	DMSO-d_6	[97]
6-2-155	isoschininallylol	$C_{20}H_{24}O_5$	$CDCl_3$	[98]
6-2-156	isoschinilenol	$C_{20}H_{24}O_5$	$CDCl_3$	[99]
6-2-157	palustroside	$C_{21}H_{24}O_{13}$	DMSO-d_6	[100]
6-2-158	6-methoxy-3′,4′-dehydromurranganon acetate	$C_{18}H_{18}O_7$	$CDCl_3$	[101]
6-2-159	6-methoxy-3′,4′-dehydromurranganon 2-methylpropanoate	$C_{20}H_{22}O_7$	$CDCl_3$	[101]
6-2-160	6-methoxy-3′,4′-dehydromurranganon 3-methylbutanoate	$C_{21}H_{24}O_7$	$CDCl_3$	[101]
6-2-161	6-methoxy-3′,4′-dehydromurranganon propanoate	$C_{19}H_{20}O_7$	$CDCl_3$	[101]
6-2-162	6-methoxymurranganon acetate	$C_{18}H_{20}O_7$	$CDCl_3$	[101]



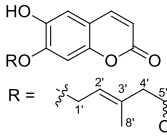
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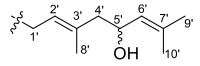
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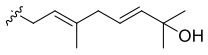
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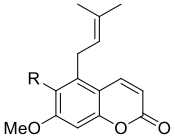


6-2-136 R =

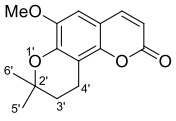


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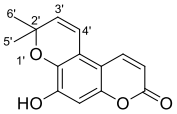




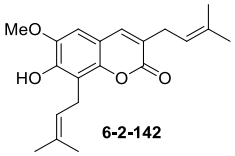
6-2-138 R = OH
6-2-139 R = OMe



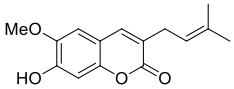
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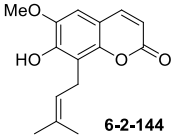
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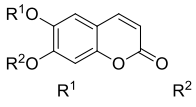
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6-2-143



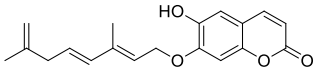
6-2-144



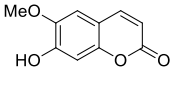
6-2-145 Me

6-2-146 Me

6-2-147 Me CH_2CH_2OH

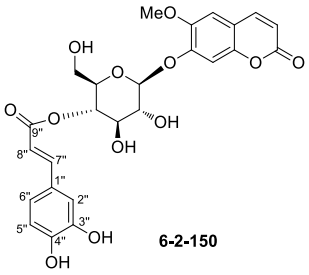


6-2-148

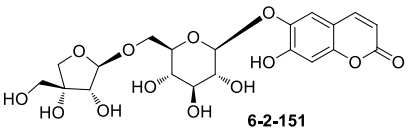


6-2-149

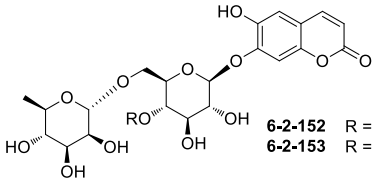
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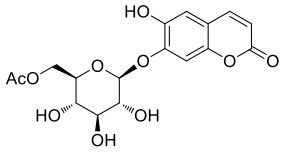
6-2-150



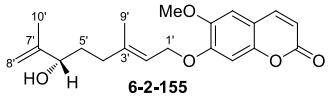
6-2-151



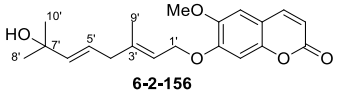
6-2-152 R = H
6-2-153 R = *E*-Coum



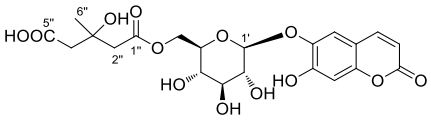
6-2-154



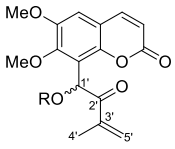
6-2-155



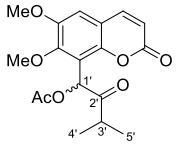
6-2-156



11-2-157



6-2-158 R = Ac
6-2-159 R = *iso*butyryl
6-2-160 R = Val
6-2-161 R = propionyl



6-2-162

Table 6-2-39: ^{1}H NMR spectroscopic data of coumarins **6-2-133**~**6-2-136**.

H	6-2-133	6-2-134	6-2-135	6-2-136
3	6.30 d(9.5)	6.19 d(9.4)	6.31 d(9.6)	6.26 d(9.5)
4	7.59 d(9.5)	7.53 d(9.4)	7.61 d(9.6)	7.59 d(9.5)

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Table 6-2-39 (continued)

H	6-2-133	6-2-134	6-2-135	6-2-136
5	6.86 s	6.73 s	6.78 s	6.95 s
8				6.80 s
1′	4.53 d(7.5)		4.58 d(7.2)	4.66 d(6.3)
2′	5.39 br t(7.5)		5.54 qt(7.2, 1.2)	5.59 t(6.3)
3′		5.69 d(10.0)		
4′	1.72 d(1.5)	6.81 d(10.0)	1.77 s	2.26 m
5′	1.78 br s	1.47 s	1.70 s	4.54 m
6′		1.47 s		5.18 d(8.0)
8′				1.70 s
9′				1.82 s
10′				1.70 s
1″	4.30 s		3.57 d(6.9)	
2″			5.22 qt(6.9, 1.5)	
4″	6.16 s, 5.86 q(1.5)		1.84 s	
5″	1.92 br s		1.66 s	
OMe	3.88 s	3.83 s	3.89 s	

Table 6-2-40: ^{1}H NMR spectroscopic data of coumarins **6-2-137**~**6-2-140**.

H	6-2-137	6-2-138	6-2-139	6-2-140
3	6.28 d(9.5)	6.25 d(9.7)	6.25 d(9.8)	6.23 d(9.6)
4	7.59 d(9.5)	8.00 d(9.7)	7.75 d(9.8)	7.87 d(9.6)
5	6.96 s			7.01 s
8	6.82 s	6.85 s	6.72 s	
1′	4.67 d(6.8)	3.60 d(6.5)	3.55 d(6.6)	
2′	5.50 t(6.8)	5.09 t(6.5)	5.02 t(6.6)	
3′				1.91 t(6.9)
4′	2.78 d(5.5)	1.67 s	1.80 s	2.93 t(6.9)
5′	5.61 td(15.5, 5.5)	1.82 s	1.67 s	1.39 s
6′	5.70 d(15.5)			1.39 s
8′	1.76 s			
9′	1.32 s			
10′	1.32 s			
OMe		3.95 s	3.77 s(6-OMe)	3.85 s
OMe			3.90 s(7-OMe)	

Table 6-2-41: ^{1}H NMR spectroscopic data of coumarins **6-2-141**~**6-2-144**.

H	6-2-141	6-2-142	6-2-143	6-2-144
3	6.19 d(9.7)			6.22 d(9.4)
4	8.08 d(9.7)	7.30 s	7.31 s	7.90 d(9.4)
5		6.67 s	6.85 s	7.13 s

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Table 6-2-41 (continued)

H	6-2-141	6-2-142	6-2-143	6-2-144
8	6.63 s		6.78 s	
1′		3.20 d(7.2)	3.17 d(7.2)	3.41 d(7.2)
2′		5.27 m	5.26 m	5.17 t(7.2, 1.4)
3′	5.90 d(10.0)			
4′	6.79 d(10.0)	1.78 s	1.76 s	1.78 br s
5′	1.43 s	1.67 s	1.64 s	1.63 br s
6′	1.43 s			
1″		3.54 d(7.2)		
2″		5.27 m		
4″		1.82 s		
5″		1.65 s		
OMe		3.89 s	3.90 s	3.85 s
OH		6.07 s		9.73 s

Table 6-2-42: ^{1}H NMR spectroscopic data of coumarins **6-2-145**~**6-2-148**.

H	6-2-145	6-2-146	6-2-147	6-2-148
3	6.28 d(9.5)	6.28 d(9.5)	6.28 d(9.5)	6.28 d(9.5)
4	7.59 br d(9)	7.60 br d(9.5)	7.59 d(9.5)	7.59 d(9.5)
5	6.86 s	6.84 br s	6.85 s	6.97 s
8	6.84 br s	6.84 br s	6.85 s	6.83 s
1′	4.27 m	4.12 dd(9.5, 2.7), 3.95 dd(9.5, 8)	4.02 t(4.5)	4.69 d(6.7)
2′	4.76 t(7)	3.81 m	4.16 t(4.5)	5.52 dt(6.7, 1.2)
3′		1.87 sept(6.8)		
4′	5.18 br s, 5.07 t(1.5)	1.03 d(6.8)		6.19 d(15.6)
5′	1.88 s	0.99 d(6.8)		5.63 dt(15.6, 7.1)
6′				2.83 d(7.1)
8′				4.92 br s
9′				1.85 s
10′				1.72 s
OMe	3.87 s	3.87 s	3.89 s	
OH	2.34 br			

Table 6-2-43: ^{1}H NMR spectroscopic data of coumarins **6-2-149**~**6-2-152**.

H	6-2-149	6-2-150	6-2-151	6-2-152
3	6.19 d(9.4)	6.33 d(10.0)	6.17 d(9.5)	6.27 d(9.5)
4	7.60 d(9.4)	7.96 d(10.0)	7.89 d(9.5)	7.61 d(9.5)
5	6.92 s	7.31 s	7.39 s	7.23 s
8	6.85 s	7.19 s	6.77 s	7.72 s
1′		5.23 d(7.0)	4.81 d(7.7)	5.62 d(7.5)

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Table 6-2-43 (continued)

H	6-2-149	6-2-150	6-2-151	6-2-152
2′		3.42 m		4.38 m
3′		3.59 m		4.37 m
4′		4.75 t		4.08 m
5′		3.79 m		4.23 m
6′		3.42 m, 3.33 m		4.10 m, 4.39 m
1″			5.01 d(2.6)	5.45 s
2″		7.05 d(1.5)		4.67 m
3″				4.76 d(9.0)
4″				4.29 m
5″		6.76 d(8.0)		4.34 m
6″		7.02 dd(8.0, 1.5)		1.62 d(6.0)
7″		7.49 d(15.5)		
8″		6.28 d(15.5)		
OMe	3.95 s			

Table 6-2-44: ^{1}H NMR spectroscopic data of coumarins **6-2-153**~**6-2-156**.

H	6-2-153	6-2-154	6-2-155	6-2-156
3	6.30 d(9.5)	6.30 d(9.6)	6.27 d(9.5)	6.28 d(9.6)
4	7.86 d(9.5)	7.9 d(9.6)	7.61 d(9.5)	7.62 d(9.6)
5	7.02 s	7.00 s	6.82 s	6.85 s
8	7.31 s	7.09 s	6.79 s	6.83 s
1′	5.00 d(7.7)	5.00 d(7.8)	4.67 d(6.4)	4.69 d(6.4)
2′	3.70 m	3.34 t(7.2, 6.0)	5.49 t(6.4)	5.51 br t(6.4)
3′	3.52 m	3.37 t(7.2, 6.0)		
4′	4.97 t(9.0)	3.15 t(6.0, 7.2)	2.11 m	2.77 d(6.4)
5′	3.64 m	3.75 m	1.66 m	5.60 dt(15.6, 6.4)
6′	3.33 m, 3.57 m	4.09 d(11.1), 4.34 d(11.1)	4.02 t(6.5)	5.67 d(15.6)
8′			4.90 s, 4.81 s	1.31 s
9′			1.75 s	1.76 s
10′			1.70 s	1.31 s
1″	4.67 s			
2″	3.92 m			
3″	4.00 m			
4″	3.43 m			
5″	3.69 m			
6″	1.17 d(6.2)			
2‴	7.49 d(8.6)			
3‴	6.82 d(8.6)			
5‴	6.82 d(8.6)			
6‴	7.49 d(8.6)			
7‴	7.71 d(15.9)			
8‴	6.40 d(15.9)			
OMe			3.88 s	3.91 s
OAc		2.03 s		
OH		9.50		

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Table 6-2-45: ^{1}H NMR spectroscopic data of coumarins **6-2-157**~**6-2-159**.

H	6-2-157	6-2-158	6-2-159	H	6-2-157	6-2-158	6-2-159
3	6.16 d(9.5)	6.32 d(9.5)	6.38 d(9.5)	6′	4.43 dd(11.8, 2.3) 4.12 dd(11.8, 6.6)		
4	7.81 d(9.5)	7.64 d(9.5)	7.65 d(9.5)	2″	2.52 (ov)		2.67 sept(7.1)
5	6.78 s	6.99 s	6.97 s	3″			1.20 d(7.1)
8	7.30 s			4″	2.60~2.65, AB(14.4)		1.29 d(7.1)
1′	4.76 d(7.3)	7.18 s	7.22 s	6″	1.29 s		
2′	3.00~3.70 m			OMe		3.79 s(7-OMe)	3.83 s
3′	3.00~3.70 m					3.87 s(6-OMe)	3.91 s
4′	3.00~3.70 m	1.83 br s	1.90 br s	OAc		2.13 s	
5′	3.00~3.70 m	5.52 br s 5.56 br s	5.57 br s 5.60 br s				

Table 6-2-46: ^{1}H NMR spectroscopic data of coumarins **6-2-160**~**6-2-162**.

H	6-2-160	6-2-161	6-2-162	H	6-2-160	6-2-161	6-2-162
3	6.38 d(9.5)	6.38 d(9.5)	6.36 d	2″	2.26 dd(14.6, 6.8) 2.36 dd(14.6, 6.8)	2.47 q(7.5)	
4	7.63 d(9.5)	7.63 d(9.5)	7.64 d	3″	2.19 m	1.20 t(7.5)	
5	6.96 s	6.96 s	6.92 s	4″	1.00 d(6.5)		
1′	7.24 s	7.25 s	7.24 s	5″	1.01 d(6.5)		
3′			2.88 m	OMe	3.83 s	3.83 s	3.90 s
4′	1.90 br s	1.90 br s	1.06 d(6.9)		3.90 s	3.91 s	3.92 s
5′	5.57 br s 5.61 br s	5.58 br s 5.61 br s	1.18 d(6.9)	OAc			2.17 s

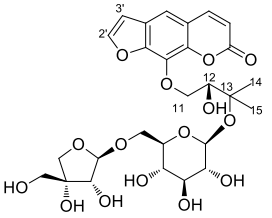
Table 6-2-47: Cos, MFs, and TSs of coumarins **6-2-163**~**6-2-195**.

No.	Compounds	MFs	Test solvents	References
6-2-163	13-*O*-[*β*-D-apiofuranosyl(1→6)-*β*-D-glucopyranosyl]-(12*R*)-heraclenol	$C_{27}H_{34}O_{15}$	C_5D_5N	[102]
6-2-164	8-[3-(2,4-benzenediol)-propionic acid methyl ester]-coumarin-7-*β*-D-glucoside	$C_{25}H_{26}O_{12}$	DMSO-d_6	[103]
6-2-165	phebaclavin I	$C_{15}H_{16}O_5$	$CDCl_3$	[104]
6-2-166	imperatorin	$C_{16}H_{14}O_4$	$CDCl_3$	[105]
6-2-167	8-geranyloxypsoralen	$C_{21}H_{22}O_4$	$CDCl_3$	[105]
6-2-168	heraclenin	$C_{16}H_{14}O_5$	$CDCl_3$	[105]
6-2-169	heraclenol	$C_{16}H_{14}O_4$	C_5D_5N	[102]
6-2-170	phebaclavin A	$C_{16}H_{16}O_6$	$CDCl_3$	[106]
6-2-171	phebaclavin B	$C_{16}H_{16}O_6$	$CDCl_3$	[106]
6-2-172	phebaclavin D	$C_{16}H_{16}O_7$	$CDCl_3$	[106]
6-2-173	phebaclavin E	$C_{16}H_{16}O_7$	$CDCl_3$	[106]
6-2-174	phebaclavin F	$C_{15}H_{14}O_7$	CD_3OD	[106]
6-2-175	phebaclavin G	$C_{16}H_{16}O_7$	$CDCl_3$	[106]
6-2-176	phebaclavin H	$C_{16}H_{16}O_7$	$CDCl_3$	[106]

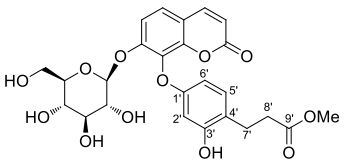
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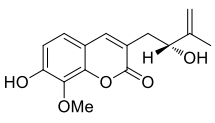
No.	Compounds	MFs	Test solvents	References
6-2-177	7,8-dihydroxy-3-(3-hydroxy-4-oxo-4*H*-pyran-2-yl)-2*H*-chromen-2-one	$C_{14}H_8O_7$	DMSO-d_6	[107]
6-2-178	8-methoxypeucedanin	$C_{16}H_{16}O_5$	$CDCl_3$	[108]
6-2-179	stenocarpin isobutyrate	$C_{16}H_{16}O_7$	$CDCl_3$	[108]
6-2-180	7-*O*-(6′-acetoxy-*β*-D-glucopyranosyl)-8-hydroxycoumarin	$C_{17}H_{18}O_{10}$	CD_3OD	[109]
6-2-181	methylschinilenol	$C_{21}H_{27}O_5$	$CDCl_3$	[99]
6-2-182	hydroxyepoxycollinin	$C_{20}H_{24}O_6$	$CDCl_3$	[99]
6-2-183	8-methoxyanisocoumarin H	$C_{20}H_{24}O_5$	$CDCl_3$	[99]
6-2-184	hydroxyschininallylol	$C_{20}H_{24}O_6$	$CDCl_3$	[99]
6-2-185	hydroxyepoxycollinin II	$C_{20}H_{24}O_6$	$CDCl_3$	[99]
6-2-186	schinitrienin	$C_{20}H_{22}O_4$	$CDCl_3$	[99]
6-2-187	schininallylone	$C_{20}H_{22}O_5$	$CDCl_3$	[99]
6-2-188	clauslactone R	$C_{20}H_{20}O_7$	CD_3COCD_3	[110]
6-2-189	clauslactone T	$C_{19}H_{18}O_7$	CD_3OD	[110]
6-2-190	skimminan	$C_{20}H_{26}O_{11}$	DMSO-d_6	[111]
6-2-191	xanthotoxin	$C_{12}H_8O_4$	$CDCl_3$	[112]
6-2-192	pabularin A	$C_{28}H_{30}O_{13}$	CD_3OD	[113]
6-2-193	pabularin C	$C_{28}H_{30}O_{13}$	CD_3OD	[113]
6-2-194	3-(1′,1′-dimethylallyl)-7-hydroxy-8-methoxy-2*H*-1-benzopyran-2-one	$C_{15}H_{16}O_4$	$CDCl_3$	[62]
6-2-195	3″-*O*-*β*-D-glucopyranosyl-(2″*R*)-heraclenol	$C_{22}H_{26}O_{11}$	C_5D_5N	[64]



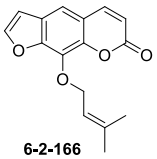
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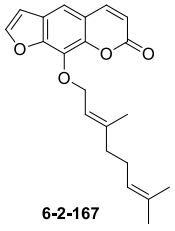
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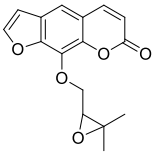
6-2-165



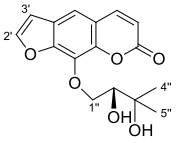
6-2-166



6-2-167

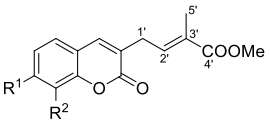


6-2-168

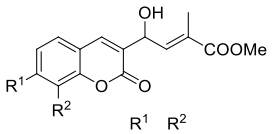


6-2-169

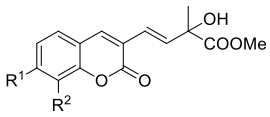
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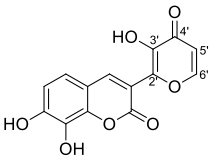
	R^1	R^2
6-2-170	OMe	OH
6-2-171	OH	OMe



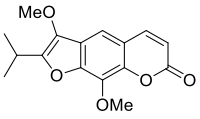
	R^1	R^2
6-2-172	OMe	OH
6-2-173	OH	OMe
6-2-174	OH	OH



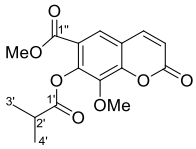
	R^1	R^2
6-2-175	OMe	OH
6-2-176	OH	OMe



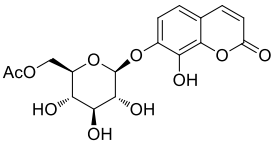
6-2-177



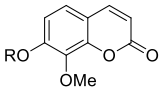
6-2-178



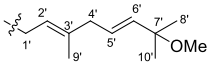
6-2-179



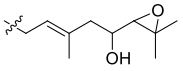
6-2-180



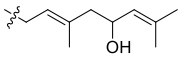
6-2-181 R =

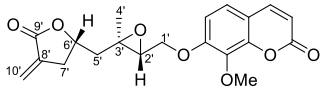


6-2-182 R =

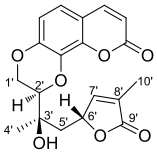


6-2-183 R =



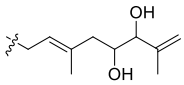


6-2-188

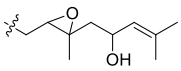


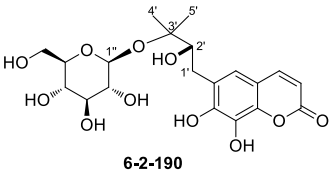
6-2-189

2-2-184 R =



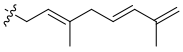
6-2-185 R =



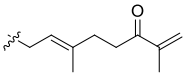


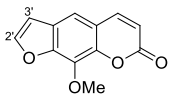
6-2-190

6-2-186 R =



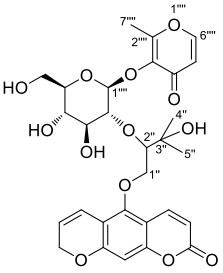
6-2-187 R =



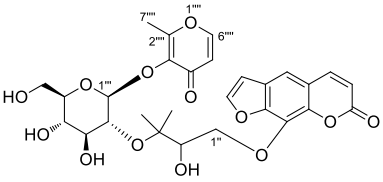


6-2-191

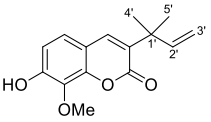
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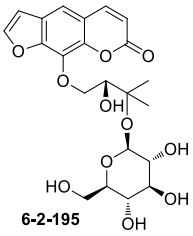
6-2-192



6-2-193



6-2-194



6-2-195

Table 6-2-48: ^{1}H NMR spectroscopic data of coumarins **6-2-163**~**6-2-166**.

H	6-2-163	6-2-164	6-2-165	6-2-166
3	6.40 d(9.6)	6.35 d(9.0)		6.38 d(9.3)
4	7.82 d(9.6)	8.05 d(9.0)	7.55 s	7.77 d(9.3)
5	7.58 s	7.58 d(8.9)	7.09 d(8.6)	7.36 s
6		7.29 d(8.9)	6.90 d(8.6)	
11	5.07 dd(1.8, 10.0)			
	4.98 dd(7.7, 10.0)			
12	4.63 dd(7.7, 1.8)			
14	1.64 s			
15	1.69 s			
1′			2.68 dd(8.5, 14.3)	
			4.41 dd(3.8, 8.5)	
2′	7.84 d(2.1)	6.34 d(3.0)	2.90 dd(3.8, 14.3)	7.69 d(2.4)
3′	6.85 d(2.1)			6.81 d(2.4)
4′			5.04 s, 4.89 s	
5′		6.94 d(9.0)	1.83 s	
6′		6.29 dd(9.0, 3.0)		
7′		2.70 m		
8′		2.50 m		
1″	5.16 d(7.8)	5.06 d(7.5)		5.01 d(7.2)
2″	3.97 (ov)	3.16 d(7.5)		5.61 t(7.3)
3″	4.20 m	3.25 m		
4″	3.95 (ov)	3.12 m		1.72 s
5″	4.05 m	3.35 m		1.74 s
6″	4.67 d(10.0)	3.68 d(11.1)		
	4.09 d(10.0)	3.45 dd(12.0, 6.0)		

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Table 6-2-48 (continued)

H	6-2-163	6-2-164	6-2-165	6-2-166
1‴	5.74 d(1.0)			
2‴	4.72 d(1.0)			
4‴	4.55 d(9.2), 4.33 d(9.2)			
5‴	4.16 s			
OMe		3.56 s	4.13 s	
OH		9.42 s		

Table 6-2-49: ^{1}H NMR spectroscopic data of coumarins **6-2-167**~**6-2-170**.

H	6-2-167	6-2-168	6-2-169	6-2-170
3	6.37 d(9.6)	6.37 d(9.3)	6.38 d(9.8)	
4	7.77 d(9.6)	7.79 d(9.6)	7.76 d(9.8)	7.40 s
5	7.36 s	7.36 s	7.39 s	6.97 d(8.5)
6				6.85 d(8.5)
1′				3.43 d(7.5)
2′	7.69 d(2.1)	7.71 d(2.4)	7.72 d(2.2)	6.91 tq(7.5, 1.0)
3′	6.81 d(2.1)	6.81 d(2.4)	6.63 d(2.2)	
5′				1.95 d(1.0)
1″	5.04 m	4.60 t(5.4)	4.75 dd(10.2, 2.5)	
			4.42 dd(10.2, 7.8)	
2″	5.61 t(7.3)	3.34 t(5.5)	3.88 dd(7.8, 2.6)	
3″	1.69 s			
4″	2.03 d(3.0)	1.35 s	1.34 s	
5″	2.03 d(3.0)	1.29 s	1.28 s	
6″	5.04 m			
7″	1.56 s			
8″	1.63 s			
OMe				3.98 s
COOMe				3.77 s
OH			3.62 br s, 2.79 br s	

Table 6-2-50: ^{1}H NMR spectroscopic data of coumarins **6-2-171**~**6-2-174**.

H	6-2-171	6-2-172	6-2-173	6-2-174
4	7.41 s	7.66 s	7.65 s	7.63 s
5	7.08 d(8.5)	7.04 d(8.5)	7.15 d(8.5)	7.32 d(8.5)
6	6.91 d(8.5)	6.88 d(8.5)	6.93 d(8.5)	6.85 d(8.5)
1′	3.43 d(7.5)	5.55 br d(8.5)	5.54 br d(8.5)	5.54 br d(8.5)
2′	6.90 tq(7.5, 1.0)	6.84 dq(8.5, 1.0)	6.84 dq(8.5, 1.0)	6.80 dq(8.5, 1.0)
5′	1.96 d(1.0)	1.98 d(1.0)	2.00 d(1.0)	1.98 s
OMe	4.12 s	3.99 s	4.12 s	
COOMe	3.78 s	3.76 s	3.77 s	3.77 s

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Table 6-2-51: ^{1}H NMR spectroscopic data of coumarins **6-2-175**~**6-2-178**.

H	6-2-175	6-2-176	6-2-177	6-2-178
3				6.34 d(9.7)
4	7.61 s	7.60 s	7.23 s	7.74 d(9.7)
5	7.02 d(8.5)	7.12 d(8.5)	6.70 d(8.4)	7.22 s
6	6.87 d(8.5)	6.90 d(8.5)	7.02 d(8.4)	
1′	6.73 d(6.0)	6.73 d(16.0)		
2′	6.97 d(16.0)	6.95 d(16.0)		
5′	1.60 s	1.60 s	6.62 d(5.4)	
6′			8.27 d(5.4)	
1″				3.25 sept(7.0)
2″				1.35 d(7.0)
3″				1.35 d(7.0)
OMe	3.99 s	4.12 s		4.26 s(8-OMe)
				3.91 s(6-OMe)
COOMe	3.83 s	3.84 s		
OH			12.80 br s(3′-OH)	
			10.30 br s(7-OH)	
			9.68 br s(8-OH)	

Table 6-2-52: ^{1}H NMR spectroscopic data of coumarins **6-2-179**~**6-2-182**.

H	6-2-179	6-2-180	6-2-181	6-2-182
3	6.43 d(9.8)	6.31 d(9.5)	6.26 d(9.6)	6.26 d(9.6)
4	7.68 d(9.8)	7.86 d(9.5)	7.61 d(9.6)	7.62 d(9.6)
5	7.89 s	7.07 d(8.5)	7.14 d(8.4)	7.14 d(8.8)
6		7.15 d(8.5)	6.86 d(8.4)	6.86 d(8.8)
1′		4.97 d(7.5)	4.70 d(6.2)	4.70 d(6.6)
2′	2.93 sept(7.0)	3.60 m	5.52 t(6.2)	5.64 t(6.6)
3′	1.37 d(7.0)	3.55 m		
4′	1.37 d(7.0)	3.44 m	2.80 d(6.0)	2.30 dd(13.6, 6.6)
				2.39 dd(13.6, 7.8)
5′		3.72 m	5.54 m	3.65 m
6′		4.46 dd(11.9, 2.0)	5.47 d(16.0)	2.73 d(8.0)
		4.28 dd(11.9, 6.4)		
7′			3.14 s(OMe)	
8′			1.25 s	1.31 br s
9′			1.74 br s	1.82 s
10′			1.25 s	1.32 s
8-OMe	3.86 s		3.98 s	3.98 s
1″-OMe	3.99 s			
Ac		1.95 s		
OH				2.06 br s

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Table 6-2-53: ^{1}H NMR spectroscopic data of coumarins **6-2-183**~**6-2-186**.

H	6-2-183	6-2-184	6-2-185	6-2-186
3	6.26 d(9.6)	6.26 d(9.6)	6.29 d(9.6)	6.26 d(9.6)
4	7.61 d(9.6)	7.62 d(9.6)	7.63 d(9.6)	7.62 d(9.6)
5	7.14 d(8.4)	7.14 d(8.6)	7.18 d(8.6)	7.14 d(8.6)
6	6.85 d(8.4)	6.86 d(8.6)	6.89 d(8.6)	6.86 d(8.6)
1′	4.71 d(6.4)	4.72 d(6.4)	4.05 dd(9.4, 7.2), 4.34 dd(9.4, 4.8)	4.70 d(6.4)
2′	5.59 br t(6.4)	5.63 br t(6.4)	4.18 dd(7.2, 4.8)	5.55 br t(6.4)
4′	2.21 dd(13.8, 5.0) 2.23 dd(13.8, 5.0)	2.18 dd(14.2, 9.8) 2.32 br d(14.2)	1.98 dd(12.6, 8.0) 2.28 dd(12.6, 7.2)	2.85 d(7.2)
5′	4.51 ddd(8.4, 8.0, 5.0)	3.86 m	4.86 ddd(8.8, 8.0, 7.2)	5.62 dt(15.6, 7.2)
6′	5.17 dt(8.4, 1.6)	4.16 br t(3.6)	5.37 dt(8.8, 1.2)	6.17 d(15.6)
8′	1.71 d(1.2)	5.00 br s, 5.07 br s	1.75 d(1.6)	4.89 br s, 4.91 br s
9′	1.81 s	1.81 s	1.41 s	1.76 br s
10′	1.69 d(1.2)	1.78 s	1.69 d(1.2)	1.31 s
OMe	3.98 s	3.98 s	4.00 s	3.99 s
OH	1.50 br s(5′-OH)	2.07 br s(5′-OH), 1.95 br s(6′-OH)	2.55 br s(5′-OH)	

Table 6-2-54: ^{1}H NMR spectroscopic data of coumarins **6-2-187**~**6-2-191**.

H	6-2-187	6-2-188	6-2-189	6-2-190	6-2-191
3	6.26 d(9.6)	6.25 d(9.6)	6.23 d(9.6)	6.19 d(9.5)	6.35 d(9.5)
4	7.62 d(9.6)	7.88 d(9.6)	7.82 d(9.6)	7.90 d(9.5)	7.75 d(9.5)
5	7.14 d(8.8)	7.36 d(8.7)	7.07 d(8.8)	6.99 s	7.34 s
6	6.85 d(8.8)	7.14 d(8.7)	6.84 d(8.8)		
1′	4.70 d(6.4)	4.54 dd(11.5, 3.4) 4.20 dd(11.5, 6.6)	4.64 dd(11.2, 2.0) 4.13 dd(11.2, 9.0)	3.38 dd(8.5, 14) 3.18 dd(9, 14)	
2′	5.50 br t(6.4)	3.25 dd(6.6, 3.4)	4.03 dd(9.0, 2.0)	4.78 dd(3, 9)	7.67 d(2.4)
3′					6.82 d(2.4)
4′	2.39 t(7.6)	1.50 s	1.44 s	1.28 s	
5′	2.84 t(7.6)	1.88~2.00 m	2.09 dd(14.9, 3.9) 1.92 dd(14.9, 9.5)	1.24 s	
6′		4.76~4.83 m	5.29~5.31 m		
7′		3.18 ddt(17.2, 7.6, 2.5) 2.66~2.72 m	7.31~7.32 m		
8′	5.78 br s, 5.97 br s				
9′	1.77 br s				
10′	1.87 br s	6.08 t(2.5), 5.66 t(2.5)	1.86 d(1.6)		
1″				4.45 d(8)	
2″				2.88 dd(5, 8.5)	
3″				3.17 t(9.5)	
4″				3.05 d(9.5)	

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Table 6-2-54 (continued)

H	6-2-187	6-2-188	6-2-189	6-2-190	6-2-191
5″				4.03 ddd(5, 9.5)	
6″				3.34 dd(5, 10.5)	
				3.38 dd(2, 10.5)	
OMe	3.98 s	3.92 s			4.30 s

Table 6-2-55: ^{1}H NMR spectroscopic data of coumarins **6-2-192**~**6-2-195**.

H	6-2-192	6-2-193	6-2-194	6-2-195
3	6.07 d(9.8)	6.29 d(9.6)		6.40 d(9.5)
4	8.28 d(9.8)	7.94 d(9.6)	7.50 s	7.79 d(9.5)
5		7.48 s	7.06 d(8)	7.36 s
6			6.86 d(8)	
8	7.08 s			
2′	7.66 d(2.3)	7.82 d(2.2)	6.17 dd(11, 17)	7.82 d(2.0)
3′	7.11 d(2.3)	6.87 d(2.2)	5.09 dd(1, 17)	6.85 d(2.0)
			5.10 dd(1, 11)	
4′			1.48 s	
5′			1.48 s	
1″	4.77 m	4.62 dd(10.5, 2.6)		5.10 dd(2.3, 9.9)
	4.27 dd(10.3, 8.4)	4.36 dd(10.5, 8.2)		5.00 dd(7.7, 9.9)
2″	3.79 dd(13.6, 8.4)	3.83 dd(8.2, 2.6)		4.68 m
4″	1.25 s	1.17 s		1.66 s
5″	1.22 s	1.12 s		1.68 s
1‴	4.68 d(7.5)	4.68 d(7.6)		5.22 d(7.8)
2‴	3.36 dd(9.6, 7.5)	3.25 m		4.00 t(8.0)
3‴	3.03~3.25 m	3.21~3.28 m		4.35 m
4‴	3.03~3.25 m	3.21~3.28 m		3.95 br s
5‴	3.03~3.25 m	3.21~3.28 m		4.24 (ov)
6‴	3.67 dd(11.9, 2.3)	3.65 dd(11.8, 5.5)		4.50 d(11.6)
	3.49 dd(11.9, 5.8)	3.51 m		4.24 (ov)
5⁗	6.25 d(5.6)	6.25 d(5.6)		
6⁗	7.85 d(5.6)	7.75 d(5.6)		
7⁗	2.20 s	2.23 s		
OMe			4.12 s	

Table 6-2-56: Cos, MFs, and TSs of coumarins **6-2-196**~**6-2-201**.

No.	Compounds	MFs	Test solvents	References
6-2-196	pestalasin A	$C_{14}H_{16}O_5$	$CDCl_3$	[114]
6-2-197	pestalasin B	$C_{14}H_{16}O_6$	CD_3COCD_3	[114]
6-2-198	pestalasin C	$C_{14}H_{16}O_6$	$CDCl_3$-CD_3OD	[114]
6-2-199	pestalasin D	$C_{13}H_{14}O_6$	CD_3COCD_3	[114]
6-2-200	pestalasin E	$C_{11}H_{10}O_5$	CD_3COCD_3	[114]
6-2-201	3-hydroxymethyl-6,8-dimethoxycoumarin	$C_{12}H_{12}O_5$	$CDCl_3$	[114]

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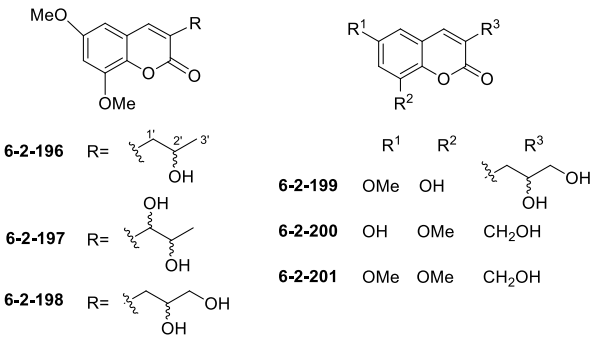


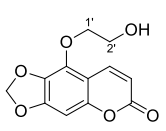
Table 6-2-57: ^{1}H NMR spectroscopic data of coumarins **6-2-196**~**6-2-201**.

H	6-2-196	6-2-197	6-2-198	6-2-199	6-2-200	6-2-201
4	7.52 s	7.94 s	7.53 s	7.72 s	7.79 s	7.67 s
5	6.43 d(2.6)	6.69 d(2.6)	6.37 d(2.6)	6.64 d(2.85)	6.64 d(2.5)	6.48 d(2.5)
7	6.64 d(2.6)	6.83 d(2.6)	6.54 d(2.6)	6.68 d(2.85)	6.75 d(2.5)	6.65 d(2.5)
1′	2.55 dd(8.0, 14.0)	4.59 d(7.0)	2.48 dd(8.2, 14.2)	2.51 dd(9.0, 13.55)	4.49 s	4.62 s
	2.71 dd(3.3, 14.0)		2.67 dd(4.2, 14.2)	2.80 m		
2′	4.15 m	4.1 m	3.83 m	3.91 m		
3′	1.27 d(6.2)	1.25 d(6.3)	3.38 dd(6.2, 11.4)	3.52 d(6.3)		
			3.48 dd(4.0, 11.4)	3.50 d(5.05)		
OMe	3.82 s, 3.92 s	3.88 s, 3.96 s	3.81 s, 3.89 s	3.80 s	3.91 s	3.84 s, 3.94 s

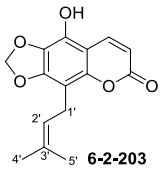
Table 6-2-58: Cos, MFs, and TSs of coumarins **6-2-202**~**6-2-211**.

No.	Compounds	MFs	Test solvents	References
6-2-202	5-(2′-hydroxyethoxy)-6,7-methylenedioxycoumarin	$C_{12}H_{10}O_6$	$CDCl_3$	[92]
6-2-203	5-hydroxy-6,7-methylenedioxy-8-(3,3-dimethylallyl)-coumarin	$C_{15}H_{14}O_5$	C_6D_6	[92]
6-2-204	5,6,7-trimethoxycoumarin	$C_{12}H_{12}O_5$	DMSO-d_6	[115]
6-2-205	yunngnin A	$C_{12}H_{10}O_6$	$CDCl_3$	[116]
6-2-206	5,7-dihydroxy-6-methoxy-8-(3-methyl-2-butenyl)-coumarin	$C_{15}H_{16}O_5$	CD_3OD	[117]
6-2-207	5-hydroxy-6-methoxy-7-prenyloxy-coumarin	$C_{15}H_{18}O_7$	$CDCl_3$	[118]
6-2-208	–	$C_{19}H_{22}O_9$	$CDCl_3$	[118]
6-2-209	5,6-dimethoxy-7-prenyloxy-coumarin	$C_{16}H_{18}O_7$	$CDCl_3$	[118]
6-2-210	6-hydroxy-5,7-dimethoxy-2*H*-benzopyran-2-one	$C_{11}H_{10}O_5$	CD_3COCD_3	[119]
6-2-211	7-acetoxy-5,6-dimethoxy-2*H*-benzopyran-2-one	$C_{13}H_{12}O_6$	CD_3COCD_3	[119]

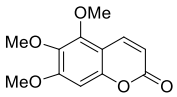
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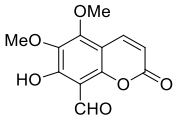
6-2-202



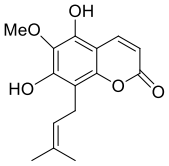
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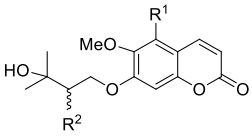
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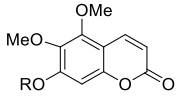
6-2-205



6-2-206



	R^1	R^2
6-2-207	OH	OH
6-2-208	OAc	OAc
6-2-209	OMe	OH



6-2-210 R = H
6-2-211 R = Ac

Table 6-2-59: ^{1}H NMR spectroscopic data of coumarins **6-2-202**~**6-2-206**.

H	6-2-202	6-2-203	6-2-204	6-2-205	6-2-206
3	6.22 d(9.5)	5.85 d(9.5)	6.24 d(9.6)	6.27 d(9.8)	6.15 d(9.7)
4	7.94 br d(9.5)	7.33 d(9.5)	7.94 d(9.6)	7.95 d(9.5)	7.95 d(9.7)
8	6.55 br s		6.61 s		
1′	3.95 t(5)	3.47 br d(7.5)			3.53 br d(6.5)
2′	4.55 t(5)	5.48 t quint(7, 1.5)			5.06 m
3′					
4′		1.83 s			1.82 s
5′		1.61 s			1.68 s
OMe			4.04 s(5-OMe)	4.24 s(5-OMe)	3.81 s
			3.92 s(6-OMe)	3.90 s(6-OMe)	
			3.86 s(7-OMe)		
CHO				10.43 s	
OCH_2O	6.00 s	5.06 s			
OH				12.74 s(7-OH)	

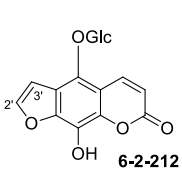
Table 6-2-60: ^{1}H NMR spectroscopic data of coumarins **6-2-207**~**6-2-211**.

H	6-2-207	6-2-208	6-2-209	6-2-210	6-2-211
3	6.23 d	6.17 d	6.29 d	6.13 d(9.7)	6.38 d(9.7)
4	7.97 d	7.86 d	7.62 d	7.97 d(9.7)	8.09 d(9.7)
8	6.43 s	6.55 s	6.77 s	6.59 s	6.93 s
1′	4.35 dd	4.20 dd	4.30 m		
2′	4.10 dd	4.04 dd	4.20 m		
4′	1.39 s	1.26 s	1.33 s		
5′	1.35 s	1.19 s	1.30 s		
OMe	4.07 s	3.79 s	3.78 s	3.86 s, 4.01 s	3.85 s, 4.03 s
OAc			2.03 s, 2.11 s		2.35 s
			2.12 s		

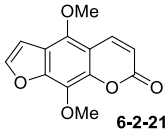
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Table 6-2-61: Cos, MFs, and TSs of coumarins **6-2-212**~**6-2-221**.

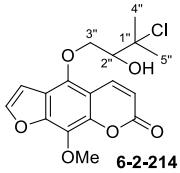
No.	Compounds	MFs	Test solvents	References
6-2-212	8-hydroxy-5-*O*-*β*-D-glucosylpsoralen	$C_{17}H_{16}O_{10}$	C_5D_5N	[64]
6-2-213	isopimpinellin	$C_{13}H_{10}O_5$	$CDCl_3$	[120]
6-2-214	5-*O*-(3-chloro-2-hydroxy-3-methylbutyl)-8-meth-oxypsoralen	$C_{17}H_{17}ClO_6$	$CDCl_3$	[121]
6-2-215	5,7,8-trihydroxycoumarin-5-*β*-(6-*O*-malonyl-gluco-pyranoside)	$C_{18}H_{18}O_{13}$	DMSO-d_6	[122]
6-2-216	7,8-dihydroxy-5-methoxycoumarin-7-*β*-sophoroside	$C_{22}H_{28}O_{15}$	DMSO-d_6	[122]
6-2-217	9-(2-hydroxy-3-methoxy-butoxy)bergapten	$C_{18}H_{20}O_7$	$CDCl_3$	[123]
6-2-218	9-[(3,3-dimethyloxiran-2-yl)methoxy]-4-(3-methyl-but-2-enyloxy)-7*H*-furo[3,2-*g*]chromen-7-one	$C_{21}H_{22}O_6$	$CDCl_3$	[124]
6-2-219	byakangelicol	$C_{17}H_{16}O_6$	$CDCl_3$	[124]
6-2-220	isoimperatorin	$C_{16}H_{14}O_5$	$CDCl_3$	[112]
6-2-221	phellopterin	$C_{17}H_{16}O_5$	$CDCl_3$	[112]



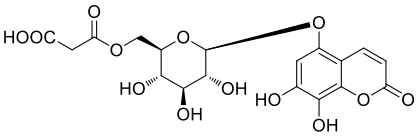
6-2-212



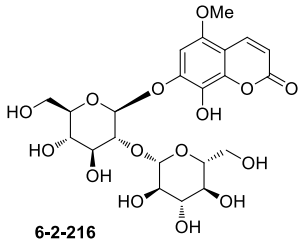
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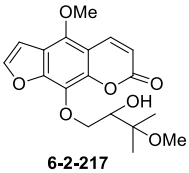
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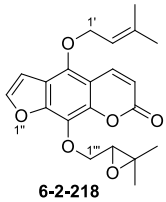
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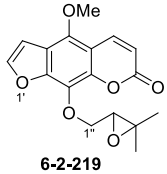
6-2-216



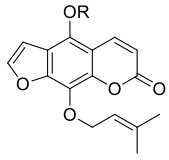
6-2-217



6-2-218



6-2-219



6-2-220 R = H
6-2-221 R = Me

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Table 6-2-62: ^{1}H NMR spectroscopic data of coumarins **6-2-212**~**6-2-216**.

H	6-2-212	6-2-213	6-2-214	6-2-215	6-2-216
3	6.30 d(9.7)	6.30 d(9.6)	6.30 d(9.9)	6.09 d(9.6)	6.15 d(9.6)
4	8.84 d(9.7)	8.13 d(9.6)	8.17 d(9.9)	8.15 d(9.6)	8.44 d(9.6)
6				6.66 s	6.90 s
1′				4.69 d(7.4)	4.94 d(7.7)
2′	7.88 br s	7.63 d(2.1)	7.64 d(2.2)		
3′	7.81 br s	7.00 d(2.1)	6.99 d(2.2)		
6′				4.39 d(11.1)	
				4.10 dd(11.1, 6.8)	
1″	5.48 d(7.6)				4.58 d(7.8)
2″	4.38 (ov)		4.07 dd(7.8, 2.8)		
3″	4.05 br s		4.60 dd(10.0, 2.8)		
			4.33 dd(10.0, 7.8)		
4″	4.37 (ov)		1.69 s		
5″	4.36 (ov)		1.69 s		
6″	4.56 d(11.0), 4.39 (ov)				
OMe		4.17 s (6H)	4.18 s		3.85 s

Table 6-2-63: ^{1}H NMR spectroscopic data of coumarins **6-2-217**~**6-2-221**.

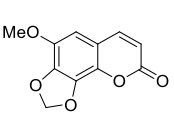
H	6-2-217	6-2-218①	6-2-219①	6-2-220	6-2-221
3	6.27 d(9.8)	6.30 d(9.8)	6.35 d(9.8)	6.26 d(9.6)	6.25 d(9.6)
4	8.12 d(9.8)	8.14 d(9.8)	8.20 d(9.8)	8.08 d(9.6)	8.09 d(9.6)
5				7.22 s	
1′		4.82 d(6.5)			
2′	7.62 d(2.3)	5.52 t(6.5)	7.65 d(2.2)	7.58 d(2.3)	7.60 d(2.3)
3′	6.99 d(2.3)		7.05 d(2.2)	6.97 d(2.3)	7.02 d(2.3)
4′		1.62 s			
5′		1.80 s			
1″	4.58 dd(2.8, 10.2)		4.51 d(6.8)	4.84 d(7.0)	4.82 d(7.0)
	4.21 dd(8.5, 10.2)				
2″	3.98 dd(2.8, 8.5)	7.65 d(2.5)	3.35 t(6.8)	5.53 t(7.0)	5.34 t(7.0)
3″		6.95 d(2.5)			
4″	1.25 s		1.30 s	1.71 s	1.72 s
5″	1.25 s		1.40 s	1.69 s	1.69 s
1‴		4.46 d(5.5)			
2‴		3.38 t(5.5)			
4‴		1.26 s			
5‴		1.34 s			
OMe	4.18 s(5-OMe)		4.21 s		4.25 s
	3.24 s(3″-OMe)				

① The data in the literature were not assigned, and here, the deployments are only to display the data.

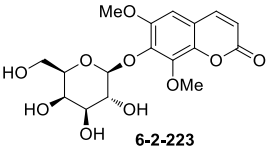
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Table 6-2-64: Cos, MFs, and TSs of coumarins **6-2-222**~**6-2-227**.

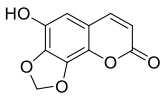
No.	Compounds	MFs	Test solvents	References
6-2-222	6-methoxy-7,8-methylenedioxycoumarin	$C_{11}H_8O_5$	DMSO-d_6	[115]
6-2-223	euoniside	$C_{17}H_{20}O_{10}$	DMSO-d_6	[125]
6-2-224	artekeiskeanol C	$C_{21}H_{26}O_6$	$CDCl_3$	[126]
6-2-225	artekeiskeanol D	$C_{21}H_{26}O_6$	$CDCl_3$	[126]
6-2-226	artemicapin C	$C_{10}H_6O_5$	CD_3COCD_3	[127]
6-2-227	–	$C_{21}H_{20}O_8$	DMSO-d_6	[128]



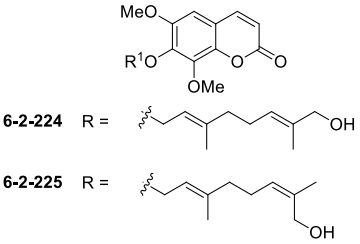
6-2-222

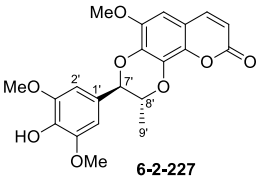


6-2-223



6-2-226





6-2-227

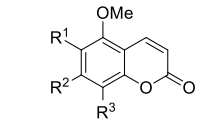
Table 6-2-65: ^{1}H NMR spectroscopic data of coumarins **6-2-222**~**6-2-227**.

H	6-2-222	6-2-223	6-2-224	6-2-225	6-2-226	6-2-227
3	6.25 d(9.6)	6.41 d(9.5)	6.30 d(9.5)	6.31 d(9.7)	6.21 d(9.6)	6.33 d(9.3)
4	7.56 d(9.6)	7.97 d(9.5)	7.58 d(9.5)	7.58 d(9.7)	7.80 d(9.6)	7.96 d(9.3)
5	6.59 s	7.13 s	6.63 s	6.63 s	6.78 s	6.91 s
1′		5.15 d(7.8)	4.63 d(7.5)	4.62 d(7)		
2′		4.03 m	5.52 tdd (6.4, 2.3, 1.3)	5.51 tdd (7.3, 2.4, 1.5)		6.74 s
3′		4.21 m				
4′		4.16 m	2.04 br t(7.5)	2.03 br t(7.3)		
5′		4.31 m	2.11 br q(7)	2.13 br q(7.5)		
6′		3.92 m	5.32 br t(7)	5.21 br t(7.2)		6.74 s
7′						4.73 d(8.1)
8′			3.94 s	4.07 s		4.47 dq(8.1, 6.3)
9′			1.61 s	1.75 d(1)		1.17 d(6.3)
10′			1.66 s	1.67 s		
OMe	3.92 s	3.82 s	3.85 s (6-OMe)	3.86 s (6-OMe)		3.78 s (6-OMe)
		3.91 s	3.99 s (8-OMe)	4.0 s (8-OMe)		3.77 s (3′, 5′-OMe)
OCH_2O	6.18 s				6.19 s	
OH						8.58 s(4′-OH)

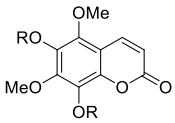
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Table 6-2-66: Cos, MFs, and TSs of coumarins **6-2-228**~**6-2-234**.

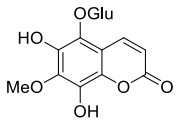
No.	Compounds	MFs	Test solvents	References
6-2-228	artemicapin A	$C_{12}H_{10}O_6$	$CDCl_3$	[127]
6-2-229	artemicapin B	$C_{11}H_8O_6$	CD_3COCD_3	[127]
6-2-230	8-hydroxy-5,6,7-trimethoxycoumarin	$C_{12}H_{12}O_6$	DMSO-d_6	[128]
6-2-231	artelin	$C_{12}H_{12}O_6$	CD_3COCD_3	[119]
6-2-232	6,8-dihydroxy-5,7-dimethoxycoumarin	$C_{11}H_{10}O_6$	CD_3COCD_3	[119]
6-2-233	7-methoxy-5,6,8-trihydroxycoumrin-5-β-glucopyranoside	$C_{16}H_{18}O_{11}$	DMSO-d_6	[122]
6-2-234	purpurasolol	$C_{15}H_{16}O_7$	$CDCl_3$	[129]



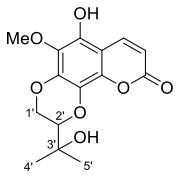
	R^1	R^2	R^3
6-2-228	OCH_2O		OMe
6-2-229	OCH_2O		OH
6-2-230	OMe	OMe	OH



6-2-231 R = Me
6-2-232 R = H



6-2-233



6-2-234

Table 6-2-67: ^{1}H NMR spectroscopic data of coumarins **6-2-228**~**6-2-231**.

H	6-2-228	6-2-229	6-2-230	6-2-231
3	6.06 d(9.6)	6.19 d(9.8)	6.35 d(9.7)	6.29 d(9.9)
4	7.77 d(9.6)	7.98 d(9.8)	8.01 d(9.7)	7.94 d(9.9)
OMe	3.92 s(5-OMe)	3.90 s(5-OMe)	3.84 s(5-OMe)	3.90 s, 3.97 s
	3.89 s(8-OMe)		3.83 s(6-OMe)	3.98 s, 4.04 s
			3.86 s(7-OMe)	
OCH_2O	6.00 s	6.16 s		
OH			9.60 s(8-OH)	

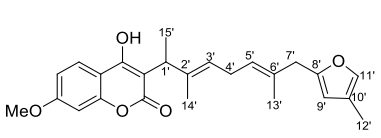
Table 6-2-68: ^{1}H NMR spectroscopic data of coumarins **6-2-232**~**6-2-234**.

H	6-2-232	6-2-233	6-2-234	H	6-2-232	6-2-233	6-2-234
3	6.16 d(9.8)	6.29 d(9.7)	6.22 d(9.6)	4′			1.45 s
4	7.99 d(9.8)	8.29 d(9.7)	7.99 d(9.6)	5′			1.36 s
1′		4.50 d(7.8)	4.62 dd(2.0, 11.3)	OMe	3.86 s	3.80 s	3.91 s
			4.14 dd(9.4, 11.3)		3.98 s		
2′			3.94 dd(2.0, 9.4)				

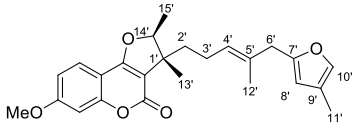
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Table 6-2-69: Compounds, MFs, and test solvents of coumarins **6-2-235**~**6-2-257**.

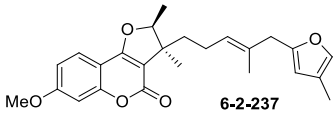
No.	Compounds	MFs	Test solvents	References
6-2-235	fukanemarin B	$C_{25}H_{28}O_5$	$CDCl_3$	[130]
6-2-236	fukanefuromarin E	$C_{25}H_{28}O_5$	$CDCl_3$	[130]
6-2-237	fukanefuromarin F	$C_{25}H_{28}O_5$	$CDCl_3$	[130]
6-2-238	fukanefuromarin G	$C_{25}H_{28}O_5$	$CDCl_3$	[130]
6-2-239	fukanemarin A	$C_{24}H_{28}O_5$	$CDCl_3$	[131]
6-2-240	setarin	$C_{12}H_{10}O_3$	$CDCl_3$	[132]
6-2-241	4-acetyl-*ε*-acetoxyferulenol	$C_{28}H_{34}O_6$	$CDCl_3$	[133]
6-2-242	fercoprenol	$C_{24}H_{30}O_5$	$CDCl_3$	[134]
6-2-243	fercoprolone	$C_{18}H_{18}O_5$	$CDCl_3$	[134]
6-2-244	ferprenin	$C_{24}H_{28}O_3$	$CDCl_3$	[135]
6-2-245	isoferprenin	$C_{24}H_{28}O_3$	$CDCl_3$	[136]
6-2-246	nassauvirevolutin A	$C_{25}H_{32}O_4$	$CDCl_3$	[137]
6-2-247	nassauvirevolutin B	$C_{25}H_{30}O_4$	$CDCl_3$	[137]
6-2-248	nassauvirevolutin C	$C_{25}H_{32}O_4$	$CDCl_3$	[137]
6-2-249	isotriptospinocoumarin	$C_{14}H_{12}O_3$	$CDCl_3$	[137]
6-2-250	4-methoxy-5-methylcoumarin	$C_{11}H_{10}O_3$	$CDCl_3$	[138]
6-2-251	4-methoxy-3,5-dimethylcoumarin	$C_{12}H_{12}O_3$	$CDCl_3$	[138]
6-2-252	8-hydroxy-4-methoxy-5-methylcoumarin	$C_{11}H_{10}O_4$	$CDCl_3$	[138]
6-2-253	8-hydroxy-4-methoxy-3,5-dimethylcoumarin	$C_{12}H_{12}O_4$	$CDCl_3$	[138]
6-2-254	4,6,7-trimethoxy-3,5-dimethylcoumarin	$C_{14}H_{16}O_5$	$CDCl_3$	[138]
6-2-255	7-hydroxy-4,6-dimethoxy-3,5-dimethylcoumarin	$C_{13}H_{14}O_5$	$CDCl_3$	[138]
6-2-256	glaumacidine A	$C_{17}H_{18}O_6$	$CDCl_3$	[139]
6-2-257	glaumacidine B	$C_{17}H_{18}O_6$	$CDCl_3$	[139]



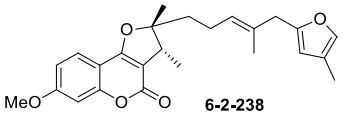
6-2-235



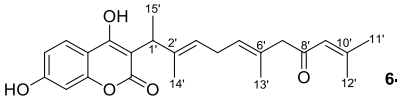
6-2-236



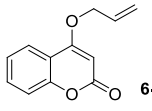
6-2-237



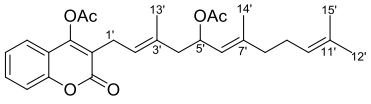
6-2-238



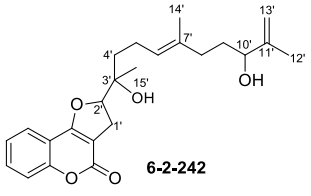
6-2-239



6-2-240

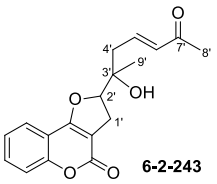


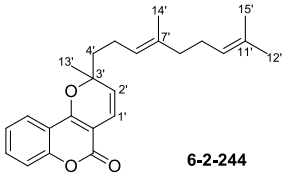
6-2-241

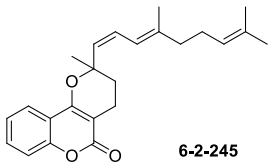


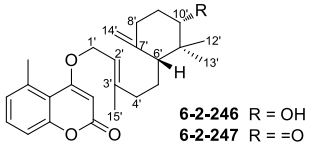
6-2-242

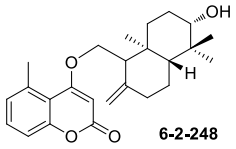
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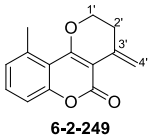


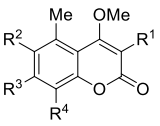












	R^1	R^2	R^3	R^4
6-2-250	H	H	H	H
6-2-251	Me	H	H	H
6-2-252	H	H	H	OH
6-2-253	Me	H	H	OH
6-2-254	Me	OMe	OMe	H
6-2-255	Me	OMe	OH	H

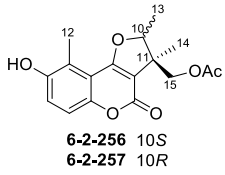


Table 6-2-70: ^{1}H NMR spectroscopic data of coumarins **6-2-235**~**6-2-239**.

H	6-2-235	6-2-236	6-2-237	6-2-238	6-2-239
5	7.62 d(8.8)	7.52 d(9.0)	7.52 d(8.8)	7.51 br s	7.59 d(8.8)
6	6.81 dd(2.6, 8.8)	6.82 m	6.82 m	6.81 m	6.81 dd(2.3, 8.8)
8	6.76 d(2.6)	6.82 m	6.82 m	6.81 m	6.92 d(2.3)
1′	3.79 br q			3.19 q(7.0)	3.78 q(7.0)
2′		1.73 m	1.66 m	1.71 m, 1.92 m	
3′	5.74 t(7.0)	2.07 m	2.03 m	2.26 m	5.74 t(7.0)
4′	2.91 m	5.18 t(6.7)	5.13 t(7.0)	5.25 t(7.0)	2.93 m
5′	5.27 t(7.5)				5.29 t(7.3)
6′		3.18 s	3.15 s	3.24 s	
7′	3.29 s				3.12 s
8′		5.84 s	5.82 s	5.88 s	
9′	5.91 s				6.14 br s
10′		7.03 br s	7.02 br s	7.06 br s	
11′	7.07 br s	1.97 s	1.96 s	1.98 s	1.89 s
12′	2.0 s	1.56 s	1.51 s	1.64 s	1.35 d(7.0)
13′	1.68 s	1.28 s	1.44 s	1.29 d(7.0)	1.75 s
14′	1.75 s		4.60 q(7.0)		1.70 s
15′	1.36 d(7.0)	1.44 d(7.0)	1.53 d(7.0)	1.48 s	2.17 s
OMe	3.85 s	3.86 s	3.86 s	3.86 s	

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Table 6-2-71: ^{1}H NMR spectroscopic data of coumarins **6-2-240**~**6-2-243**.

H	6-2-240	6-2-241	6-2-242	6-2-243
3	5.715 s			
5	7.87 dd(9.0, 2.5)	7.33 m	7.68 dd(1.5, 8)	7.66 dd(1.5, 8)
6	7.59 dd(9.0, 2.5)	7.25 m	7.29 br dd(8, 8)	7.31 br dd(8, 8)
7	7.32 dd(8.5, 2.5)	7.49 m	7.57 ddd(1.5, 8, 8)	7.58 ddd(1.5, 8, 8)
8	7.26 dd(8.5, 2.5)	7.33 m	7.38 br d(8)	7.39 br d(8)
1′	4.72 d(6.0)	3.18 d(7.1)	3.18 dd(9, 15) 3.12 dd(10.5, 15)	3.18 d(9.5)
2′	6.11 m	5.19 tqt(7.1, 1.4, 0.7)	4.97 dd(9, 10.5)	4.98 dd(9.5, 9.5)
3′	5.45 d(16.0), 5.53 d(16.0)			
4′		2.30 ddd(13.5, 7.6, 0.7) 2.12 ddd(13.5, 6.1, 0.7)	1.59 m	2.56 br dd(7, 14) 2.43 br dd(8.5, 14)
5′		5.61 ddd(9.0, 7.6, 6.1)	2.20 m, 1.59 m	6.91 ddd(7, 8.5, 16)
6′		5.05 dq(9.0, 1.4)	5.19 br dd(7, 7)	6.19 br d(16)
8′		1.95 m	2.03 m	2.26 s
9′		2.00 m	2.01 m, 1.62 m	1.38 s
10′		4.99 ddqq(6.9×2,1.4×2)	4.04 br dd(6, 6)	
12′		1.62 d(1.4)	1.73 br s	
13′		1.76 d(1.4)	4.93 dd(1, 1), 4.84 dd(1, 1)	
14′		1.66 d(1.4)	1.65 br s	
15′		1.53 d(1.4)	1.37 s	
4-OAc		2.43 s		
5′-OAc		1.93 s		

Table 6-2-72: ^{1}H NMR spectroscopic data of coumarins **6-2-244**~**6-2-247**.

H	6-2-244	6-2-245	6-2-246	6-2-247
3			5.65 s	5.63 s
5	7.80 dd(7.8, 1.8)	7.83 dd(7.7, 1.4)		
6	7.53 dq(7.8, 8.5)	7.25 ddd(8.3, 7.7, 1.3)	7.02 br d(8)	7.02 br d(8)
7	7.30 m	7.48 ddd(8.3, 7.3, 1.4)	7.37 t(8)	7.37 t(8)
8	7.80 m	7.29 dd(7.3, 1.3)	7.17 br d(8)	7.17 br d
1′	6.59 d(10.1) or 5.49 d(10.1)	2.58 ddd(17.4, 5.9, 5.9) 2.47 ddd(17.4, 9.2, 6.4)	4.65 br d(7)	4.65 br d
2′	5.49 d(10.1) or 6.59 d(10.1)	2.02 ddd(14.7, 6.4, 5.9) 1.88 ddd(14.7, 9.2, 5.9)	5.49 br t(7)	5.48 br t
4′		5.6 d(15.3)	1.97 m, 2.21 m	2.01 ddd, 1.89 ddd
5′		6.36 dd(15.3, 10.8)		1.68 dddd, 1.22 m
6′	5.08 br m	5.78 dq(10.8, 1.3)		2.17 dd
8′		1.95~2.10 m		
9′		1.95~2.10 m	1.86 dq	2.31 dt, 2.64 ddd
10′	5.08 br m	5.049 tq(6.8, 1.2)	3.41 d	

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Table 6-2-72 (continued)

H	6-2-244	6-2-245	6-2-246	6-2-247
12′	1.67 br s	1.65 br s	1.02 s	1.20 s
13′	1.53 s	1.54 s	0.74 s	1.04 s
14′	1.56 s	1.62 d(1.3)	4.60 br s, 4.90 br s	4.85 br s, 5.05 br s
15′	1.56 s	1.56 d(1.2)	1.76 br s	1.72 br s
5-Me			2.66 s	2.66 s

Table 6-2-73: ^{1}H NMR spectroscopic data of coumarins **6-2-248**~**6-2-250**.

H	6-2-248	6-2-249	6-2-250	H	6-2-248	6-2-249	6-2-250
3	5.67 s		5.65 s	10′	3.32 dd		
6	7.00 br d	7.00 br d	7.02~7.49 m	12′	1.04 s		
7	7.37 t	7.35 t	7.02~7.49 m	13′	0.83 s		
8	7.17 br d	7.15 br d	7.02~7.49 m	14′	4.52 br s, 4.95 br s		
1′	4.30 dd, 4.22 dd	4.47 t		15′	0.82 s		
2′	2.32 br d	2.70 br t		4-OMe			3.94 s
4′	2.18 m, 2.49 m	6.44 br s, 5.16 q		5-Me	2.57 s	2.68 s	2.64 s
9′	1.87 m, 1.73 m						

Table 6-2-74: ^{1}H NMR spectroscopic data of coumarins **6-2-251**~**6-2-254**.

H	6-2-251	6-2-252	6-2-253	6-2-254
6	7.07~7.35 m	6.96 d(8)	6.96 d(8)	
7	7.07~7.35 m	7.01 d(8)	6.98 d(8)	
8	7.07~7.35 m			6.74 s
4-OMe	3.88 s	3.97 s	3.88 s	3.84 s
6-OMe				3.79 s
7-OMe				3.91 s
5-Me	2.70 s	2.57 s	2.61 s	2.61 s
3-Me	2.18 s		2.18 s	2.14 s

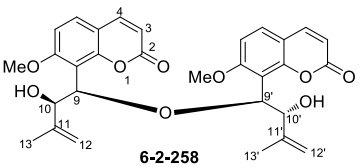
Table 6-2-75: ^{1}H NMR spectroscopic data of coumarins **6-2-255**~**6-2-257**.

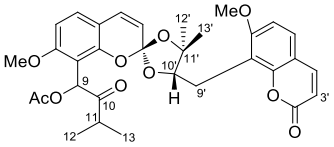
H	6-2-255	6-2-256	6-2-257	H	6-2-255	6-2-256	6-2-257
7		7.05 d(8.0)	7.04 d(8.0)	15		4.19 s	4.37 s
8	6.82 s	7.10 d(8.0)	7.11 d(8.0)	4-OMe	3.86 s		
10		4.71 q(5.6)	4.93 q(6.3)	6-OMe	3.79 s		
12		2.57 s	2.57 s	OAc		1.99 s	2.05 s
13		1.54 d(5.6)	1.49 d(6.3)	5-Me	2.62 s		
14		1.50 s	1.34 s	3-Me	2.14 s		

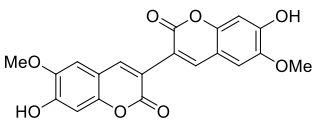
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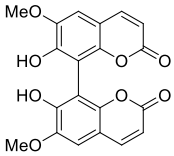
Table 6-2-76: Compounds, MFs, and test solvents of coumarins **6-2-258**~**6-2-271**.

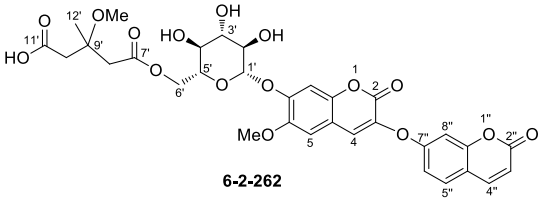
No.	Compounds	MFs	Test solvents	References
6-2-258	bismurrangatin	$C_{30}H_{30}O_9$	$CDCl_3$	[140]
6-2-259	murramarin A	$C_{32}H_{34}O_{10}$	DMSO-d_6	[140]
6-2-260	7,7′-dihydroxy-6,6′-dimethoxy-3,3′-biscoumarin	$C_{20}H_{14}O_8$	DMSO-d_6	[94]
6-2-261	7,7′-dihydroxy-6,6′-dimethoxy-8,8′-biscoumarin	$C_{20}H_{14}O_8$	DMSO-d_6	[94]
6-2-262	9′-methoxyl-rutarensin	$C_{32}H_{32}O_{16}$	CD_3OD	[141]
6-2-263	murrmeranzin	$C_{30}H_{32}O_9$	CD_3OD	[43]
6-2-264	rivulobirin B	$C_{23}H_{12}O_9$	C_5D_5N	[64]
6-2-265	artemicapin D	$C_{22}H_{16}O_{10}$	$CDCl_3$	[127]
6-2-266	(12*R*,12″*R*)-diheraclenol	$C_{32}H_{30}O_{11}$	$CDCl_3$	[102]
6-2-267	candibirin F	$C_{33}H_{32}O_{11}$	$CDCl_3$	[142]
6-2-268	–	$C_{38}H_{38}O_{11}$	$CDCl_3$	[143]
6-2-269	daphnoretin	$C_{19}H_{12}O_7$	DMSO-d_6	[62]
6-2-270	edgeworin	$C_{18}H_{10}O_6$	DMSO-d_6	[62]
6-2-271	7-hydroxyl-odesmethoxyrutarensin	$C_{30}H_{28}O_{16}$	DMSO-d_6	[103]

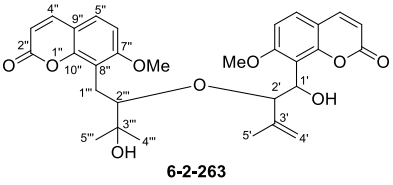


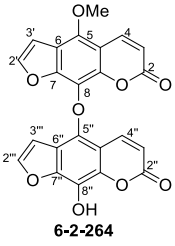


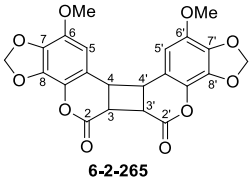












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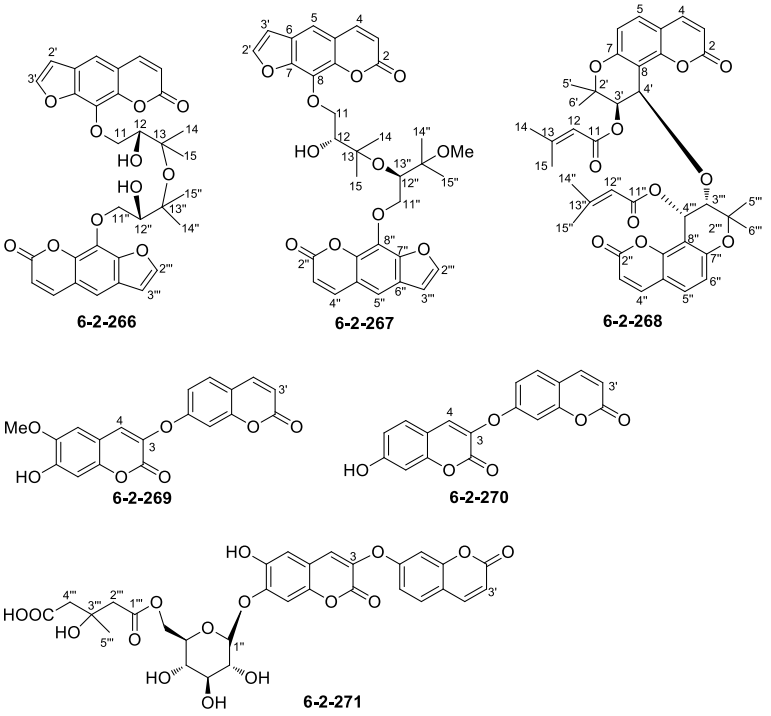


Table 6-2-77: ^{1}H NMR spectroscopic data of coumarins **6-2-258**~**6-2-261**.

H	6-2-258	6-2-259	6-2-260	6-2-261
3	6.01 d(9.5)	5.59 d(9.9)		6.21 d(9.5)
4	7.33 d(9.5)	6.82 d(9.9)	8.30 s	7.99 d(9.5)
5	7.00 d(8.8)	7.31 d(8.8)	7.29 s	7.34 s
6	6.54 d(8.8)	6.70 d(8.8)		
8			6.83 s	
9	5.10 d(8.8)	6.59 s		
10	5.02 d(8.8)			
11		2.23 t(7.0)		
12	4.63 s, 4.60 s	0.80 d(7.0)		
13	1.69 s	0.41 br s		
3′	5.95 d(9.5)	6.27 d(9.5)		6.21 d(9.5)
4′	7.23 d(9.5)	7.96 d(9.5)	8.30 s	7.99 d(9.5)
5′	6.95 d(8.4)	7.58 d(8.8)	7.29 s	7.34 s
6′	6.57 d(8.4)	7.08 d(8.8)		
8′			6.83 s	
9′	5.44 d(8.1)	3.05 dd(14.3, 9.5) 2.87 dd(14.3, 2.6)		
10′	5.00 d(8.1)	4.32 dd(2.6, 9.5)		
12′	4.72 s	1.26 s		

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Table 6-2-77 (continued)

H	6-2-258	6-2-259	6-2-260	6-2-261
13′	1.72 s	1.47 s		
OMe	1.69 s(13-OMe)	3.95 s(7′-OMe)	3.83 s	3.90 s
	1.72 s(13′-OMe)	3.75 s(7-OMe)	3.83 s	3.90 s
OAc		1.94 s		

Table 6-2-78: ^{1}H NMR spectroscopic data of coumarins **6-2-262**~**6-2-265**.

H	6-2-262	6-2-263	6-2-264	6-2-265
3		6.23 d(9.4)	6.50 d(9.9)	3.98 m
4	7.72 s	7.86 d(9.4)	8.22 d(9.9)	4.08 m
5	7.25 s	7.52 d(8.7)		5.95 s
6		7.03 d(8.7)		
8	7.17 s			
1′	5.03 d(7.0)	5.34 d(8.7)		
2′	3.33~3.72 m	4.83 d(8.7)	7.91 d(2.2)	
3′			7.37 d(2.2)	3.98 m
4′		4.63 s, 4.53 s		4.08 m
5′		1.63 s		5.95 s
6′	4.45 dd(11.5, 2.0)			
	4.17 dd(11.5, 6.5)			
8′	2.71 s			
10′	2.59 d(15.5)			
12′	1.26 s			
3″	6.28 d(9.6)	6.22 d(9.4)	6.64 d(9.8)	
4″	7.88 d(9.6)	7.85 d(9.4)	8.70 d(9.8)	
5″	7.58 d(8.5)	7.45 d(8.6)		
6″	7.04 dd(9.0, 2.0)	7.02 d(8.6)		
8″	7.02 d(2.0)			
1‴		3.02 dd(13.5, 9.7)		
		2.99 dd(13.5, 3.1)		
2‴		3.66 dd(9.7, 3.1)	7.76 d(2.2)	
3‴			6.11 d(2.2)	
4‴		1.27 s		
5‴		1.29 s		
OMe	3.51 s (9′-OMe)	3.93 s, 3.94 s	4.29 s	3.68 s
	3.86 s (6-OMe)			
OCH_2O				6.02 s

Table 6-2-79: ^{1}H NMR spectroscopic data of coumarins **6-2-266**~**6-2-268**.

H	6-2-266	6-2-267	6-2-268	H	6-2-267	6-2-268
3	6.38 d(9.5)	6.32 d(9.4)	6.25 d(9.5)	3″	6.34 d(9.6)	6.22 d(9.5)
4	7.78 d(9.5)	7.67 d(9.4)	7.65 d(9.5)	4″	7.73 d(9.6)	7.6 d(9.5)
5	7.39 s	7.25 s	7.35 d(8.6)	5″	7.34 s	7.35 d(8.6)

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Table 6-2-79 (continued)

H	6-2-266	6-2-267	6-2-268	H	6-2-267	6-2-268
6			6.79 d(8.6)	6″		6.79 d(8.6)
11	4.82 dd(3.4, 10.3)	4.55 d(10.5, 7.7),		11″	4.41 dd(10.3, 4.3)	
	4.54 dd(7.4, 10.3)	4.77 d(10.5, 3.2)			4.61 dd(10.3, 4.1)	
12	3.90 dd(3.4, 7.4)	4.17 dd(7.7, 3.2)	5.81 s or 5.73 s	12″	4.06 dd(4.3, 4.1)	5.81 s or 5.73 s
14	1.54 s	1.41 s	1.93 s	14″	1.30 s	1.93 s
15	1.54 s	1.44 s	1.93 s	15″	1.30 s	1.93 s
2′		7.66 d(2.3)		2‴	7.69 d(2.2)	
3′	6.38 d(9.5)	6.75 d(2.3)	5.22 d(4.6)	3‴	6.80 d(2.2)	4.05 d(4.5)
4′	7.78 d(9.5)		5.44 d(4.6)	4‴		6.45 d(4.5)
5′	7.39 s		1.42 s	5‴		1.5 s or 1.47 s
6′			1.42 s	6‴		1.5 s or 1.47 s
11′	4.82 dd(3.4, 10.3),					
	4.54 dd(7.4, 10.3)					
12′	3.90 dd(3.4, 7.4)					
14′	1.54 s					
15′	1.54 s					

Table 6-2-80: ^{1}H NMR spectroscopic data of coumarins **6-2-269**~**6-2-271**.

H	6-2-269	6-2-270	6-2-271	H	6-2-271
4	7.86 s	7.92 s	7.87 s	1″	5.03 d(7.2)
5	7.20 s	7.52 d(9)	7.08 s	2″	3.35 m
6	3.81 s(OMe)	6.85 dd(2, 9)		3″	3.36 m
8	6.86 s	6.80 d(2)	7.17 s	4″	3.25 t(11.4)
3′	6.37 d(9)	6.37 d(9)	6.38 d(9.6)	5″	3.70 ddd(11.4, 6.0, 1.8)
4′	8.03 d(9)	8.03 d(9)	8.03 d(9.6)	6″	4.06 dd(12.0, 6.0), 4.36 dd(12.0, 1.8)
5′	7.71 d(9)	7.70 d(9)	7.71 d(9.0)	2‴	2.38 s
6′	7.10 dd(2, 9)	7.12 dd(2, 9)	7.15 dd(9.0, 2.4)	4‴	2.55 d(14.4), 2.56 d(14.4)
8′	7.16 d(2)	7.18 d(2)	7.20 d(2.4)	6‴	1.12 s

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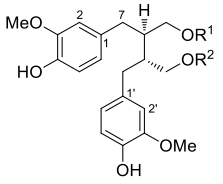
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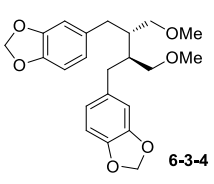
6.3 Lignans

Table 6-3-1: Compounds, MFs, and test solvents of lignans **6-3-1**~**6-3-30**.

No.	Compounds	MFs	Test solvents	References
6-3-1	(–)-(2*R*,3*R*)-secoisolariciresinol	$C_{20}H_{26}O_6$	CD_3OD	[144]
6-3-2	hanultarin	$C_{30}H_{34}O_9$	CD_3OD	[144]
6-3-3	(–)-(2*R*,3*R*)-1,4-*O*-diferuloylsecoisolariciresinol	$C_{40}H_{42}O_{12}$	DMSO-d_6	[144]
6-3-4	cubebin dimethyl ether	$C_{22}H_{26}O_6$	$CDCl_3$	[145]
6-3-5	kerinol	$C_{20}H_{26}O_8$	CD_3COCD_3	[146]
6-3-6	9,9′-*O*-di-(*Z*)-feruloyl-(–)-secoisolariciresinol	$C_{40}H_{42}O_{12}$	$CDCl_3$	[147]
6-3-7	7-(4-hydroxy-3-methoxyphenyl)-7′-(3′,4′-methylenedioxyphenyl)-8,8′-lignan-7-methyl ether	$C_{21}H_{26}O_5$	$CDCl_3$	[148]
6-3-8	*threo*-austrobailignan-5	$C_{20}H_{22}O_4$	$CDCl_3$	[149]
6-3-9	magnovatin A	$C_{20}H_{22}O_5$	$CDCl_3$	[150]
6-3-10	magnovatin B	$C_{21}H_{26}O_5$	$CDCl_3$	[150]
6-3-11	9,9′-di-*O*-feruloyl-(+)-5,5′-dimethoxysecoisolaric-iresinol	$C_{42}H_{46}O_{14}$	DMSO-d_6	[151]
6-3-12	secoisolariciresinol diglucoside	$C_{32}H_{46}O_{16}$	CD_3OD	[152]
6-3-13	saururin A	$C_{20}H_{22}O_6$	$CDCl_3$	[153]
6-3-14	9,9′-dibenzoylsecoisolariciresinol	$C_{34}H_{34}O_8$	$CDCl_3$	[154]
6-3-15	sauriol A	$C_{20}H_{26}O_6$	$CDCl_3$	[155]
6-3-16	(2*S*,3*S*)-2,3-bis(5-methoxy-3,4-methylenedioxybenzyl)butane-1,4-diol diacetate	$C_{26}H_{30}O_{10}$	$CDCl_3$	[156]
6-3-17	(2*R*,3*R*)-2,3-bis(5-methoxy-3,4-methylenedioxybenzyl)butane-1,4-diol	$C_{22}H_{26}O_8$	$CDCl_3$	[156]
6-3-18	glehlinoside A	$C_{34}H_{42}O_{14}$	CD_3OD	[157]
6-3-19	glehlinoside B	$C_{35}H_{44}O_{15}$	CD_3OD	[157]
6-3-20	(–)-secoisolariciresinol 4-*O*-*β*-D-glucopyranoside	$C_{26}H_{36}O_{11}$	CD_3OD	[157]
6-3-21	2-(4-hydroxybenzoyl)-3-[(*E*)-1-(4-hydroxyphenyl)methylidene] succinic acid	$C_{18}H_{14}O_7$	CD_3OD	[158]
6-3-22	tinosposides A	$C_{27}H_{38}O_{11}$	CD_3OD	[159]
6-3-23	anolignan A	$C_{19}H_{18}O_4$	CD_3OD	[160]
6-3-24	anolignan B	$C_{18}H_{18}O_2$	CD_3OD	[160]
6-3-25	5-demethoxyniranthin	$C_{23}H_{30}O_6$	$CDCl_3$	[161]
6-3-26	justin A	$C_{24}H_{28}O_8$	$CDCl_3$	[162]
6-3-27	(–)-dihydroclusin diacetate	$C_{26}H_{32}O_9$	$CDCl_3$	[162]
6-3-28	secoisolariciresinol dimethyl ether diacetate	$C_{26}H_{34}O_8$	$CDCl_3$	[162]
6-3-29	5-methoxy-4,4′-di-*O*-methylsecolariciresinol diacetate	$C_{27}H_{36}O_9$	$CDCl_3$	[162]
6-3-30	justin B	$C_{25}H_{30}O_9$	$CDCl_3$	[162]

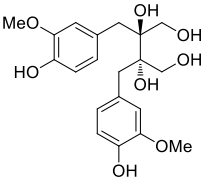


	R^1	R^2
6-3-1	H	H
6-3-2	*E*-Fer	H
6-3-3	*E*-Fer	*E*-Fer

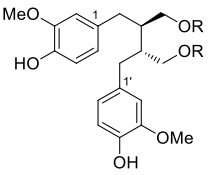


6-3-4

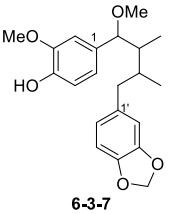
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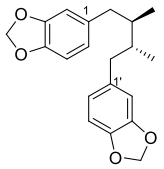
6-3-5



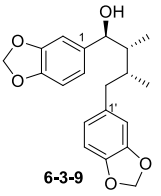
6-3-6 R = *Z*-Fer



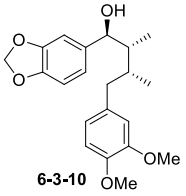
6-3-7



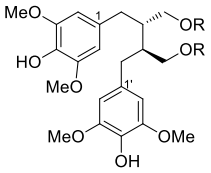
6-3-8



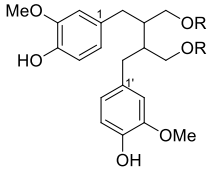
6-3-9



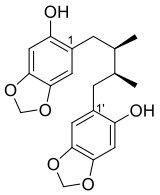
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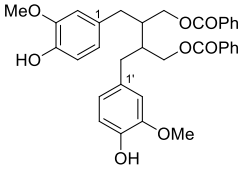
6-3-11 R = *E*-Fer



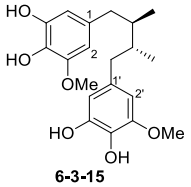
6-3-12 R = Glc



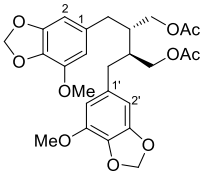
6-3-13



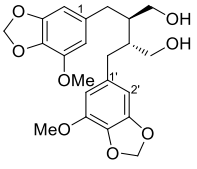
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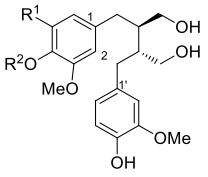
6-3-15



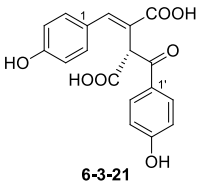
6-3-16



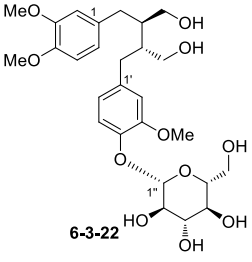
6-3-17



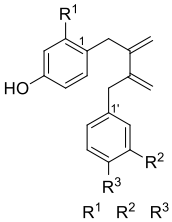
	R^1	R^2
6-3-18	H	6"-Van-Glc
6-3-19	OMe	6"-Van-Glc
6-3-20	H	Glc



6-3-21

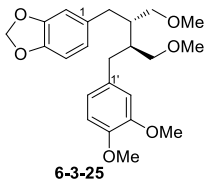


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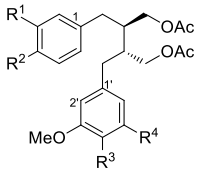


	R^1	R^2	R^3
6-3-23	OH	OCH_2O	
6-3-24	H	H	OH

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6-3-25



	R^1	R^2	R^3	R^4
6-3-26	OCH_2O		OH	H
6-3-27	OCH_2O		OMe	OMe
6-3-28	OMe	OMe	OMe	H
6-3-29	OMe	OMe	OMe	OMe
6-3-30	OCH_2O		OH	OMe

Table 6-3-2: ^{1}H NMR spectroscopic data of lignans **6-3-1**~**6-3-3**.

H	6-3-1	6-3-2	6-3-3
2	6.58 d(2.4)	6.62 d(1.6)	6.65 br s
5	6.65 d(8.0)	6.664 d(7.6)	6.67 d(7.6)
6	6.53 dd(8.0, 2.4)	6.55 dd(7.6, 1.6)	6.54 d(7.6)
7	2.64 dd(14.0, 7.2)	2.71 dd(14.0, 7.2)	2.75 dd(14.0, 6.0)
	2.54 dd(14.0, 7.6)	2.60 dd(14.0, 8.0)	2.57 dd(14.0, 8.8)
8	1.91 m	2.24 m	2.19 m
9	3.59 m	4.33 dd(11.2, 6.0)	4.27 dd(10.8, 7.2)
		4.10 dd(11.2, 6.4)	4.07 dd(10.8, 4.8)
2′	6.58 d(2.4)	6.58 d(2.0)	6.65 br s
5′	6.65 d(8.0)	6.662 d(8.0)	6.67 d(7.6)
6′	6.53 dd(8.0, 2.4)	6.54 dd(8.0, 2.0)	6.54 d(7.6)
7′	2.64 dd(14.0, 7.2)	2.62 d(7.6)	2.75 dd(14.0, 6.0)
	2.54 dd(14.0, 7.6)		2.57 dd(14.0, 8.8)
8′	1.91 m	1.97 m	2.19 m
9′	3.59 m	3.53 dd(11.2, 6.8)	4.27 dd(10.8, 7.2)
		3.60 dd(11.2, 6.0)	4.07 dd(10.8, 4.8)
2″		7.17 d(1.6)	7.29 br s
5″		6.81 d(8.4)	6.77 d(8.4)
6″		7.05 dd(8.4, 1.6)	7.09 d(8.4)
7″		7.56 d(16.0)	7.52 d(15.6)
8″		6.35 d(16.0)	6.47 d(15.6)
2‴			7.29 s
5‴			6.77 d(8.4)
6‴			7.09 d(8.4)
7‴			7.52 d(15.6)
8‴			6.47 d(15.6)
3-OMe	3.72 s	3.71 s	3.67 s
3′-OMe		3.73 s	3.67 s
3″-OMe		3.83 s	3.80 s
3‴-OMe			3.80 s

Table 6-3-3: ^{1}H NMR spectroscopic data of lignans **6-3-4**~**6-3-6**.

H	6-3-4	6-3-5	6-3-6
2	6.7 d(7.8)	7.00 d(1.5)	6.49 d(2.0)
5	6.59 d(1.3)	6.72 d(8.1)	6.87 d(8.0)
6	6.56 dd(7.9, 1.6)	6.80 dd(8.1, 1.5)	6.58 dd(8.0, 2.0)

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Table 6-3-3 (continued)

H	6-3-4	6-3-5	6-3-6
7	3.26 m, 3.30 m	3.10 d(13.6), 3.00 d(13.6)	2.70 dd(13.8, 7.2), 2.75 dd(13.8, 7.2)
8	2.02 m		2.16 m
9	2.55 dd(13.9, 8.0), 2.65 dd(13.5, 5.9)	3.60 d(10.6), 3.52 br d(10.6)	4.16 dd(11.4, 5.4), 4.34 dd(11.4, 5.6)
2′	6.59 d(1.3)	7.00 d(1.5)	6.49 d(2.0)
5′	6.7 d(7.8)	6.72 d(8.1)	6.87 d(8.0)
6′	6.56 dd(7.9, 1.6)	6.80 dd(8.1, 1.5)	6.58 dd(8.0, 2.0)
7′	3.26 m, 3.30 m	3.10 d(13.6), 3.00 d(13.6)	2.70 dd(13.8, 7.2), 2.75 dd(13.8, 7.2)
8′	2.02 m		2.16 m
9′	2.55 dd(13.9, 8.0), 2.65 dd(13.5, 5.9)	3.60 d(10.6), 3.52 br d(10.6)	4.16 dd(11.4, 5.4), 4.34 dd(11.4, 5.6)
2″			7.78 d(2.0)
5″			6.88 d(8.4)
6″			7.12 dd(8.4, 2.0)
7″			6.90 d(12.8)
8″			5.84 d(12.8)
2‴			7.78 d(2.0)
5‴			6.88 d(8.4)
6‴			7.12 dd(8.4, 2.0)
7‴			6.90 d(12.8)
8‴			5.48 d(12.8)
3,3′-OMe		3.82 s	3.78 d
9-OMe	3.28 s		
9′-OMe	3.28 s		3.93 s
3″,3‴-OMe			
3,3′-OCH_2O	5.92 s		

Table 6-3-4: ^{1}H NMR spectroscopic data of lignans **6-3-7**~**6-3-10**.

H	6-3-7	6-3-8	6-3-9	6-3-10
2	6.81 s	5.58 d(1.4)	6.86 m	6.87 m
5	6.93 d(8.0)	6.73 d(7.9)	6.76 m	6.79 m
6	6.79 dd(1.2, 8.0)	6.54 dd(7.9, 1.6)	6.77 m	6.79 m
7	4.01 d(7.2)	2.34 dd(13.6, 8.3) 2.55 dd(13.6, 6.1)	4.41 d(9.5)	4.42 d(9.6)
8	1.74 m	1.73 m	1.82 ddq(9.5, 2.9, 7.1)	1.84 ddq(9.6, 2.9, 7.0)
9	1.04 d(6.8)	0.81 d(6.7)	0.61 d(7.1)	0.63 d(7.0)
2′	6.46	6.64 d(1.5)	6.72 d(1.6)	6.76 m
5′	6.67 d(8.0)	6.71 d(7.9)	6.73 d(6.6)	6.79 m
6′	6.44 dd(1.2, 8.0)	6.60 dd(8.0, 1.5)	6.65 dd(6.6, 1.6)	6.76 m

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Table 6-3-4 (continued)

H	6-3-7	6-3-8	6-3-9	6-3-10
7′	2.73 dd(3.6, 13.6)	2.26 dd(13.4, 9.3)	2.84 dd(13.1, 3.8)	2.87 dd(13.2, 3.9)
	2.11 dd(11.2, 13.6)	2.71 dd(13.4, 4.8)	2.13 dd(13.1, 11.6)	2.17 dd(13.2, 10.5)
8′	1.56 m	1.73 m	2.32 dddq(11.6, 3.8, 2.9, 6.9)	2.36 dddq(10.5, 3.9, 2.9, 6.9)
9′	0.76 d(6.8)	0.83 d(6.7)	0.88 d(6.9)	0.88 d(6.9)
OMe	3.89 s(3-OMe)			3.88 s(3′-OMe)
	3.19 s(7-OMe)			3.87 s(4′-OMe)
OCH_2O	5.89 dd(1.6, 4.4)	5.92 br s	5.963 d(1.5), 5.960 d(1.5)	5.955 d(1.4),
			5.927 d(1.4), 5.925 d(1.4)	5.953 d(1.4)

Table 6-3-5: ^{1}H NMR spectroscopic data of lignans **6-3-11**~**6-3-14**.

H	6-3-11	6-3-12	6-3-13	6-3-14
2	6.37 s	6.58 d(2.0)		6.53 d(1.8)
3			6.29 s	
5		6.64 d(8.0)		6.79 dd(8.0, 1.8)
6	6.37 s	6.56 dd(8.0, 2.0)	6.34 s	6.61 dd(8.0, 1.8)
7	2.58 dd(7.8, 13.8)	2.60 dd(14.0, 8.0)	2.50 dd(5.5, 13.9)	2.81 m
	2.74 dd(6, 13.8)	2.70 dd(14.0, 6.5)	2.26 dd(8.4, 13.9)	
8	2.20 m	2.12 m	1.72 m	2.36 m
9	4.09 dd(5.4, 11.4)	3.47 m	0.77 d(6.6)	4.54 dd(11.2, 5.9)
	4.32 dd(6.6, 11.4)			4.35 dd(11.2, 4.3)
2′	6.37 s	6.58 d(2.0)		6.53 d(1.8)
3′			6.29 s	
5′		6.64 d(8.0)		6.79 dd(8.0, 1.8)
6′	6.37 s	6.56 dd(8.0, 2.0)	6.34 s	6.61 dd(8.0, 1.8)
7′	2.58 dd(7.8, 13.8)	2.60 dd(14.0, 8.0)	2.50 dd(5.5, 13.9)	2.81 m
	2.74 dd(6.0, 13.8)	2.70 dd(14.0, 6.5)	2.26 dd(8.4, 13.9)	
8′	2.20 m	2.12 m	1.72 m	2.36 m
9′	4.32 dd(6.6, 11.4)	3.47 m	0.77 d(6.6)	4.54 dd(11.2, 5.9)
	4.09 dd(5.4, 11.4)			4.35 dd(11.2, 4.3)
1″		4.24 d(8.0)		
2″	7.29 d(1.2)	3.19 dd(9.0, 8.0)		8.01 d(8.0)
3″				7.43 t(7.7)
4″		3.47 m		7.57 t(6.5)
5″	6.78 d(7.8)	3.25 m		7.43 t(7.7)
6″	7.09 dd(1.2, 7.8)	3.85 dd(12.0, 2.0)		8.01 d(8.0)
		4.08 dd(12.0, 6.0)		
7″	7.53 d(15.6)			
8″	6.48 d(15.6)			
1‴		4.24 d(8.0)		
2‴	7.29 d(1.2)	3.19 dd(9.0, 8.0)		8.01 d(8.0)
3‴				7.43 t(7.7)

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Table 6-3-5 (continued)

H	6-3-11	6-3-12	6-3-13	6-3-14
4‴		3.47 m		7.57 t(6.5)
5‴	6.78 d(7.8)	3.25 m		7.43 t(7.7)
6‴	7.09 dd(1.2, 7.8)	3.85 dd(12.0, 2.0) 4.08 dd(12.0, 6.0)		8.01 d(8.0)
7‴	7.53 d(15.6)			
8‴	6.48 d(15.6)			
OMe	3.66 s(3, 5, 5′, 3″-OMe) 3.80 s(3′, 3‴-OMe)	3.72 s(3, 3′-OMe)		3.77 s(3, 3′-OMe)
OCH_2O			5.79 s	

Table 6-3-6: ^{1}H NMR spectroscopic data of lignans **6-3-15**~**6-3-17**.

H	6-3-15	6-3-16	6-3-17
2	6.15 d(1.5)	6.24 d(1.5)	6.34 d(1.0)
6	6.32 d(1.5)	6.21 d(1.5)	6.32 d(1.0)
7	2.32 dd(14.0, 7.7), 2.46 dd(13.7, 7.1)	2.62 dd(7.3, 13.9), 2.57 dd(7.6, 13.9)	2.75 dd(8.6, 13.7), 2.62 dd(6.1, 13.7)
8	1.72 br m	2.07 m	1.87 m
9	0.79 d(6.6)	4.15 dd(6.0, 11.3), 4.01 dd(5.5, 11.3)	3.82 t(11.4), 3.55 dd(4.2, 11.5)
2′	6.15 d(1.5)	6.24 d(1.5)	6.34 d(1.0)
6′	6.32 d(1.5)	6.21 d(1.5)	6.32 d(1.0)
7′	2.32 dd(14.0, 7.7), 2.46 dd(13.7, 7.1)	2.62 dd(7.3, 13.9), 2.57 dd(7.6, 13.9)	2.75 dd(8.6, 13.7), 2.62 dd(6.1, 13.7)
8′	1.72 br m	2.07 m	1.87 m
9′	0.79 d(6.6)	4.15 dd(6.0, 11.3), 4.01 dd(5.5, 11.3)	3.82 t(11.4), 3.55 dd(4.2, 11.5)
OMe	3.79 s(3, 3′-OMe)	3.85 s	3.87 s(5,5′-OMe)
OCH_2O		5.94 d(1.5), 5.93 d(1.5)	5.93 s
OAc		2.07 s	

Table 6-3-7: ^{1}H NMR spectroscopic data of lignans **6-3-18**~**6-3-20**.

H	6-3-18	6-3-19	6-3-20
2	6.63 d(2.0)	6.29 s	6.66 d(2.0)
5	6.89 d(8.3)		6.99 d(8.0)
6	6.34 dd(8.3, 2.0)	6.29 s	6.63 dd(8.0, 2.0)
7	2.53 m, 2.65 m	2.56 m, 2.68 m	2.58 dd(13.8, 7.8), 2.70 dd(13.8, 7.0)
8	1.85 m	1.89 m	1.89 m
9	3.58 d(5.4)	3.58 d(5.0)	3.58 d(4.7)
2′	6.48 d(2.0)	6.59 d(2.0)	6.57 d(2.0)
5′	6.64 d(8.0)	6.64 d(8.0)	6.65 d(8.0)
6′	6.51 dd(8.0, 2.0)	6.52 dd(8.0, 2.0)	6.52 dd(8.0, 2.0)

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Table 6-3-7 (continued)

H	6-3-18	6-3-19	6-3-20
7′	2.50 m, 2.62 m	2.56 m, 2.68 m	2.54 dd(13.8, 7.8), 2.66 dd(13.8, 7.0)
8′	1.82 m	1.87 m	1.86 m
9′	3.56 d(5.4)	3.56 d(5.0)	3.58 d(4.7)
1″	4.82 d(7.8)	4.74 d(7.6)	4.79 d(7.3)
2″	3.51 m	3.50 m	3.46 m
3″	3.51 m	3.43 m	3.47 m
4″	3.43 t(9.0)	3.43 m	3.44 m
5″	3.75 m	3.50 m	3.38 m
6″	4.40 dd(11.9, 7.0)	4.39 dd(11.7, 6.5)	3.68 dd(12.2, 6.2)
	4.64 dd(11.9, 2.2)	4.51 dd(11.7, 2.0)	3.87 dd(12.2, 2.0)
2‴	7.52 d(2.0)	7.39 d(2.0)	
5‴	6.85 d(8.3)	6.79 d(8.8)	
6‴	7.57 dd(8.3, 2.0)	7.44 dd(8.8, 2.0)	
3-OMe	3.72 s	3.68 s	3.76 s
5-OMe		3.68 s	
3′-OMe	3.66 s	3.76 s	3.74 s
3‴-OMe	3.84 s	3.84 s	

Table 6-3-8: ^{1}H NMR spectroscopic data of lignans **6-3-21**~**6-3-23**.

H	6-3-21	6-3-22	6-3-23
2	7.16 d(9.0)	6.63 d(1.9)	
3	6.72 d(9.0)		6.29 d(2.4)
5	6.72 d(9.0)	6.80 d(8.7)	6.19 dd(8.2, 2.4)
6	7.16 d(9.0)	6.64 dd(8.7, 1.9)	6.70 d(8.2)
7	7.84 d(2)	2.56 dd(14.2, 7.3), 2.68 dd(14.2, 7.3)	3.43 s
8		1.89 m	
9		3.58 (ov)	4.79 s, 5.15 s
2′	7.86 d(8.0)	6.68 d(1.8)	6.59 br s
3′	6.75 d(8.0)		
5′	6.75 d(8.0)	7.01 d(8.3)	6.57 d(7.7)
6′	6.75 d(8.0)	6.62 dd(8.3, 1.8)	6.58~6.59 m
7′		2.58 dd(14.2, 7.5), 2.70 dd(14.2, 7.5)	3.47 s
8′	4.20 d(2)	1.91 m	
9′		3.58 (ov)	4.83 s, 5.27 s
1″		4.82 d(7.5)	
2″		3.48 dd(8.7, 7.5)	
3″		3.46 t(8.7)	
4″		3.39 (ov)	
5″		3.39 m	
6″		3.69 dd(11.7, 5.2), 3.86 dd(11.7, 2.3)	
3-OMe		3.72 s	
4-OMe		3.79 s	
3′-OMe		3.74 s	
OCH_2O			5.81 s

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Table 6-3-9: ^{1}H NMR spectroscopic data of lignans **6-3-24**~**6-3-27**.

H	6-3-24	6-3-25	6-3-26	6-3-27
2	6.92 d(8.5)	6.56 br s	6.47~6.56 m	6.49 d(1.8)
3	6.67 d(8.5)			
5	6.67 d(8.5)	6.67 d(7.8)	6.67 d(8.0)	6.68 d(8.0)
6	6.92 d(8.5)	6.54 br d(7.8)	6.47~6.56 m	6.48 dd(1.8, 8.0)
7	3.47 s	2.61 m	2.59 m	2.59 m
8		2.02 m	2.07 m	
9	4.85 s, 5.22 s	3.27 m	3.92~4.20 m	3.92~4.22 m
2′		6.60 br s	6.47~6.56 m	6.24 s
5′		6.74 d(8.1)	6.79 d(8.0)	
6′		6.64 br d(8.1)	6.47~6.56 m	6.24 s
7′		2.56 m	2.59 m	2.59 m
8′		2.02 m	2.07 m	2.10 m
9′		3.27 m	3.92~4.20 m	3.92~4.22 m
OMe		3.265 s (9-OMe) 3.80 s (3′-OMe) 3.84 s (4′-OMe) 3.273 s (9′-OMe)	3.80 s (3′-OMe)	3.78 s (3′,5′-OMe) 3.79 s (4′-OMe)
OCH_2O		5.89 s	5.90 s	5.90 s
OAc			2.04 s	2.05 s

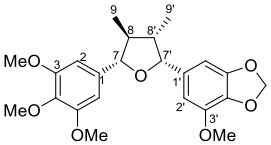
Table 6-3-10: ^{1}H NMR spectroscopic data of lignans **6-3-28**~**6-3-30**.

H	6-3-28	6-3-29	6-3-30
2	6.53 d(1.8)	6.53 d(1.8)	6.48 d(1.8)
5	6.74 d(8.0)	6.73 d(8.0)	6.66 d(8.0)
6	6.55 dd(1.8, 8.0)	6.56 dd(1.8, 8.0)	6.46 dd(1.8, 8.0)
7	2.64 m	2.62 m	2.59 m
8	2.10 m	2.08 m	2.06 m
9	3.95~4.25 m	3.92~4.22 m	3.91~4.24 m
2′	6.53 d(1.8)	6.22 s	6.24 s
5′	6.74 d(8.0)		
6′	6.55 dd(1.8, 8.0)	6.22 s	6.24 s
7′	2.64 m	2.62 m	2.59 m
8′	2.10 m	2.08 m	2.06 m
9′	3.95~4.25 m	3.92~4.22 m	3.91~4.24 m
OMe	3.79 s(3, 3′-OMe) 3.84 s(4, 4′-OMe)	3.75 s 3.78 s(3 or 4′-OMe) 3.79 s(3 or 4′-OMe) 3.81 s(4-OMe)	3.82 s(3′,5′-OMe)
OCH_2O			5.89 s
OAc	2.05 s	2.04 s	2.03 s, 2.04 s

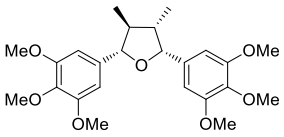
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Table 6-3-11: Compounds, MFs, and test solvents of lignans **6-3-31**~**6-3-54**.

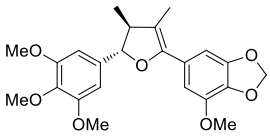
No.	Compounds	MFs	Test solvents	References
6-3-31	beilschmin A	$C_{23}H_{28}O_7$	$CDCl_3$	[163]
6-3-32	beilschmin B	$C_{24}H_{32}O_7$	$CDCl_3$	[163]
6-3-33	beilschmin C	$C_{23}H_{26}O_7$	$CDCl_3$	[163]
6-3-34	futokadsurin A	$C_{21}H_{26}O_5$	$CDCl_3$	[164]
6-3-35	futokadsurin B	$C_{21}H_{24}O_5$	$CDCl_3$	[164]
6-3-36	futokadsurin C	$C_{21}H_{24}O_5$	$CDCl_3$	[164]
6-3-37	odoratisol C	$C_{20}H_{24}O_5$	$CDCl_3$	[165]
6-3-38	odoratisol D	$C_{20}H_{22}O_5$	$CDCl_3$	[165]
6-3-39	7*R*,7′*R*,8*S*,8′*S*-(+)-neo-olivil 4-*O*-*β* -D-glucopyranoside	$C_{26}H_{34}O_{12}$	CD_3OD	[166]
6-3-40	7*S*,7′*S*,8*R*,8′*R*-icariol A_2-9-*O*-*β* -D-glucopyranoside	$C_{28}H_{38}O_{14}$	CD_3OD	[167]
6-3-41	(7*S**,8*R**,7′*S**,8′*R**)-4,4′-dimethoxyhuazhongilexin 9-*O*-*β*-D-xylopyranoside	$C_{29}H_{40}O_{13}$	CD_3OD	[168]
6-3-42	(7*S**,8*R**,7′*S**,8′*R**)-4,4′-dimethoxyhuazhongilexin 9-*O*-*α*-L-arabinopyranoside	$C_{29}H_{40}O_{13}$	CD_3OD	[168]
6-3-43	(7*S**,8*R**,7′*S**,8′*R**)-huazhongilexin 9-*O*-(2-feruloyl)-*β*-D-xylopyranoside	$C_{37}H_{44}O_{16}$	DMSO-d_6	[168]
6-3-44	lancilignanside A	$C_{26}H_{30}O_{11}$	CD_3COCD_3	[169]
6-3-45	urinaligran	$C_{22}H_{24}O_7$	$CDCl_3$	[161]
6-3-46	7*β*,8*β*-epoxyzuonin A	$C_{20}H_{18}O_6$	$CDCl_3$	[170]
6-3-47	(–)-zuonin A	$C_{20}H_{20}O_5$	$CDCl_3$	[170]
6-3-48	7,7′-bis-(4-hydroxy-3,5-dimethoxyphenyl)-8,8′-dihy-droxymethyl-tetrahydrofuran-4-*O*-*β*-glucopyranoside	$C_{28}H_{36}O_{14}$	CD_3OD	[171]
6-3-49	(7*R*,8*R*,7′*S*,8′*R*)-3′,4′-methylenedioxy-3,4,5,5′-tetra-methoxy-7,7′-epoxylignan	$C_{23}H_{28}O_7$	$CDCl_3$	[172]
6-3-50	*rel*-(7*S*,8*S*,7′*R*,8′*S*)-3,4,3′,4′-tetramethoxy-6-hydroxy-7,7′-epoxylignan	$C_{22}H_{28}O_6$	$CDCl_3$	[173]
6-3-51	*rel*-(7*S*,8*R*,7′*S*,8′*S*)-3,4,3′-trimethoxy-4′-hydroxy-7,7′-epoxylignan	$C_{21}H_{26}O_5$	$CDCl_3$	[173]
6-3-52	*rel*-(7*S*,8*R*,7′*S*,8′*S*)-3,4′,3′-trimethoxy-4-hydroxy-7,7′-epoxylignan	$C_{21}H_{26}O_5$	$CDCl_3$	[173]
6-3-53	*rel*-(7*R*,8*R*,7′*R*,8′*R*)-3′,4′-methylenedioxy-3,4,5,5′-tetramethoxy-7,7′-epoxylignan	$C_{23}H_{28}O_7$	$CDCl_3$	[174]
6-3-54	*rel*-(7*R*,8*R*,7′*R*,8′*R*)-3,4,3′,4′-dimethylenedioxy-5,5′-dimethoxy-7,7′-epoxylignan	$C_{22}H_{24}O_7$	$CDCl_3$	[174]



6-3-31

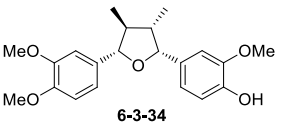


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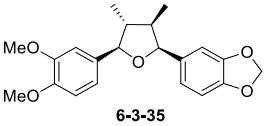


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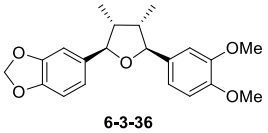
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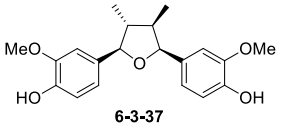
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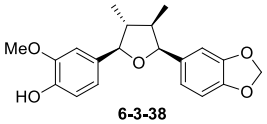
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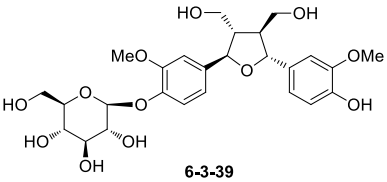
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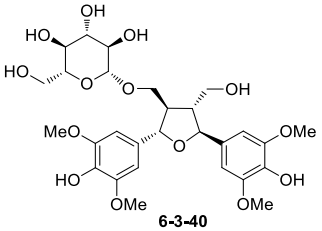
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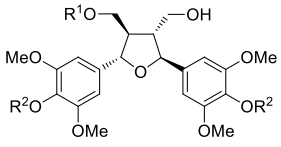
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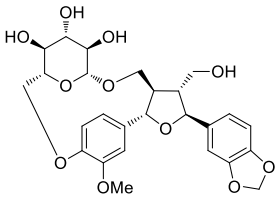
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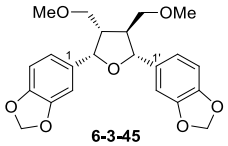
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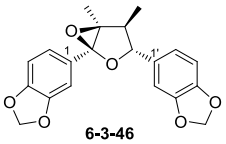
	R^1	R^2
6-3-41	β-D-Xyl	Me
6-3-42	α-L-Ara	Me
6-3-43	2-*O*-*E*-Fer-β-D-Xyl	H



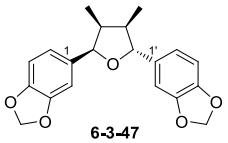
6-3-44



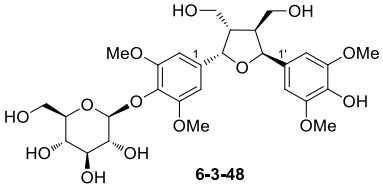
6-3-45



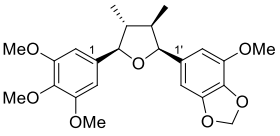
6-3-46



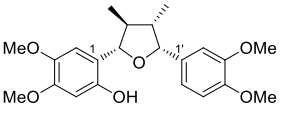
6-3-47



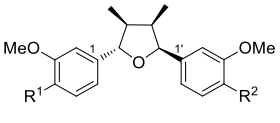
6-3-48



6-3-49

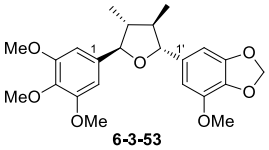


6-3-50

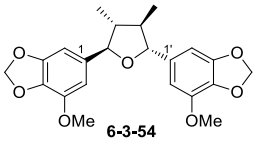


	R^1	R^2
6-3-51	OMe	OH
6-3-52	OH	OMe

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6-3-53



6-3-54

Table 6-3-12: ^{1}H NMR spectroscopic data of lignans **6-3-31**~**6-3-34**.

H	6-3-31	6-3-32	6-3-33	6-3-34
2	6.73 s	6.73 s	6.73 s	7.07 d(1.6)
5				6.88 d(8.0)
6	6.73 s	6.73 s	6.73 s	7.04 dd(1.6, 8.0)
7	4.39 d(9.0)	4.42 d(9.5)	4.86 d(10.0)	4.41 d(9.2)
8	1.77 m	1.79 m	2.47 m	1.78 ddq(6.8, 9.2, 9.2)
9	1.09 d(6.5)	1.11 d(6.0)	1.04 d(6.8)	1.06 d(6.8)
2′	6.52 d(1.0)	6.55 s	6.87 d(1.6)	6.86 d(2.0)
5′				6.88 d(8.0)
6′	6.58 d(1.0)	6.55 s	6.91 d(1.6)	6.83 dd(2.0, 8.0)
7′	5.09 d(9.0)	5.11 d(8.5)		5.12 d(8.8)
8′	2.24 m	2.25 m		2.24 ddq(6.8, 8.8, 9.2)
9′	0.70 d(7.0)	0.69 d(7.0)		0.66 d(6.8)
OMe	3.89 s(3,5-OMe)	3.87 s(3,5-OMe)	3.88 s(3,5-OMe)	3.91 s(3-OMe)
	3.86 s(4-OMe)	3.83 s(4,4′-OMe)	3.84 s	3.89 s(4-OMe)
	3.89 s(3′-OMe)	3.83 s(3′,5′-OMe)	3.92 s	3.85 s(3′-OMe)
OCH_2O	5.96 s		6.01 s	

Table 6-3-13: ^{1}H NMR spectroscopic data of lignans **6-3-35**~**6-3-37**.

H	6-3-35	6-3-36	6-3-37
2	7.06 d(2.0)	6.97 d(2.0)	6.97 d(1.7)
5	6.89 d(8.0)	6.78 d(8.0)	6.84 d(8.3)
6	7.02 dd(2.0, 8.0)	6.88 dd(2.0, 8.0)	6.90 dd(8.3, 1.7)
7	4.38 d(9.6)	4.46 d(7.2)	4.31 d(9.3)
8	1.77 ddq(6.4, 9.0, 9.6)	2.31 m	1.70 br dq(9.3, 6.6)
9	1.05 d(6.4)	1.02 d(6.4)	0.98 d(6.6)
2′	6.78 d(1.6)	6.99 d(2.0)	6.78 d(1.7)
5′	6.79 d(8.0)	6.86 d(8.0)	6.80 d(8.0)
6′	6.89 dd(1.6, 8.0)	6.95 dd(2.0, 8.0)	6.74 dd(8.0, 1.7)
7′	5.10 d(8.8)	4.47 d(7.2)	5.03 d(8.8)
8′	2.26 ddq(7.2, 8.8, 9.0)	2.26 m	2.14 br dq(8.8, 6.8)
9′	0.67 d(7.2)	1.02 d(6.4)	0.58 d(6.8)
OMe	3.92 s(3-OMe)	3.89 s(3′-OMe)	3.82 s(3-OMe)
	3.90 s(4-OMe)	3.87 s(4′-OMe)	3.77 s(3′-OMe)
OCH_2O	5.95 s	5.93 s	

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Table 6-3-14: ^{1}H NMR spectroscopic data of lignans **6-3-38**~**6-3-40**.

H	6-3-38	6-3-39	6-3-40
2	6.95 d(1.7)	7.11 d(2.0)	6.78 s
5	6.83 d(8.3)	7.16 d(8.3)	
6	6.87 dd(8.3, 1.7)	6.98 dd(8.3, 2.0)	6.78 s
7	4.27 d(9.3)	4.94 d(8.4)	5.07 d(8.3)
8	1.68 br dq(9.3, 6.6)	2.31 m	2.50 m
9	0.95 d(6.6)	3.57~3.73 m	3.68 dd(10.0, 5.4), 4.10 dd(10.0, 4,9)
2′	6.70 d(1.7)	7.03 d(1.7)	6.75 s
5′	6.71 d(8.0)	6.78 d(8.1)	
6′	6.79 dd(8.0, 1.7)	6.87 dd(8.1, 1.7)	6.75 s
7′	5.01 d(8.8)	4.98 d(8.1)	4.99 d(8.5)
8′	2.13 br dq(8.8, 7.1)	2.31 m	2.38 m
9′	0.59 d(7.1)	3.57~3.73 m	3.66 dd(11.4, 5.4), 3.79 dd(11.4, 4.4)
1″		4.89 d(7.6)	4.28 d(7.6)
OMe	3.82 s	3.89 s(3-OMe)	
		3.88 s(3′-OMe)	
OCH_2O	5.85 s		

Table 6-3-15: ^{1}H NMR spectroscopic data of lignans **6-3-41**~**6-3-44**.

H	6-3-41	6-3-42	6-3-43	6-3-44
2	6.71 s	6.71 s	6.63 s	6.99 d(1.3)
5				6.76 d(8.0)
6	6.71 s	6.71 s	6.63 s	6.92 d(1.3, 8.0)
7	5.04 d(8.0)	5.07 d(8.0)	5.04 d(8.0)	5.01 d(8.2)
8	2.34 m	2.36 m	2.23 m	2.40 m
9	3.88 dd(11.5, 3.5)	3.99 dd(10.5, 4.0)	3.90 br d(10.0)	3.57 (ov)
	3.67 dd(11.5, 3.5)	3.67 dd(10.5, 4.0)	3.76 (ov)	3.98 dd(4.4, 9.6)
2′	6.73 s	6.75 s	6.61 s	7.05 d(1.7)
5′				6.80 d(8.1)
6′	6.73 s	6.75 s	6.61 s	6.88 dd(1.7, 8.1)
7′	4.99 d(8.0)	4.99 d(8.0)	4.84 d(8.5)	4.94 d(8.6)
8′	2.34 m	2.36 m	2.23 m	2.28 m
9′	3.73 m	3.73 dd(11.5, 3.0)	3.81 (ov)	3.58 (ov)
	3.60 dd(11.5, 2.0)	3.60 dd(11.5, 3.0)	3.46 dd(12.4, 3.0)	3.70 m
1″	4.17 d(7.5)	4.14 d(7.5)	4.36 d(7.6)	4.27 d(7.1)
2″	3.15 t(8.0)	3.50 m	3.50 t(8.5)	3.16 (ov)
3″	3.24 (ov)	3.45 dd(9.5, 3.0)	3.22 m	3.35 t(7.6)
4″	3.43 m	3.75 m	3.58 m	3.46 (ov)
5″	3.79 (ov), 3.12 dd(13.5, 2.50)	3.79 (ov), 3.50 m	3.83(ov), 3.22 m	3.45 (ov)
6″				3.18 (ov),
				3.79 dd(5.7, 10.8)
OMe	3.81 s(3, 5-OMe)	3.81 s(3, 5-OMe)	3.78 s(3, 5-OMe)	3.83 s
	3.81 s(3′, 5′-OMe)	3.81 s(3′, 5′-OMe)	3.83 s(3′, 5′-OMe)	
	3.70 s(4, 4′-OMe)	3.70 s(4, 4′-OMe)		
OCH_2O				5.97 s

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Table 6-3-16: ^{1}H NMR spectroscopic data of lignans **6-3-45**~**6-3-47**.

H	6-3-45	6-3-46	6-3-47
2	6.90 d(1.5)	7.14 d(1.7)	6.99 d(1.3)
5	6.76 d(8.0)	6.80 d(7.8)	6.79 d(8.0)
6	6.83 dd(8.0, 1.5)	7.15 dd(7.8, 1.7)	6.90 dd(8.0, 1.3)
7	5.02 d(7.3)		4.30 d(9.2)
8	2.56 m		1.68 m
9	2.95 dd(9.2, 5.7)	1.28 s	0.64 d(7.1)
2′	7.00 d(1.6)	7.02 d(1.5)	6.84 br s
5′	6.78 d(8.1)	6.76 d(7.9)	6.77 br s
6′	6.91 dd(8.1, 1.6)	6.87 dd(7.9, 1.5)	6.77 br s
7′	4.67 d(8.0)	4.82 d(10.1)	5.05 d(8.7)
8′	2.26 m	2.40 dq(10.1, 6.7)	2.16 m
9′	3.45 dd(9.5, 4.9), 3.51 dd(9.5, 5.4)	0.97 d(6.7)	1.01 d(6.7)
9-OMe	3.07 s		
9′-OMe	3.34 s		
OCH_2O	5.940 s(3,4-OCH_2O-)	5.93 s	5.93 s
	5.936 s(3′,4′-OCH_2O-)	5.96 s	5.95 s

Table 6-3-17: ^{1}H NMR spectroscopic data of lignans **6-3-48**~**6-3-50**.

H	6-3-48	6-3-49	6-3-50
2	6.70 s	6.73 d(2.2)	6.57 s
5			6.51 s
6	6.70 s	6.73 d(2.2)	
7	4.75 d(4.0)	4.38 d(6.6)	4.57 d(9.6)
8	3.12 m	1.78 m	1.97~2.05 m
9	3.86~3.92 m, 4.24~4.30 m	1.07 d(6.6)	1.17 d(6.3)
2′	6.65 s	6.55 d(2.1)	6.77 d(2.0)
5′			6.85 d(8.1)
6′	6.65 s	6.60 d(2.1)	6.78 dd(2.0, 8.1)
7′	4.70 d(4.0)	5.08 d(6.6)	5.15 d(8.6)
8′	3.12 m	2.23 m	2.21~2.31 m
9′	3.86~3.92 m, 4.24~4.30 m	0.69 d(6.9)	0.71 d(7.1)
1″	4.76 d(7.2)		
2″	3.47 m		
3″	3.40 t(7.2)		
4″	3.41 t(7.2)		
5″	3.19 m		
6″	3.66 dd(12.0, 4.8), 3.77 dd(12.0, 2.4)		
OMe	3.83 s(3,5-OMe)	3.89 s(3,5,3′-OMe)	3.88 s, 3.85 s
		3.84 s(4-OMe)	3.83 s, 3.82 s
OCH_2O		5.91 s	

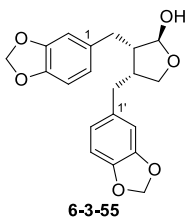
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Table 6-3-18: ^{1}H NMR spectroscopic data of lignans **6-3-51**~**6-3-54**.

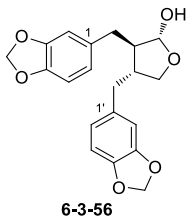
H	6-3-51	6-3-52	6-3-53	6-3-54
2	6.96 d(1.8)	6.95 d(1.8)	6.54 s	6.51 s
5	6.85 d(8.1)	6.89 d(8.1)		
6	6.92 dd(1.8, 8.1)	6.85~6.87 m	6.54 s	6.51 s
7	4.66 d(9.3)	4.64 d(9.1)	4.52 d(7.2)	4.50 d(9.0)
8	2.41~2.47 m	2.40~2.49 m	1.67 m	1.68 m
9	1.00 d(6.3)	1.00 d(6.6)	0.96 d(4.5)	0.96 d(6.3)
2′	6.94 d(2.0)	6.92 d(1.3)	6.52 s	6.51 s
5′	6.91 d(8.8)	6.85~6.87 m		
6′	6.78 dd(2.0, 8.8)	6.85~6.87 m	6.52 s	6.51 s
7′	5.46 d(4.3)	5.46 d(4.5)	4.52 d(7.2)	4.50 d(9.0)
8′	2.41~2.47 m	2.40~2.49 m	1.67 m	1.68 m
9′	0.62 d(7.0)	0.62 d(7.0)	0.96 d(4.5)	0.96 d(6.3)
OMe	3.88 s, 3.89 s, 3.90 s	3.87 s, 3.88 s, 3.90 s	3.80 s(3,5-OMe) 3.76 s(4-OMe) 3.84 s(5′-OMe)	3.85 s(5,5′-OMe)
OCH_2O			5.87 s	5.88 s, 5.88 s

Table 6-3-19: Compounds, MFs, and test solvents of lignans **6-3-55**~**6-3-64**.

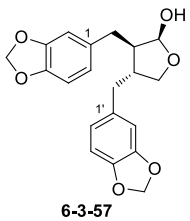
No.	Compounds	MFs	Test solvents	References
6-3-55	(8*S*, 8′*R*, 9*S*)-cubebin	$C_{20}H_{20}O_6$	$CDCl_3$	[175]
6-3-56	(8*R*, 8′*R*, 9*R*)-cubebin	$C_{20}H_{20}O_6$	$CDCl_3$	[175]
6-3-57	(8*R*, 8′*R*, 9*S*)-cubebin	$C_{20}H_{20}O_6$	$CDCl_3$	[175]
6-3-58	tripterygiol	$C_{22}H_{28}O_8$	CD_3COCD_3	[176]
6-3-59	4,4′-dihydroxy-3,3′-dimethoxy-9-butoxy-9,9′-epoxylignan	$C_{24}H_{32}O_6$	DMSO-d_6	[177]
6-3-60	4,4′-dihydroxy-3,3′-dimethoxy-9-ethoxy-9,9′-epoxylignan	$C_{22}H_{28}O_6$	$CDCl_3$	[177]
6-3-61	isocubebin	$C_{20}H_{20}O_6$	CD_3OD	[177]
6-3-62	aristelegin B	$C_{22}H_{28}O_6$	$CDCl_3$	[178]
6-3-63	aristelegin C	$C_{21}H_{24}O_6$	$CDCl_3$	[178]
6-3-64	sanjidin A	$C_{24}H_{28}O_9$	$CDCl_3$	[179]



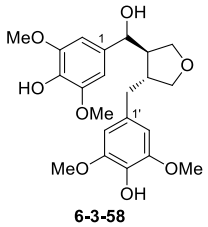
6-3-55



6-3-56

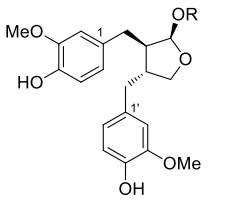


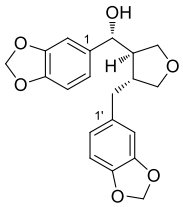
6-3-57

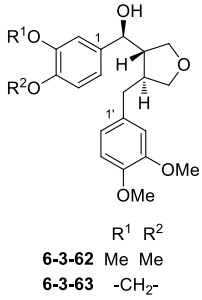


6-3-58

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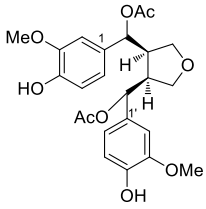


Table 6-3-20: ^{1}H NMR spectroscopic data of lignans **6-3-55**~**6-3-58**.

H	6-3-55	6-3-56	6-3-57	6-3-58
2	6.49 d(1.5)	6.45 d(1.5)	6.56 d(1.5)	6.64 s
5	6.61 d(7.5)	6.61 d(8.5)	6.66 d(8.0)	
6	6.47 dd(7.5, 1.5)	6.44 dd(8.5, 1.5)	6.52 dd(8.0, 1.5)	6.64 s
7	2.33 dd(14.0, 8.0)	2.37 m	2.37 m	4.79 d(6.0)
	2.56 dd(14.0, 7.5)	2.60 dd(13.7, 7.5)	2.52 m	
8	2.02 m	2.07 m	1.93 m	2.32 m
9	5.04 d(1.5)	5.15 d(1.5)	5.15 d(4.5)	3.73 dd(10.2, 6.3)
				3.87 dd(10.2, 7.2)
2′	6.42 d(1.5)	6.51 d(1.5)	6.67 d(2.0)	6.52 s
5′	6.61 d(7.5)	6.63 d(7.5)	6.66 d(8.0)	
6′	6.41 dd(7.5, 1.5)	6.49 dd(7.5, 1.5)	6.62 dd(8.0, 2.0)	6.52 s
7′	2.44 m	2.50 m, 2.52 m	2.50 m	2.54 dd(13.2, 11.1)
			2.70 dd(14.0, 10.0)	2.95 dd(13.2, 4.8)
8′	2.02 m	2.07 m	2.37 m	2.71 m
9′	3.32 t(8.5)	3.73 dd(8.5, 8.0)	3.50 dd(8.5, 7.5)	3.69 dd(8.1, 7.1)
	3.83 dd(8.5, 7.0)	3.93 dd(8.5, 7.0)	4.03 t(8.5)	3.96 dd(8.1, 6.6)
OMe				3.80 s
OCH_2O		5.85 d(1.5)	5.85 d(1.5)	

Table 6-3-21: ^{1}H NMR spectroscopic data of lignans **6-3-59**~**6-3-61**.

H	6-3-59	6-3-60	6-3-61
2	6.67 d(1.8)	6.53 d(1.8)	6.84 d(1.2)
5	6.66 d(7.8)	6.80 d(7.8)	6.76 m
6	6.53 dd(1.8, 7.8)	6.61 dd(1.8, 7.8)	6.76 m
7	2.48 m	2.56 m	4.80 d(6.6)

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Table 6-3-21 (continued)

H	6-3-59	6-3-60	6-3-61
8	2.01 m	2.15 m	2.35 m
9	4.73 d(1.8)	4.84 d(1.2)	3.75 dd(6.6, 10.8), 3.88 dd(5.4, 10.8)
2′	6.61 d(1.8)	6.43 d(1.8)	6.68 d(1.2)
5′	6.65 d(7.8)	6.77 d(7.8)	6.73 d(7.8)
6′	6.48 dd(1.8, 7.8)	6.55 dd(1.8, 7.8)	6.64 dd(1.2, 7.8)
7′	2.39 m, 2.48 m	2.56 m, 2.42 dd(15.6, 8.4)	2.53 dd(10.2, 13.8), 2.87 dd(5.4, 13.8)
8′	2.07 m	2.14 m	2.70 m
9′	3.48 m, 3.82 t(7.8)	4.00 dd(7.2, 8.4), 3.67 t(7.8)	3.72 dd(6.6, 8.4), 3.74 dd(6.6, 8.4)
1″	3.21 m, 3.48 m	3.71 m, 3.39 m	
2″	1.39 m	1.17 t(6.6)	
3″	1.23 m		
4″	0.83 t(7.2)		
3-OMe	3.72 s	3.81 s	
3′-OMe	3.71 s	3.80 s	
OCH_2O			5.93 d(6.6), 5.93 d(6.6)

Table 6-3-22: ^{1}H NMR spectroscopic data of lignans **6-3-62**~**6-3-64**.

H	6-3-62	6-3-63	6-3-64
2	6.71 d(1.8)	6.7~6.9	
5	6.80 d(8.1)	6.7~6.9	6.90 d(8.1)
6	6.74 dd(8.1, 1.8)	6.7~6.9	6.88 dd(8.1, 1.7)
7	4.82 d(6.7)	4.78 d(6.4)	4.92 d(7.7)
8	2.43 tt(13.6, 6.7)	2.37 tt(14.0, 6.4)	2.47 m
9	3.78 dd(13.6, 10.8), 3.93 dd(10.8, 6.7)	3.79 m, 3.91 dd(10.0, 6.4)	4.23 dd(11.8, 4.9), 4.25 dd(11.8, 5.6)
2′	6.89 d(1.8)	6.7~6.9	6.94 d(1.7)
5′	6.82 d(8.2)	6.7~6.9	6.90 d(8.1)
6′	6.85 dd(8.2, 1.8)	6.7~6.9	6.88 dd(8.1, 1.7)
7′	2.58 dd(13.6, 10.2), 2.93 dd(13.6, 4.9)	2.55 dd(13.2, 10.6), 2.91 dd(13.2, 4.8)	4.92 d(7.7)
8′	2.75 m	2.73 m	2.47 m
9′	3.76 dd(8.8, 6.8), 4.06 dd(8.8, 6.8)	3.76 m, 4.04 dd(8.8, 6.8)	4.23 dd(11.8, 4.9), 4.25 dd(11.8, 5.6)
OMe	3.87 s, 3.87 s	3.85 s	3.92 s(3,3′-OMe)
	3.90 s, 3.90 s	3.86 s	
OCH_2O		5.94 s	
OAc			1.97 s, 1.97 s

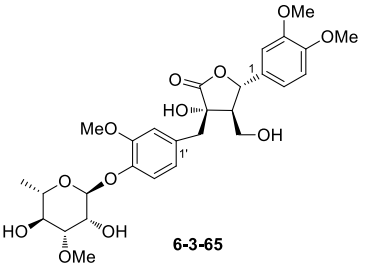
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Table 6-3-23: Compounds, MFs, and test solvents of lignans **6-3-65**~**6-3-93**.

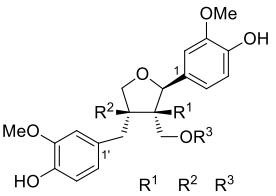
No.	Compounds	MFs	Test solvents	References
6-3-65	(8*R*,8′*S*,7*S*)-4′-(3″-methoxyrhamnopyranosyl)-oxy-8′-hydroxy-3,3′,4-trimethoxy-8-hydroxymethyl-lign-7–9′-lactone	$C_{28}H_{36}O_{12}$	CD_3OD	[180]
6-3-66	olivil 9-*O*-*β*-D-xyloside	$C_{25}H_{32}O_{11}$	CD_3OD	[181]
6-3-67	berchemol 9-*O*-*α*-rhamnoside	$C_{26}H_{34}O_{11}$	CD_3OD	[181]
6-3-68	(–)-lariciresinol-4′-(6″-*O*-feruloyl-*β*-D-glucopyranoside)	$C_{36}H_{42}O_{14}$	CD_3COCD_3	[182]
6-3-69	(–)-lariciresinol-4′-(4″,6″-di-*O*-feruloyl-*β*-D-glucopyranoside)	$C_{46}H_{50}O_{17}$	CD_3OD	[182]
6-3-70	5,5′-dimethoxylariciresinol-4′-(4″,6″-di-*O*-feruloyl-*β*-D-glucopyranoside)	$C_{48}H_{54}O_{19}$	CD_3COCD_3	[182]
6-3-71	4-*O*-[*α*-(1,2-dihydroxyethyl)syringyl]-5,5′-dimethoxylariciresinol-4′-(4″,6″-di-*O*-feruloyl-*β*-D-glucopyranoside)	$C_{59}H_{68}O_{24}$	CD_3COCD_3	[182]
6-3-72	(–)-berchemol	$C_{20}H_{24}O_7$	CD_3OD	[183]
6-3-73	gentioluteol	$C_{21}H_{26}O_8$	CD_3OD	[183]
6-3-74	(7*S*,8*R*,8′*R*)-9-*O*-acetyldihydrosesamin	$C_{22}H_{22}O_7$	$CDCl_3$	[184]
6-3-75	7*S*,8*R*,7′*S*,8′*R*-3,4,3′,4′-tetramethoxy-9,7′-dihydr-oxy-8,8′:7,O,9′-lignan	$C_{22}H_{28}O_7$	$CDCl_3$	[185]
6-3-76	forsythialan A	$C_{20}H_{22}O_7$	$CDCl_3$	[186]
6-3-77	forsythialan B	$C_{21}H_{24}O_7$	$CDCl_3$	[186]
6-3-78	dysosmarol	$C_{20}H_{24}O_7$	CD_3OD	[187]
6-3-79	altissinone	$C_{21}H_{20}O_8$	$CDCl_3$	[188]
6-3-80	neoarctin A	$C_{26}H_{34}O_{12}$	CD_3OD	[189]
6-3-81	lanicepside A	$C_{26}H_{34}O_{12}$	CD_3OD	[190]
6-3-82	(–)-2-hydroxysesaminone	$C_{20}H_{18}O_8$	$CDCl_3$	[191]
6-3-83	mananthoside G	$C_{31}H_{36}O_{17}$	CD_3OD	[191]
6-3-84	mananthoside H	$C_{32}H_{38}O_{17}$	CD_3OD	[191]
6-3-85	8,9-epoxy-lariciresinol	$C_{20}H_{22}O_6$	CD_3OD	[192]
6-3-86	5,4′,8-trihydroxy-3,3′-dimethoxy-8-chloromethyl-ene-7,9′-epoxylignan	$C_{20}H_{23}ClO_6$	$CDCl_3$	[192]
6-3-87	(+)-9′-isovaleryllariciresinol①	$C_{25}H_{32}O_7$	CD_3COCD_3	[193]
6-3-88	9′-*O*-acetyl-(7*S*,8*R*,7′*S*,8′*R*)-(–)-fargesol②	$C_{24}H_{30}O_8$	$CDCl_3$	[194]
6-3-89	massoniresinol-4′-*O*-*β*-D-glucoside	$C_{26}H_{34}O_{13}$	CD_3OD	[195]
6-3-90	berchemol-4′-*O*-*β*-D-glucoside	$C_{26}H_{34}O_{12}$	CD_3OD	[195]
6-3-91	tinosposide B	$C_{27}H_{36}O_{12}$	CD_3OD	[159]
6-3-92	{(2*S*,3*R*,4*R*)-2-(3,4-dimethoxyphenyl)-4-[(3,4-dimethoxyphenyl)methyl]tetrahydrofuran-3-yl}-methyl(2*E*)-2-methylbut-2-enoate	$C_{27}H_{34}O_7$	$CDCl_3$	[196]
6-3-93	(8*S*, 7′*R*)-9′-lariciresinol-(*α*-methyl)-butanoate	$C_{25}H_{32}O_7$	$CDCl_3$	[197]

① Anorther designation, (+)-9′-isovaleroxylariciresinol, was also used in the original literation.
② Typographic errors exist in the literature, giving different absolute configurations.

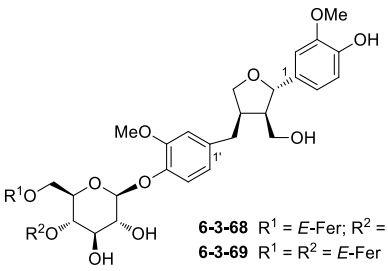
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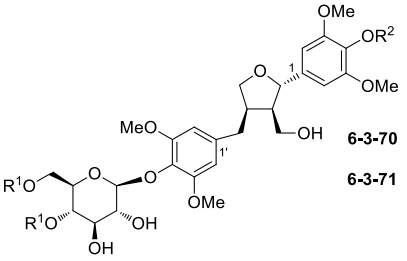
6-3-65



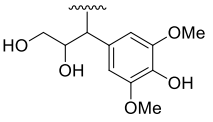
	R^1	R^2	R^3
6-3-66	H	OH	D-Xyl
6-3-67	OH	H	Rha

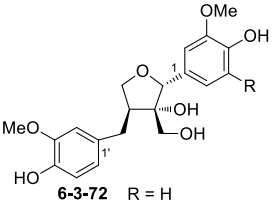


6-3-68 R^1 = *E*-Fer; R^2 = H
6-3-69 R^1 = R^2 = *E*-Fer

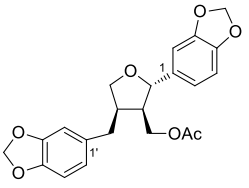


6-3-70 R^1 = *E*-Fer; R^2 = H
6-3-71 R^1 = *E*-Fer; R^2 =

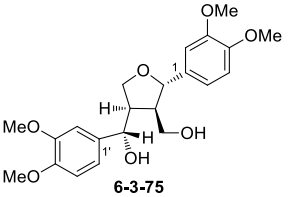




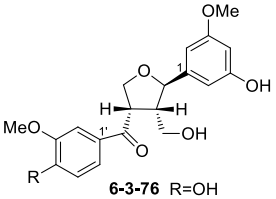
6-3-72 R = H
6-3-73 R = OMe



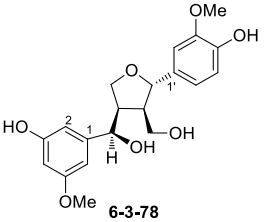
6-3-74



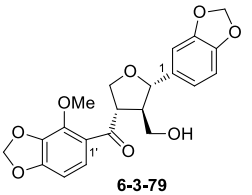
6-3-75



6-3-76 R=OH
6-3-77 R=OMe

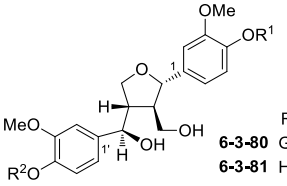


6-3-78

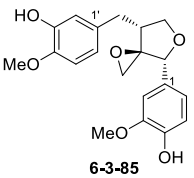


6-3-79

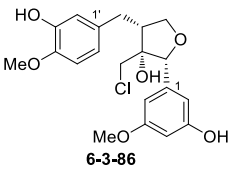
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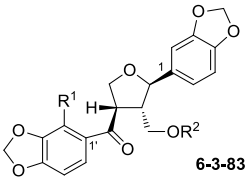
6-3-80 Glc H
6-3-81 H Glc



6-3-85

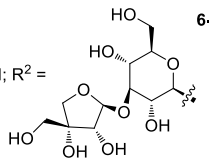


6-3-86

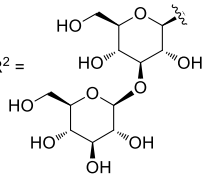


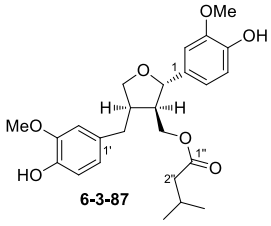
6-3-82 R^1 = OH; R^2 = H

6-3-83 R^1 = OH; R^2 =

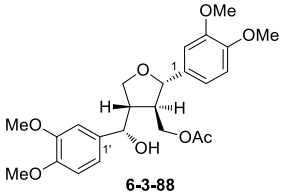


6-3-84 R^1 = H; R^2 =

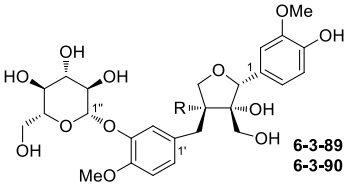




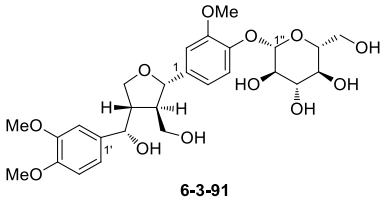
6-3-87



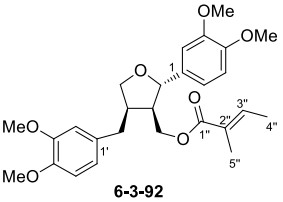
6-3-88



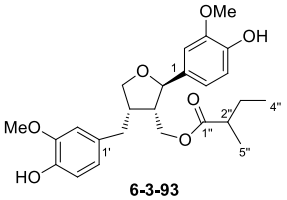
6-3-89 R = OH
6-3-90 R = H



6-3-91



6-3-92



6-3-93

Table 6-3-24: ^{1}H NMR spectroscopic data of lignans **6-3-65**~**6-3-67**.

H	6-3-65	6-3-66	6-3-67
2	6.38 d(1.8)	7.11 d(2.0)	6.94 d(1.5)
5	6.84 d(8.2)	6.74 d(8.0)	6.78 d(7.9)
6	6.58 dd(8.2, 1.8)	6.87 dd(8.0, 2.0)	6.75 dd(7.9, 1.5)

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Table 6-3-24 (continued)

H	6-3-65	6-3-66	6-3-67
7	5.13 d(9.1)	4.75 d(7.9)	4.87 s
8	2.44 ddd(9.1, 7.3, 4.8)	2.41 td(7.3, 4.9)	
9	3.93 dd(11.3, 7.3), 3.58 dd(11.4, 4.8)	4.04 dd(10.1, 4.9), 3.69 dd(10.1, 7.0)	3.83, 3.56 d(10.1)
2′	6.96 d(1.7)	6.91 d(1.5)	6.78 d(2.1)
5′	7.05 d(8.2)	6.70~6.74 m	6.72 d(8.2)
6′	6.81 dd(8.2, 1.7)	6.70~6.74 m	6.66 dd(8.2, 2.1)
7′	3.32 d(13.1), 3.05 d(13.1)	3.00 d(14.0), 2.91 d(14.0)	3.01 dd(13.1, 3.7), 2.50 t(12.5)
8′			2.57~2.63 m
9′		3.83~3.85 m, 3.61 d(14.0)	4.07 dd(8.4, 6.9), 3.63~3.67 m
1″	5.32 d(1.4)	4.24 d(7.6)	4.73 d(1.6)
2″	3.82~4.27 m	3.18~3.23 m	3.90 dd(3.4, 1.6)
3″	3.82~4.27 m	3.32 dd(8.9, 7.4)	3.73 dd(9.5, 3.4)
4″	3.82~4.27 m	3.49 ddd(10.1, 8.9, 5.2)	3.39 t(9.5)
5″	3.82~4.27 m	3.85~3.88 m, 3.18~3.23 m	3.63~3.67 m
6″	1.21 d(6.2)		1.25 d(6.4)
3-OMe	3.62 s	3.85 s	3.84 s
3′-OMe	3.80 s	3.83 s	3.85 s
4-OMe	3.78 s		
3″-OMe	3.51 s		

Table 6-3-25: ^{1}H NMR spectroscopic data of lignans **6-3-68**~**6-3-71**.

H	6-3-68	6-3-69	6-3-70	6-3-71
2	6.79 d(2.4)	6.86 d(2.1)	6.64 s	6.72 s
5	7.12 d(8.0)	6.77 d(8.4)		
6	6.76 dd(8.0, 2.4)	7.04 dd(8.4, 2.1)	6.64 s	6.72 s
7	4.75 d(6.0)	4.70 d(6.8)	4.77 d(6.0)	4.83 d(6.0)
8	2.22~2.29 m	2.22~2.28 m	2.35 br sept(6.4)	2.34 br sept(6.4)
9	3.64 (ov), 3.81 (ov)	3.59 (ov), 3.87 (ov)	3.69 (ov), 3.85 (ov)	3.46 (ov), 3.88 (ov)
2′	6.96 d(2.0)	6.89 d(2.0)	6.58 s	6.58 s
5′	6.72 d(8.0)	6.78 d(8.0)		
6′	6.32 dd(8.0, 2.0)	6.58 dd(8.0, 2.0)	6.58 s	6.58 s
7′	2.88 dd(13.4, 4.5)	2.82 dd(13.6, 4.4)	2.95 dd(13.2, 4.8)	2.95(ov)
	2.46 dd(13.4, 4.8)	2.40 dd(13.6, 4.9)	2.52 dd(13.2, 11.2)	2.52 dd(13.2, 11.2)
8′	2.61 m	2.61 m	2.72 m	2.72 m
9′	3.85 (ov)	3.92 (ov)	3.96 dd(8.4, 6.8)	3.96 dd(8.4, 6.8)
	3.81 (ov)	3.57 (ov)	3.67 (ov)	3.67 (ov)
1″	4.90 d(7.2)	4.90 d(7.8)	4.87 d(7.6)	4.84 d(7.6)
2″	3.53 (ov)	3.55 (ov)	3.62 t(9.0)	3.62 t(9.0)
3″	3.59 (ov)	3.70 (ov)	3.78 (ov)	3.78 (ov)
4″	3.48 (ov)	5.06 t(9.6)	5.09 t(9.0)	5.08 t(9.0)

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Table 6-3-25 (continued)

H	6-3-68	6-3-69	6-3-70	6-3-71
5″	3.73 (ov)	3.82 (ov)	3.80 (ov)	3.80 (ov)
6″	4.51 dd(12.4, 2.0)	4.33 dd(12.0, 6.0)	4.18 dd(12.0, 4.0)	4.21 dd(12.0, 4.0)
	4.35 dd(12.4, 6.8)	4.24 dd(12.0, 5.0)	4.21 dd(12.0, 6.6)	4.23 dd(12.0, 6.4)
2‴	7.33 d(2.4)	7.09 d(2.0)	7.32 d(1.6)	7.32 d(1.6)
5‴	6.87 d(7.6)	6.78 d(8.0)	6.85 d(8.0)	6.85 d(8.0)
6‴	7.13 dd(7.6, 2.4)	7.00 dd(8.0, 2.0)	7.12 dd(8.0, 1.6)	7.12 dd(8.0, 1.6)
7‴	7.61 d(16.0)	7.56 d(16.0)	7.63 d(15.6)	7.63 d(15.6)
8‴	6.32 d(16.0)	6.33 d(16.0)	6.42 d(15.6)	6.42 d(15.6)
2⁗		7.07 d(2.0)	7.26 d(2.0)	7.26 d(2.0)
5⁗		6.78 d(8.0)	7.05 dd(8.4, 2.0)	7.05 dd(8.4, 2.0)
6⁗		7.00 dd(8.0, 2.0)	6.82 d(8.4)	6.82 d(8.4)
7⁗		7.62 d(16.0)	7.55 d(15.6)	7.55 d(15.6)
8⁗		6.22 d(16.0)	6.32 d(15.6)	6.32 d(15.6)
2⁗′				6.69 s
6⁗′				6.69 s
OMe	3.79 s(3-OMe)	3.77 s(3-OMe)	3.79 s(3,5-OMe)	3.80 s(3,5-OMe)
	3.79 s(3′-OMe)	3.79 s(3′-OMe)	3.82 s(3′,5′-OMe)	3.83 s(3′,5′-OMe)
	3.90 s(3‴-OMe)	3.84 s(3‴-OMe)	3.85 s(3‴-OMe)	3.89 s(3‴-OMe)
		3.84 s(3⁗-OMe)	3.86 s(3⁗-OMe)	3.87 s(3⁗-OMe)

Table 6-3-26: ^{1}H NMR spectroscopic data of lignans **6-3-72**~**6-3-74**.

H	6-3-72	6-3-73	6-3-74
2	6.85 d(2.2)	6.63 s	6.80 d(1.5)
5	6.67 d(9.1)		6.76 (ov)
6	6.64 dd(2.2, 9.1)	6.63 s	6.76 (ov)
7	4.71 s	4.83 s	4.76 d(6.0)
8			2.50 (ov)
9	3.69 d(11.6),	3.80 d(11.3),	4.15 dd(11.5, 7.5),
	3.49 d(11.6)	3.65 d(11.3)	4.31 dd(11.5, 7.0)
2′	6.70 d(1.9)	6.81 d(1.9)	6.66 d(1.5)
5′	6.62 d(8.2)	6.71 d(8.1)	6.73 d(8.0)
6′	6.54 dd(1.9, 8.2)	6.65 dd(1.9, 8.1)	6.62 dd(8.0, 1.5)
7′	2.97 dd(3.3, 13.0),	3.08 dd(3.5, 12.8),	2.80 dd(13.5, 5.0), 2.50 (ov)
	2.36 dd(12.3, 13.0)	2.48 dd(12.8, 12.8)	
8′	2.47 m	2.57 m	2.70 m
9′	3.96 dd(6.7, 8.4),	4.06 dd(6.7, 8.2),	4.05 dd(9.0, 6.5),
		3.66 dd(5.5, 8.2)	3.71 dd(9.0, 7.0)
	3.55 dd(5.5, 8.4)		
3-OMe	3.83 s	3.58 s	
5-OMe		3.58 s	
3′-OMe	3.84 s	3.83 s	
OCH_2O			5.94 s, 5.95 s
OAc			2.04 s

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Table 6-3-27: ^{1}H NMR spectroscopic data of lignans **6-3-75**~**6-3-78**.

H	6-3-75	6-3-76	6-3-77	6-3-78
2	6.88 s	7.02 s	7.03 s	6.86 s
4		6.87 s	6.88 s	6.73 s
5	6.83 d(7.8)			
6	6.87 m	6.87 s	6.88 s	6.73 s
7	4.94 d(7.0)	4.67 d(9.1)	4.68 d(9.1)	4.47 d(8.5)
8	2.27 m	2.89 m	2.91 m	2.52 m
9	3.90 m	3.65 dd(5.6, 10.9)	3.67 dd(5.6, 10.9)	3.92 dd(8.0, 8.6)
	3.99 dd(3.7, 11.3)	3.77 dd(4.4, 10.9)	3.78 dd(4.4, 10.9)	
2′	6.89 s	7.57 d(2.0)	7.58 d(2.0)	6.91 d(1.2)
5′	6.82 d(8.0)	6.96 d(8.2)	6.92 d(8.3)	6.74 d(7.9)
6′	6.87 m	7.56 dd(2.0, 8.2)	7.61 dd(2.0, 8.3)	6.79 br d(1.2, 7.9)
7′	5.09 d(3.7)			4.61 d(7.4)
8′	2.80 m	4.18 m	4.19 m	1.88 m
9′	4.05 t(8.3)	4.18 m	4.19 m	3.21 dd(5.5, 11.3)
	4.14 t(8.6)	4.28 br d(11.0)	4.29 br d(11.0)	3.29 m
OMe	3.858 s, 3.864 s	3.91 s(3-OMe)	3.93 s(3-OMe)	3.81 s(3-OMe)
	3.869 s, 3.873 s	3.95 s(3′-OMe)	3.95 s(3′-OMe)	3.84 s(3′-OMe)
			3.97 s(4-OMe)	

Table 6-3-28: ^{1}H NMR spectroscopic data of lignans **6-3-79**~**6-3-81**.

H	6-3-79	6-3-80	6-3-81
2	6.97 d(1.5)	7.08 br s	6.94 d(1.8)
5	6.77 d(8.0)	7.14 d(7.9)	6.76 d(8.1)
6	6.85 dd(8.0, 1.5)	6.97 d(7.9)	6.79 dd(8.1, 1.8)
7	4.57 d(9.0)	4.66 d(7.5)	4.52 d(8.6)
8	2.85 m	2.28 m	2.25~2.31 m
9	3.63 dd(11.0, 6.5),	3.79 dd(11.1, 4.5),	3.58~3.63 m
	3.73 dd(11.0, 5.0)	3.69 dd(11.0, 6.4)	
2′		6.99 br s	7.09 d(2.0)
5′	6.59 d(8.5)	7.10 d(7.9)	7.14 d(8.2)
6′	7.27 d(8.0)	6.76 d(7.9)	6.93 dd(8.2, 2.0)
7′		4.57 d(8.1)	4.53 d(8.8)
8′	4.03 m	2.63 m	2.59~2.66 m
9′	4.17 dd(9.0, 6.0),	4.27 dd(9.0, 4.5),	3.73 dd(8.4. 6.4)
	4.22 t(9.0)	3.90 dd(9.0, 7.5)	
1″		4.89 d(6.8)	4.88 d(7.6)
2″			3.49 dd(9.2, 7.5)
3″			3.46 t(9.2)
4″			3.39~3.41 m
5″			3.39~3.41 m
6″			3.87(ov), 3.69 dd(12.2, 4.1)
OMe	4.11 s	3.85 s(3-OMe)	3.86 s(3-OMe)
		3.88 s(3′-OMe)	3.89 s(3′-OMe)
3-OCH_2O	5.95 s		
3′-OCH_2O	6.03 s		

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Table 6-3-29: ^{1}H NMR spectroscopic data of lignans **6-3-82**~**6-3-84**.

H	6-3-82	6-3-83	6-3-84
2	6.98 s	6.98 s	6.95 s
5	6.78 d(8.0)	6.77 d(7.8)	6.79 d(8.0)
6	6.86 d(8.0)	6.92 d(7.8)	6.90 d(8.0)
7	4.67 d(9.0)	4.82 d(8.7)	4.92 d(6.6)
8	2.84 br s	2.73 br s	2.85 m
9	3.75 br s, 3.67 br s	4.00 m, 3.56 m	3.82 m, 3.48 m
2′			7.44 d(1.5)
5′	6.52 d(8.5)	6.58 d(7.9)	6.90 d(8.0)
6′	7.44 d(8.5)	7.60 d(7.9)	7.65 dd(8.0, 1.5)
8′	4.19 m	4.35 m	4.35 m
9′	4.25 m, 4.20 m	4.18 m	4.30 m, 4.22 m
1″		4.34 d(7.6)	4.07 d(7.8)
2″		3.23 m	3.18 m
3″		3.36 m	3.40 m
4″		3.31 m	3.30 m
5″		3.47 m	3.35 m
6″		3.79 m, 3.63 m	3.79 m, 3.62 m
1‴		5.35 d(2.2)	4.48 d(7.8)
2‴		3.84 m	3.25 m
3‴			3.33 m
4‴		3.96 m, 3.71 m	3.26 m
5‴		3.59 m, 3.51 m	3.29 m
6‴			3.83 m, 3.62 m
3-OCH_2O	5.96 s	5.92 s	5.94 s
3′-OCH_2O	6.10 s	6.05 s	6.06 s

Table 6-3-30: ^{1}H NMR spectroscopic data of lignans **6-3-85**~**6-3-87**.

H	6-3-85	6-3-86	6-3-87
2	6.86 d(2.0)	6.89 s	6.97 d(1.8)
4		6.81 s	
5	6.79 d(8.0)		6.75 d(7.8)
6	6.73 dd(2.0, 8.0)	6.80 s	6.69 dd(7.8, 1.8)
7	4.67 m	4.87 m	4.75 d(6.6)
8			2.53 m
9	2.39 t(4.5), 2.80 t(4.5)	3.14 t(15.0), 3.28 t(15.0)	4.39 dd(11.4, 6.6), 4.19 dd(11.4, 7.2)
2′	6.33 d(2.0)	6.70 d(2.0)	6.86 d(2.4)
5′	6.81 d(8.0)	6.72 d(10.0)	6.79 d(8.4)
6′	6.59 dd(2.0, 8.0)	6.60 dd(2.0, 10.0)	6.81 dd(8.4, 2.4)
7′	2.64 dd(10.0, 14.0), 2.74 dd(5.0, 14.0)	2.48 m, 2.85 m	2.87 dd(13.2, 4.8)
8′	2.45 m	2.45 m	2.78 m

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Table 6-3-30 (continued)

H	6-3-85	6-3-86	6-3-87
9′	3.97 dd(4.0, 9.0), 4.03 dd(6.5, 8.0)	3.86 dd(2.5, 12.0), 3.95 dd(5.0, 12.0)	4.02 dd(8.4, 6.6), 3.72 dd(8.4, 6.6)
2″			2.19 m
3″			2.05 m
4″			0.95 d(6.6)
5″			0.95 d(6.6)
3-OMe	3.80 s	3.77 s	
4′-OMe	3.85 s	3.80 s	

Table 6-3-31: ^{1}H NMR spectroscopic data of lignans **6-3-88**~**6-3-90**.

H	6-3-88	6-3-89	6-3-90
2	6.92 d(1.9)	7.03 d(2.0)	6.92
5	6.84 d(8.2)	6.71 d(8.2)	6.73
6	6.88 dd(1.9, 8.2)	6.75 dd(8.1, 2.0)	6.73
7	4.52 d(7.7)	4.99 s	4.82 s
8	2.10 m		
9	3.85 m	3.67 d(11.5), 3.78 d(11.5)	3.60 d(11.4), 3.79 d(11.4)
2′	6.86 s	6.97 d(1.9)	6.90 d(2.00)
5′	6.81 br s	7.09 d(8.20)	7.09 d(8.00)
6′	6.81 br s	6.86 dd(8.2, 1.9)	6.77 dd(8.00, 2.00)
7′	4.59 d(7.7)	2.94 d(13.9), 3.01 d(13.9)	2.54 dd(13.4, 13.2), 3.12 dd(13.4, 13.2)
8′	2.50 m		2.59 m
9′	3.98 dd(7.4, 9.3), 4.34 dd(4.1, 9.3)	3.65 d(8.7), 3.83 d(8.90)	3.63 dd(8.50, 5.50), 4.05 dd(3.50, 6.50)
1″		4.87 d(7.5)	4.86 d(7.40)
OMe	3.86 s, 3.87 s 3.88 s, 3.90 s	3.81 s 3.86 s	3.83 s 3.86 s
OAc	1.91 s		

Table 6-3-32: ^{1}H NMR spectroscopic data of lignans **6-3-91**~**6-3-93**.

H	6-3-91	6-3-92	6-3-93
2	7.01 d(1.6)	6.87 m	6.85 m
5	7.13 d(8.2)	6.84 m	6.85 m
6	6.91 dd(8.2, 1.6)	6.86 m	6.85 m
7	4.67 d(7.1)	4.87 d(6.4)	4.79 d(6.4)
8	1.89 m	2.60 m	2.55 m
9	3.25 dd(11.0, 6.0) 3.32 dd(11.0, 6.0)	4.28 dd(11.4, 7.1) 4.41 dd(11.4, 7.1)	3.76 t(7.2) 4.06 t(7.2)
2′	6.90 d(1.6)	6.78 m	6.67 br s

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Table 6-3-32 (continued)

H	6-3-91	6-3-92	6-3-93
5′	6.88 d(8.2)	6.68 m	6.85 m
6′	6.81 dd(8.2, 1.6)	6.72 m	6.67 br s
7′	4.49 d(8.5)	2.57 d(13.2), 2.90 dd(13.2, 4.6)	2.86 dd(13.0, 4.4), 2.55 m
8′	2.54 m	2.75 m	2.72 m
9′	3.95 dd(8.9, 7.3), 4.26 dd(8.9, 4.4)	3.77 dd(8.7, 6.4), 4.08 dd(8.7, 6.4)	4.18 dd(11.2, 7.2), 4.39 dd(11.2, 7.2)
1″	4.88 d(7.5)		
2″	3.50 dd(9.1, 7.6)		2.37 dd(13.6, 7.2)
3″	3.46 t(9.1)	6.12 qq	1.47 m, 1.68 m
4″	3.40(ov)	1.99 dd(7.1, 1.4)	0.92 t(7.3)
5″	3.40 m	1.87 br s	1.55 d(7.3)
6″	3.69 dd(10.5, 5.1), 3.86 dd(10.5, 2.3)		
OMe	3.86 s(3-OMe) 3.80 s(3′-OMe) 3.80 s(4′-OMe)	3.87 s 3.86 s 3.85 s	3.93 s(3′-OMe) 3.94 s(3-OMe)

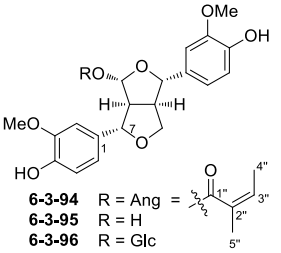
Table 6-3-33: Compounds, MFs, and test solvents of lignans **6-3-94**~**6-3-131**.

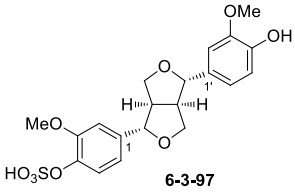
No.	Compounds	MFs	Test solvents	References
6-3-94	9*α*-angloyloxypinoresinol	$C_{25}H_{28}O_8$	CD_3Cl	[198]
6-3-95	9*α*-hydroxypinoresinol	$C_{20}H_{22}O_7$	C_5D_5N	[198]
6-3-96	4-[(*β*-D-glucopyranosyl)oxy]pinoresinol	$C_{26}H_{32}O_{12}$	CD_3OD	[199]
6-3-97	pinoresinol 4-sulfate	$C_{20}H_{22}O_9S$	DMSO-d_6	[200]
6-3-98	pinoresinol	$C_{20}H_{22}O_6$	CD_3COCD_3	[201]
6-3-99	syringaresinol	$C_{22}H_{26}O_8$	CD_3COCD_3	[201]
6-3-100	pinoresinol-4′-*O*-[6″-*O*-(*E*)-feruloyl]-*β*-D-glucopyranoside	$C_{36}H_{40}O_{14}$	CD_3COCD_3	[201]
6-3-101	pinoresinol-4′-*O*-[4″,6″-*O*-(*E*)-diferuloyl]-*β*-D-glucopyranoside	$C_{46}H_{48}O_{17}$	CD_3COCD_3	[201]
6-3-102	syringaresinol-4′-*O*-[4″,6″-*O*-(*E*)-diferuloyl]-*β*-D-glucopyranoside	$C_{48}H_{52}O_{19}$	CD_3COCD_3	[201]
6-3-103	ecbolin A	$C_{23}H_{24}O_9$	$CDCl_3$	[202]
6-3-104	rayalinol	$C_{22}H_{26}O_8$	$CDCl_3$	[203]
6-3-105	(1*S*,2*R*,5*S*,6*R*)-2-(4-hydroxyphenyl)-6-(3-methoxy-4-hydroxyphenyl)-3,7-dioxabicyclo[3.3.0]octane	$C_{19}H_{20}O_5$	$CDCl_3$	[204]
6-3-106	(+)-pinoresinol 4-*O*-[6″-*O*-galloyl]-*β*-D-glucopyranoside	$C_{33}H_{36}O_{15}$	CD_3OD	[205]
6-3-107	(+)-1-hydroxy-2,6-bis-*epi*-pinoresinol	$C_{20}H_{22}O_7$	$CDCl_3$	[206]
6-3-108	2′-methoxykobusin	$C_{22}H_{24}O_7$	$CDCl_3$	[207]
6-3-109	2′-methoxy-4″-hydroxydemethoxykobusin	$C_{21}H_{22}O_7$	$CDCl_3$	[207]

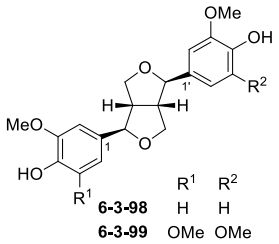
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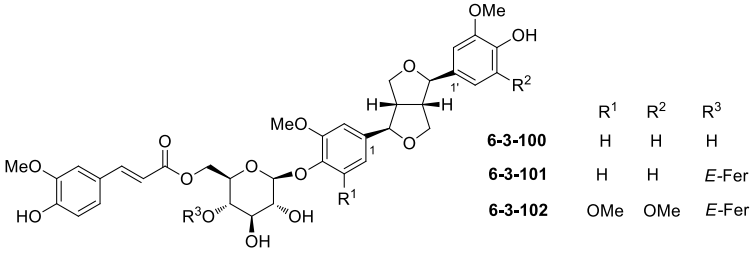
Table 6-3-33 (continued)

No.	Compounds	MFs	Test solvents	References
6-3-110	(+)-beechenol	$C_{19}H_{18}O_5$	$CDCl_3$	[208]
6-3-111	boropinan	$C_{25}H_{30}O_6$	CD_3COCD_3	[209]
6-3-112	sesamin	$C_{20}H_{18}O_6$	$CDCl_3$	[210]
6-3-113	2α-guaicyl-4-oxo-6α-catechyl-3,7-dioxabicyclo-[3.3.0] octane	$C_{20}H_{20}O_8$	CD_3OD	[211]
6-3-114	(+)-epimagnolin B	$C_{23}H_{28}O_7$	$CDCl_3$	[212]
6-3-115	di-demethyl-5-hydroxypinoresinol	$C_{18}H_{18}O_7$	$CDCl_3$	[213]
6-3-116	demethylpinoresinol	$C_{19}H_{20}O_6$	$CDCl_3$	[213]
6-3-117	pinoresinol	$C_{20}H_{22}O_6$	$CDCl_3$	[213]
6-3-118	didemethoxy pinoresinol	$C_{18}H_{18}O_6$	$CDCl_3$	[213]
6-3-119	4′-methyl-5′-hydroxypinoresinol	$C_{21}H_{24}O_7$	$CDCl_3$	[213]
6-3-120	5′-hydroxy-methyl-piperitol	$C_{21}H_{22}O_7$	$CDCl_3$	[213]
6-3-121	syzygiresinol A	$C_{19}H_{18}O_7$	$CDCl_3$	[213]
6-3-122	syzygiresinol B	$C_{18}H_{16}O_8$	$CDCl_3$	[213]
6-3-123	(+)-4-(3-methylbutanoyl)-2,6-di(3,4-dimethoxy)-phenyl-3,7-dioxabicyclo[3.3.0]octane	$C_{27}H_{34}O_8$	$CDCl_3$	[214]
6-3-124	(+)-4-hydroxy-2,6-di(3,4-dimethoxy)phenyl-3,7-dioxabicyclo[3.3.0]octane	$C_{22}H_{26}O_7$	$CDCl_3$	[214]
6-3-125	(–)-aptosimon	$C_{20}H_{16}O_7$	$CDCl_3$	[215]
6-3-126	(–)-diasesamin-di-γ-lactone	$C_{20}H_{14}O_8$	$CDCl_3$	[215]
6-3-127	prinsepiol-4-*O*-β-D-glucopyranoside	$C_{26}H_{32}O_{13}$	CD_3OD	[216]
6-3-128	fraxiresinol-4′-*O*-β-D-glucopyranoside	$C_{27}H_{34}O_{13}$	CD_3OD	[216]
6-3-129	prinsepiol	$C_{20}H_{22}O_8$	CD_3OD	[216]
6-3-130	caruilignan A	$C_{25}H_{32}O_9$	$CDCl_3$	[217]
6-3-131	caruilignan B	$C_{23}H_{26}O_8$	$CDCl_3$	[217]

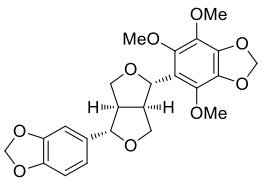




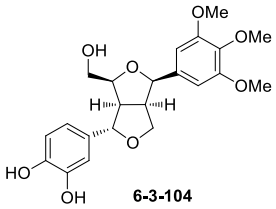




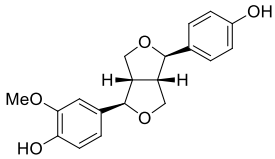
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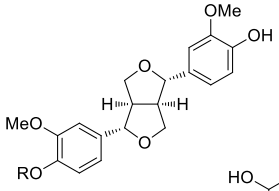
6-3-103



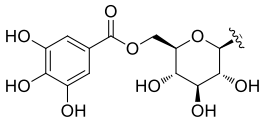
6-3-104

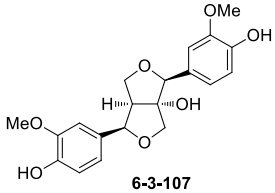


6-3-105

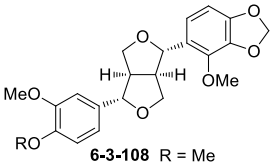


6-3-106 R =

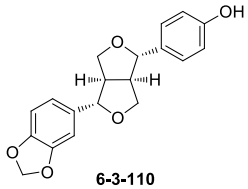




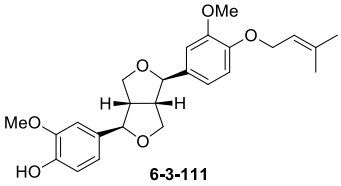
6-3-107



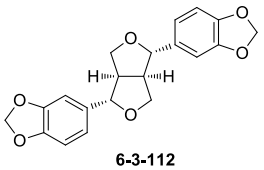
6-3-108 R = Me
6-3-109 R = H



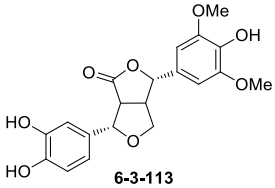
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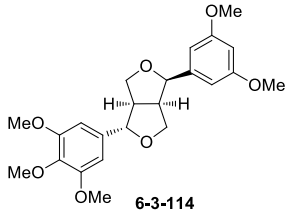
6-3-111



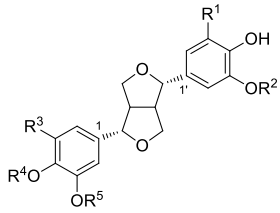
6-3-112



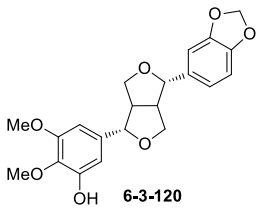
6-3-113



6-3-114



	R^1	R^2	R^3	R^4	R^5
6-3-115	OH	H	H	H	H
6-3-116	H	Me	H	H	H
6-3-117	H	Me	H	H	Me
6-3-118	H	H	H	H	H
6-3-119	H	Me	OMe	Me	H



6-3-120

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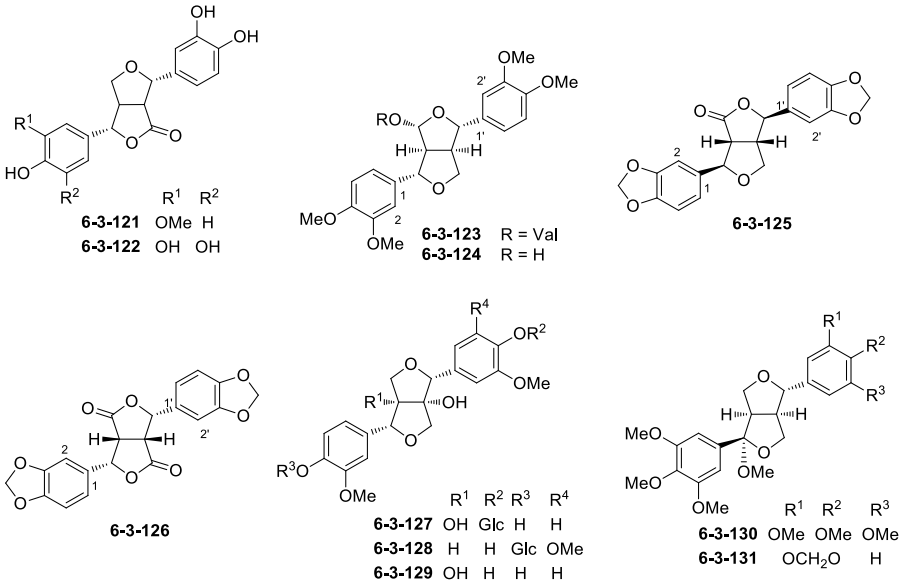


Table 6-3-34: ^{1}H NMR spectroscopic data of lignans **6-3-94**~**6-3-98**.

H	6-3-94	6-3-95	6-3-96	6-3-97	6-3-98
2	7.05 br s	7.30 d(2.0)	6.99 d(2.0)	6.92 d(1.6)	6.96 d(2.0)
5	7.00 d(8.9)	7.27 d(8.0)	6.75 d(8.0)	7.40 d(8.3)	7.05 d(8.0)
6	6.97 dd(8.9, 1.3)	7.16 dd(8.0, 2.0)	6.85 dd(8.0, 2.0)	6.82 dd(8.3, 1.8)	6.70 dd(8.0, 2.0)
7	5.09 d(6.9)	5.29 d(6.1)	4.84 d(7.6)	4.66 d(4.5)	4.60 d(5.0)
8	3.40 m	3.46 m	2.97 m	3.05 m	2.89 m
9	6.64 br s	6.16 d(1.1)	5.69 br s	3.75 m 4.15 ddd(8.9, 6.5, 2.5)	4.13 dd(9.3, 7.0) 3.40 dd(9.3, 3.0)
2′	7.11 br s	7.64 d(2.0)	7.18 d(2.0)	6.89 d(1.5)	6.96 d(2.0)
5′	7.02 d(8.5)	7.28 d(8.0)	6.79 d(8.0)	6.72 d(8.1)	7.05 d(8.0)
6′	7.09 dd(8.5, 1.2)	7.31 dd(8.0, 2.0)	6.96 dd(8.0, 2.0)	6.75 dd(8.1, 1.5)	6.70 dd(8.0, 2.0)
7′	5.27 d(6.0)	5.29 d(6.1)	4.97 d(7.6)	4.60 d(4.7)	4.60 d(5.0)
8′	3.20 m	3.45 m	3.30 m	5.10 m	2.89 m
9′	*α* 4.49 dd(9.0, 5.8)	*α* 4.40 dd(9.0, 6.1)	4.17 dd(9.2, 5.6)	3.75 m	4.13 dd(9.3, 7.0)
	β 4.22 dd(9.0, 2.6)	*β* 4.27 dd(9.0, 2.0)	3.94 dd(9.2, 2.0)	4.15 ddd(8.9, 6.5, 2.5)	3.40 dd(9.3, 3.0)
1″			4.94 d(7.2)		
2″			3.30~3.40(ov)		
3″	6.20 qd(7.2, 1.4)		3.30~3.40(ov)		
4″	2.05 d(7.2)		3.30~3.40(ov)		
5″	1.92 s		3.30~3.40(ov)		
6″			3.78 m, 3.60 m		
OMe	3.98 s, 3.96 s	3.86 s, 3.85 s	3.85 s, 3.82 s	3.74 s, 3.76 s	3.85 s
OH				8.91 s	

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Table 6-3-35: ^{1}H NMR spectroscopic data of lignans **6-3-99**~**6-3-103**.

H	6-3-99	6-3-100	6-3-101	6-3-102	6-3-103
2	6.56 s	6.99 d(2.0)	7.02 d(1.6)	6.67 s	6.87 s
5		6.79 d(8.0)	6.81 d(8.4)		6.78 d(8.0)
6	6.56 s	6.80 dd(8.0, 2.0)	7.16 dd(8.4, 1.6)	6.67 s	6.82 d(8.0)
7	4.70 d(4.3)	4.62 d(4.0)	4.68 d(4.0)	4.66 d(3.4)	4.75 d(6.6)[a]
8	3.07 m	2.99 m	2.99 m	2.99 m	3.12 m[b]
9	4.26 m	4.12 dd(9.5, 3.4)	4.20 t(8.4)	4.20 dd(9.4, 3.4)	3.85 m[c]
	3.89 m	3.73 (ov)	3.74 (ov)	3.84 (ov)	4.12 dd(7.3, 8.4)[c]
2′	6.56 s	6.96 d(2.0)	6.97 d(2.0)	6.67 s	
5′		6.78 d(8.0)	6.80 d(8.0)		
6′	6.56 s	6.87 dd(8.0, 2.0)	7.14 dd(8.0, 2.0)	6.67 s	
7′	4.70 d(4.3)	4.61 d(4.0)	4.66 d(4.0)	4.66 d(3.4)	5.25 d(6.4)[a]
8′	3.07 m	2.99 m	2.99 (ov)	2.99 m	3.35 m[b]
9′	4.26 m	4.12 dd(9.5, 3.4)	4.20 t(8.4)	4.20 dd(9.4, 3.4)	3.85 m[c]
	3.89 m	3.73 (ov)	3.74 (ov)	3.84 (ov)	4.12 dd(7.3, 8.4)[c]
1″		4.91 d(7.2)	5.01d(7.2)	5.02 d(7.2)	
2″		3.54 (ov)	3.86 (ov)	3.86 (ov)	
3″		3.78 (ov)	3.70 (ov)	3.71 (ov)	
4″		3.47 (ov)	5.06 t(9.6)	5.06 t(9.1)	
5″		3.54 (ov)	4.02 m	4.01 m	
6″		4.51 dd(11.6, 1.6)	4.28~4.32 m	4.28~4.32 m	
		4.35 dd(11.6, 4.0)			
2‴		7.35 d(2.0)	7.32 d(1.6)	7.32 d(1.8)	
5‴		6.88 d(8.0)	6.85 d(8.0)	6.85 d(8.0)	
6‴		7.15 dd(8.0, 2.0)	6.88 d(8.0, 1.6)	6.88 dd(8.0, 1.8)	
7‴		7.61 d(16.0)	7.65 d(16.4)	7.65 d(16.4)	
8‴		6.42 d(16.0)	6.43 d(16.4)	6.43 d(16.4)	
2⁗			7.29 d(1.2)	7.29 d(1.4)	
5⁗			6.84 d(8.4)	6.84 d(8.4)	
6⁗			6.85 dd(8.4, 1.2)	6.85 dd(8.4, 1.4)	
7⁗			7.60 d(16.0)	7.60 d(16.0)	
8⁗			6.36 d(16.0)	6.36 d(16.0)	
OMe	3.87 s(12H)	3.83 s(3-OMe)	3.83 s(3, 3′, 3‴-OMe)	3.81 s(3 and 5-OMe)	3.81 s
		3.81 s(3′-OMe)	3.88 s(3⁗-OMe)	3.80 s(3′, 5′-OMe)	3.90 s
		3.91 s(3‴-OMe)		3.84 s(3‴-OMe)	3.91 s
				3.88 s(3⁗-OMe)	
3-OCH_2O					5.94 s
3′-OCH_2O					5.91 s

Note: Assignments bearing the same superscript may be exchanged in the column.

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Table 6-3-36: ^{1}H NMR spectroscopic data of lignans **6-3-104**~**6-3-108**.

H	6-3-104	6-3-105	6-3-106	6-3-107	6-3-108
2	6.94 br s	6.89 d(1.5)	6.96 d(1.9)	6.97 d(1.8)	6.91 d(1.5)
5	6.83 d(8.0)	6.88 d(8.2)	7.02 d(8.4)	6.92 d(8.0)	6.83 d(8.5)
6	6.72 br d(8.0)	6.82 dd(8.2, 1.5)	6.61 dd(8.4, 1.9)	6.88 dd(1.8, 8.0)	6.88 dd(2.0, 8.5)
7	4.11 br s	4.76 m	4.71 d(5.2)	4.49 d(7.8)	4.68 d(6.0)
8	3.05 br s	3.11 m	3.05 m	2.71 dd(6.5, 7.8)	3.0 m
9	4.97 br s	ax 3.87 m	4.26 dd(9.1, 7.1)	4.16 dd(6.5, 9.7)	eq 4.20 dd(6.0, 9.0)
		eq 4.26 m	3.83 (ov)	4.05 dd(1.2, 9.7)	ax 3.92 dd(3.5, 9.0)
10	3.89 dd(12.0, 4.0) 3.46 dd(12.0, 9.0)				
2′	6.62 s	7.21 d(8.4)	6.98 d(1.9)	7.02 d(1.5)	
3′		6.80 d(8.4)			
5′		6.80 d(8.4)	6.78 d(8.1)	6.93 d(8.1)	6.51 d(8.0)
6′	6.62 s	7.21 d(8.4)	6.83 dd(8.1, 1.9)	6.98 dd(1.5, 8.1)	6.85 br d(8.0)
7′	4.76 br s	4.76 m	4.68 d(5.8)	4.75 s	5.03 d(4.0)
8′	3.11 br s	3.11 m	3.12 m		3.00 m
9′	4.31 dd(11.6, 6.3)	ax 3.87 m	4.16 dd(9.1, 7.0)	3.65 d(11)	eq 4.33 dd(7.5, 9.0)
	3.96 dd(11.6, 4.7)	eq 4.26 m	3.86 (ov)	3.53 d(11)	ax 4.00 dd(4.0, 9.0)
1″			4.83 d(7.6)		
2″			3.54 dd(9.1, 7.6)		
3″			3.50 t(9.1, 8.6)		
4″			3.41 dd(9.7, 8.6)		
5″			3.73 ddd(9.7, 7.8, 1.8)		
6″			4.56 dd(11.8, 1.8) 4.44 dd(11.8, 7.8)		
2‴			7.10 s		
6‴			7.10 s		
OMe	3.87 s	3.90 s	3.84 s(3-OMe) 3.87 s(3′-OMe)	3.93 s(3-OMe) 3.94 s(3′-OMe)	3.89 s(3-OMe) 3.87 s(4-OMe) 4.01 s(2′-OMe)
OCH_2O					5.92 br s
OH				5.64 s(4-OH), 5.61 s(4′-OH)	

Table 6-3-37: ^{1}H NMR spectroscopic data of lignans **6-3-109**~**6-3-113**.

H	6-3-109	6-3-110	6-3-111	6-3-112	6-3-113
2	6.90 d(1.8)	6.84 d(1.6)	6.98 br s	6.87 s	6.83 d(1.8)
5	6.82 br d(8.1)	6.78 d(8.2)	6.78 d(8.1)	6.81 d(8.0)	6.76 d(8.1)
6	6.89 dd(1.5, 8.1)	6.80 dd(8.2, 1.6)	6.83 dd(8.1, 1.8)	6.78 d(8.0)	6.72 dd(8.1, 1.8)

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Table 6-3-37 (continued)

H	6-3-109	6-3-110	6-3-111	6-3-112	6-3-113
7	4.66 d(5.7)	4.74 d(4.8)	4.68 d(4.0) or 4.66 d(4.0)	4.72 d(4.0)	5.18 d(3.6)
8	3.0 m	3.07 m	3.08 m	3.05 m	3.62 dd(9.1, 3.6)
9	eq 4.20 dd(6.3, 9.0)	3.87 dd(9.2, 4.0)	4.20 dd(7.0, 8.8)	3.88 dd(9.2, 4.0)	
	ax 3.92 dd(3.6, 9.0)	4.23 m	3.81 (ov)	4.25 dd(9.2, 6.8)	
2′		7.22 d(8.8)	6.98 br s	6.87 s	6.65 s
3′		6.81 d(8.8)			
5′	6.51 d(8.0)	6.81 d(8.8)	6.90 d(8.1)	6.81 d(8.0)	
6′	6.85 br d(8.0)	7.22 d(8.8)	6.88 dd(8.1, 1.8)	6.78 d(8.0)	6.65 s
7′	5.03 d(4.2)	4.71 d(4.8)	4.68 d(4.0) or 4.66 d(4.0)	4.72 d(4.0)	5.37 d(3.9)
8′	3.00 m	3.07 m	3.08 m	3.05 m	3.32 m
9′	eq 4.33 dd(7.2, 9.0)	3.87 dd(9.2, 4.0)	4.20 dd(7.0, 8.8)	3.88 dd(9.2, 4.0)	4.26 dd(9.4, 6.9)
	ax 3.99 dd(4.5, 9.0)	4.23 m	3.81 (ov)	4.25 dd(9.2, 6.8)	4.03 dd(9.4, 4.1)
1″			4.52 d(7.0)		
2″			5.46 m		
4″			1.75 s		
5″			1.71 s		
OMe	3.90 s(3-OMe)		3.80 s(3-OMe)		3.85 s
	4.01 s(4-OMe)		3.83 s(3′-OMe)		
OCH_2O	5.92 br s	5.95 s		5.96 s	
4-OH			7.51 br s		

Table 6-3-38: ^{1}H NMR spectroscopic data of lignans **6-3-114**~**6-3-118**.

H	6-3-114	6-3-115	6-3-116	6-3-117	6-3-118
2	6.59 s	7.71 d(2.1)	7.51 d(2.5)	7.58 d(3.0)	7.64 d(2.5)
5		7.79 d(8.5)	7.59 d(8.7)	7.45 d(8.5)	7.46 d(8.5)
6	6.59 s	7.59 dd(2.1)	7.42 dd(2.5, 8.7)	7.37 dd(3.0, 8.5)	
7	4.43 d(7.2)	4.63 d(5.2)	4.23 d(6.9)	4.91 d(4.9)	7.39 dd(4.8)
8	2.92 m	3.05 m	3.17 m or 2.49 br s	3.17 m	3.11 m
9	4.02 dd(0.4, 9.6)	3.94 dd(9.0, 4.1)	3.38 d(6.5)	3.36 d(7.5, 4.1)	3.40 dd(3.4, 8.6)
	3.89 m		3.34 d(1.9)		
2′	6.86 s	7.71 d(2.1)	7.71 d(2.5)	7.58 d(3.0)	7.64 d(2.5)
4′	6.93 s				
5′			7.59 d(8.7)	7.45 d(8.5)	7.46 d(8.5)
6′	6.86 s	7.59 dd(2.1)	7.42 dd(2.5, 8.7)	7.37 dd(3.0, 8.5)	
7′	4.88 d(5.2)	4.71 d(4.9)	5.02 d(6.9)	4.91 d(4.9)	7.39 dd(4.8)

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Table 6-3-38 (continued)

H	6-3-114	6-3-115	6-3-116	6-3-117	6-3-118
8′	3.34 m	3.05 m	3.17 m or 2.49 br s	3.17 m	3.11 m
9′	3.89 m 3.34 m	4.39 dd(9.0, 6.8)	3.52 d(7.0) 3.49 d(7.0)	4.27 dd(9.0, 7.1) 3.85 dd(9.0, 4.1)	3.48 dd(5.6, 8.8)
OMe	3.91 s(3′-OMe) 3.88 s(5′-OMe) 3.87 s(3, 5-OMe) 3.83 s(4-OMe)		4.13 br s	4.01 br s 3.94 br s	

Table 6-3-39: ^{1}H NMR spectroscopic data of lignans **6-3-119**~**6-3-123**.

H	6-3-119	6-3-120	6-3-121	6-3-122	6-3-123
2	7.60 d(2.5)	7.72 d(2.5)	7.60 d(2.5)	7.57 d(1.8)	6.99 d(1.7)
5			7.51 d(8.5)		6.87 d(8.4)
6	7.45 d(2.5)	7.51 d(2.5)	7.40 dd(8.5, 2.2)	7.43 d(1.8)	6.97 dd(1.7, 8.4)
7	4.67 d(4.5)	4.39 d(2.9)	4.63 d(4.7)	4.61 d(4.7)	5.00 d(6.9)
8	3.32 m	3.05 m	3.23 m	3.11 m	3.06 br t(7.3)
9	3.83 m, 3.97 d(9.6)	3.35 dd(9.0, 6.2)	3.78 dd(4.7, 9.1)	3.61 br s	6.48 br s
2′	7.60 d(2.5)	6.79 d(2.9)	7.46 d(2.6)	7.57 d(1.8)	7.01 d(1.7)
5′	7.49 d(8.9)	7.65 d(9.5)	7.51 d(8.5)	7.47 d(9.5)	6.89 d(8.4)
6′	7.39 dd(2.5, 8.9)	7.42 dd(2.9, 9.5)	7.40 dd(8.5, 2.2)	7.39 dd(1.8, 9.5)	6.95 dd(1.7, 8.4)
7′	4.67 d(4.5)	4.42 d(5.1)	4.81 d(5.1)	4.65 d(4.5)	5.14 d(6.1)
8′	3.32 m	3.05 m	3.31 d(5.1)	3.23 d(4.5)	3.28 m
9′	3.87 m, 3.56 d(9.6)	3.38 dd(9.0, 1.9)			4.31 dd(5.8, 9.1) 4.09 dd(2.5, 9.1)
2″					2.16 d(7.4)
3″					2.07 m
4″					0.93 d(6.5)
5″					0.94 d(6.5)
OMe	4.02 br s(6H) 3.95 br s	4.04 br s 3.96 br s	3.96 br s		3.94 s, 3.92 s 3.91 s, 3.90 s
OCH_2O		4.88 br s			

Table 6-3-40: ^{1}H NMR spectroscopic data of lignans **6-3-124**~**6-3-128**.

H	6-3-124	6-3-125	6-3-126	6-3-127	6-3-128
2	6.93 br s	6.87 d(1.8)	6.75 d(1.2)	7.09 d(1.5)	7.16 d(1.7)
5	6.87 d(8.0)	6.77 d(7.2)	6.82 d(8.2)	6.83 d(8.0)	7.19 dd(1.7, 8.7)
6	6.92 br d(8.0)	6.85 dd(7.2, 1.8)	6.78 dd(8.2, 1.2)	6.89 dd(1.5, 8.0)	7.00 d(8.7)
7	4.90 d(7.1)	5.32 d(3.6)	5.82 br s	5.01 s	4.93 d(5.7)
8	3.04 br t(7.6)	3.42 dd(9.2, 3.6)	3.53 br s		3.07 m
9	5.62 d(3.0)			4.02 d(9.4) 4.16 d(9.4)	3.82 dd(8.7, 6.6) 4.52 t(8.7)

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Table 6-3-40 (continued)

H	6-3-124	6-3-125	6-3-126	6-3-127	6-3-128
2′	7.11 d(1.9)	6.82 d(1.8)	6.75 d(1.2)	7.16 d(1.5)	6.75 s
5′	6.86 d(8.2)	6.76 d(6.4)	6.82 d(8.2)	7.20 d(8.0)	
6′	6.99 dd(1.9, 8.2)	6.81 dd(6.4, 1.8)	6.78 dd(8.2, 1.2)	6.99 dd(1.5, 8.0)	6.75 s
7′	5.01 d(6.5)	5.30 d(3.6)	5.82 br s	5.05 s	4.72 s
8′	3.28 m	3.20 m	3.53 br s		
9′	4.28 dd(6.0, 9.1)	4.32 dd(9.2, 6.8)		4.02 d(9.4)	3.90 d(9.2)
	4.04 dd(2.6, 9.1)	4.02 dd(9.4, 4.8)		4.17 d(9.4)	4.13 d(9.2)
1″				4.94 d(7.5)	4.92 d(7.5)
2″				3.55 dd(9.5, 7.5)	3.53 dd(9.5, 7.5)
3″				3.51 t(9.5)	3.50 t(9.5)
4″				3.44 t(9.5)	3.42 t(9.5)
5″				3.45 m	3.43 m
6″				3.74 dd(12.1, 4.5)	3.72 dd(12.1, 4.5)
				3.91 dd(12.1, 3.5)	3.90 dd(12.1, 3.5)
OMe	3.92 s, 3.90 s(6H)			3.92 s(3′-OMe)	3.91 s(3′,5′-OMe)
	3.91 s			3.91 s(3-OMe)	3.93 s(3-OMe)
OCH_2O		5.96 s	5.98 d(1.0), 5.99 d(1.0)		
		5.98 s	5.98 d(1.0), 5.99 d(1.0)		

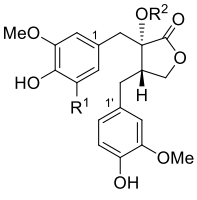
Table 6-3-41: ^{1}H NMR spectroscopic data of lignans **6-3-129**~**6-3-131**.

H	6-3-129	6-3-130	6-3-131
2	7.09 d(1.5)	6.71 s	6.71 br s
5	6.83 d(8.0)		
6	6.89 dd(1.5, 8.0)	6.71 s	6.71 br s
7	5.01 s		
8		3.31 dt(8.5, 8.5)	3.29 dt(9.0, 9.0)
9	4.02 d(9.4), 4.15 d(9.4)	*α* 3.86 (ov), *β* 3.09 dd(9.0, 9.0)	*α* 3.82 dd(9.0, 9.0), *β* 3.07 dd(9.0, 9.0)
2′	7.09 d(1.5)	6.56 s	6.85 d(1.5)
5′	6.83 d(8.0)		6.77 d(8.0)
6′	6.89 dd(1.5, 8.0)	6.56 s	6.81 dd(1.5, 8.0)
7′	5.01 s	4.48 d(6.6)	4.46 d(6.0)
8′		3.04 m	3.00 m
9′	4.02 d(9.4), 4.15 d(9.4)	*α* 4.12 dd(9.6, 6.6), *β* 4.07 dd(2.2, 9.0)	*α* 4.09 dd(7.0, 9.0), *β* 4.03 dd(2.0, 9.0)
OMe	3.91 s(3′-OMe)	3.89 s(3, 5-OMe)	3.89 s(3, 5-OMe)
	3.91 s(3-OMe)	3.84 s(4-OMe)	3.87 s(4-OMe)
		3.00 s(7-OMe)	2.98 s(7-OMe)
		3.88 s(3′, 4′, 5′-OMe)	
OCH_2O			5.95 s

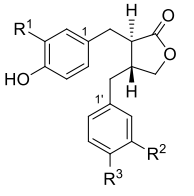
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Table 6-3-42: Compounds, MFs, and test solvents of lignans **6-3-132**~**6-3-161**.

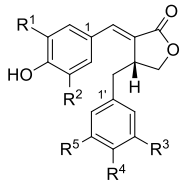
No.	Compounds	MFs	Test solvents	References
6-3-132	nortrachelogenin 8′-*O*-*β*-D-glucopyranoside	$C_{26}H_{32}O_{12}$	DMSO-d_6	[218]
6-3-133	nortrachelogenin 5′-*C*-*β*-D-glucopyranoside	$C_{26}H_{32}O_{12}$	DMSO-d_6	[218]
6-3-134	piperphilippinin I	$C_{19}H_{20}O_6$	CD_3COCD_3	[219]
6-3-135	piperphilippinin II	$C_{19}H_{18}O_6$	$CDCl_3$	[219]
6-3-136	piperphilippinin V	$C_{19}H_{20}O_5$	$CDCl_3$	[219]
6-3-137	piperphilippinin III	$C_{23}H_{26}O_8$	$CDCl_3$	[219]
6-3-138	piperphilippinin IV	$C_{19}H_{16}O_6$	CD_3COCD_3	[219]
6-3-139	matairesinol-4-*O*-*α*-L-rhamnoside	$C_{26}H_{32}O_{10}$	DMSO-d_6	[220]
6-3-140	*allo*-hydroxymatairesinol-4-*O*-*α*-L-rhamnoside	$C_{26}H_{32}O_{11}$	DMSO-d_6	[220]
6-3-141	apocynotrachelolegnin 5′-*O*-*β*-D-glucopyranoside	$C_{26}H_{32}O_{11}$	CD_3OD	[221]
6-3-142	rafanotrachelogenin 4-*O*-*β*-D-glucopyranoside	$C_{27}H_{34}O_{12}$	CD_3OD	[221]
6-3-143	(+)-7,8-didehydroarctigenin	$C_{21}H_{22}O_6$	$CDCl_3$	[222]
6-3-144	sylvestrin	$C_{22}H_{22}O_7$	$CDCl_3$	[223]
6-3-145	nemerosin	$C_{22}H_{22}O_7$	$CDCl_3$	[223]
6-3-146	hernanol	$C_{22}H_{26}O_7$	$CDCl_3$	[224]
6-3-147	aristelegin A	$C_{21}H_{20}O_7$	$CDCl_3$	[178]
6-3-148	(2*R*,3*R*)-5′-methoxyguayarol	$C_{21}H_{24}O_7$	$CDCl_3$	[225]
6-3-149	(2*S*,3*S*)-2,3-bis(5-methoxy-3,4-methylenedioxybenz-yl)-butyrolactone	$C_{22}H_{22}O_8$	$CDCl_3$	[226]
6-3-150	(2*S*,3*S*)-(+)-5-methoxyyatein	$C_{23}H_{26}O_8$	$CDCl_3$	[226]
6-3-151	(2*S*,3*S*)-2-(4-hydroxy-3-methoxybenzyl)-3-(5-meth-oxy-3,4-methylenedioxybenzyl)-butyrolactone	$C_{21}H_{22}O_7$	$CDCl_3$	[226]
6-3-152	(2*S*,3*S*)-2-(4-hydroxy-3,5-dimethoxybenzyl)-3-(5-methoxy-3,4-methylenedioxybenzyl)-butyrolactone	$C_{22}H_{24}O_8$	$CDCl_3$	[226]
6-3-153	kaerophyllin	$C_{21}H_{20}O_6$	–	[227]
6-3-154	isochaihulactone	$C_{22}H_{22}O_7$	$CDCl_3$	[227]
6-3-155	isokaerophyllin	$C_{21}H_{20}O_6$	–	[227]
6-3-156	haplotonin	$C_{25}H_{26}O_8$	$CDCl_3$	[228]
6-3-157	(8*S*,8′*S*)-(+)-8-hydroxy-oxomatairesinol	$C_{20}H_{20}O_8$	$CDCl_3$	[229]
6-3-158	(-)-4′-demethyltraxillagenin	$C_{21}H_{24}O_7$	DMSO-d_6	[230]
6-3-159	styraxlignolide C	$C_{26}H_{32}O_{11}$	C_5D_5N	[231]
6-3-160	styraxlignolide D	$C_{26}H_{32}O_{11}$	C_5D_5N	[231]
6-3-161	styraxlignolide E	$C_{26}H_{32}O_{11}$	C_5D_5N	[231]



	R^1	R^2
6-3-132	H	Glc
6-3-133	Glc	H

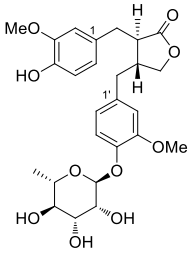


	R^1	R^2	R^3
6-3-134	OH	OMe	OH
6-3-135	OH	OCH_2O	
6-3-136	H	OMe	OH

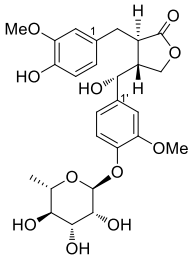


	R^1	R^2	R^3	R^4	R^5
6-3-137	OMe	OMe	OMe	OMe	OMe
6-3-138	OH	H	OCH_2O		H

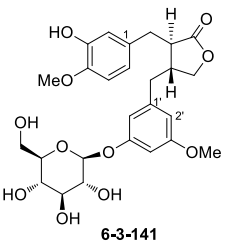
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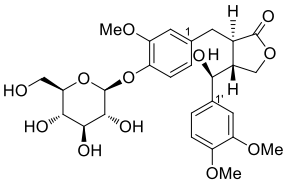
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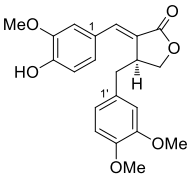
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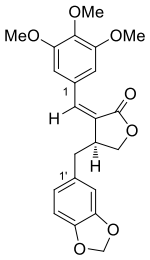
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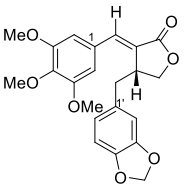
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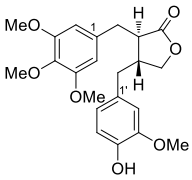
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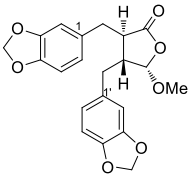
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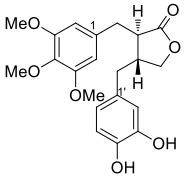
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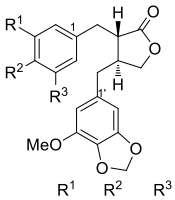
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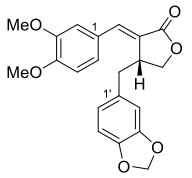
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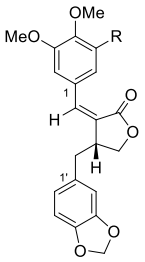
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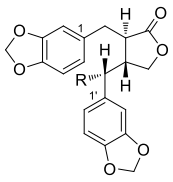
	R^1	R^2	R^3
6-3-149	OCH_2O		OMe
6-3-150	OMe	OMe	OMe
6-3-151	OMe	OH	H
6-3-152	OMe	OH	OMe



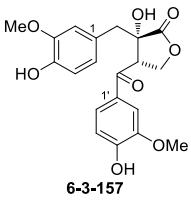
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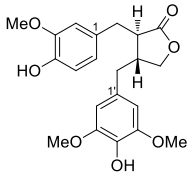
6-3-154 R = OMe
6-3-155 R = H



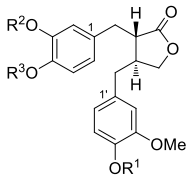
6-3-156 R = $OCOCH_2CHMe_2$



6-3-157



6-3-158



	R^1	R^2	R^3
6-3-159	Glc	H	Me
6-3-160	Glc	Me	H
6-3-161	H	Me	Glc

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Table 6-3-43: ^{1}H NMR spectroscopic data of lignans **6-3-132**~**6-3-136**.

H	6-3-132	6-3-133	6-3-134	6-3-135	6-3-136
2	6.81 d(1.8)	6.59 d(2.0)	6.77 d(2.0)	6.68 d(2.0)	6.99 d(8.4)
3					6.75 d(8.4)
5	6.67 d(8.0)		6.77 d(8.0)	6.79 d(8.0)	6.75 d(8.4)
6	6.64 dd(8.0, 1.8)	6.63 d(2.0)	6.56 dd(8.0, 2.0)	6.57 dd(8.4, 2.0)	6.99 d(8.4)
7	3.06 d(14.3)	2.86 d(14.0)	2.79 dd(13.8, 6.4)	2.86 dd(14.0, 6.0)	2.88 dd(14.4, 7.2)
	3.16 d(14.3)	2.98 d(14.0)	2.87 dd(13.8, 5.2)	2.90 dd(14.0, 5.2)	2.97 dd(14.4, 5.2)
8			2.45~2.64 m	2.43~2.65 m	2.43~2.61 m
2′	6.61 d(1.8)	6.77 d(2.0)	6.68 d(2.0)	6.47 d(1.6)	6.44 d(1.6)
5′	6.65 d(8.0)	6.67 d(8.0)	6.73 d(8.0)	6.71 d(8.0)	6.81 d(8.0)
6′	6.49 dd(8.0, 1.8)	6.60 dd(8.0, 2.0)	6.56 dd(8.0, 2.0)	6.48 dd(8.0, 1.6)	6.51 dd(8.0, 1.6)
7′	2.53 dd(13.8, 6.0)	2.41 dd(13.5, 4.5)	2.45~2.64 m	2.43~2.65 m	2.43~2.61 m
	2.62 dd(13.8, 4.2)	2.63 dd(13.5, 9.8)			
8′	2.34 m	2.41 m	2.45~2.64 m	2.43~2.65 m	2.43~2.61 m
9′	3.89 dd(8.5, 7.8)	3.95 dd(8.0, 7.0)	3.87 t(8.8)	3.85 dd(9.2, 7.2)	3.87 dd(9.2, 7.2)
	4.19 dd(10.2, 8.5)	3.91 dd(8.0, 7.0)	4.05 dd(8.8, 7.2)	4.09 dd(9.2, 6.8)	4.12 dd(9.2, 7.2)
1″	4.58 d(7.7)	4.42 d(9.0)			
2″	3.05 m	3.30 m			
3″	3.15 m	3.25 m			
4″	3.08 m	3.19 m			
5″	3.16 m	3.21 m			
6″	3.49 m	3.44 m			
	3.74 m	3.68 m			
OMe	3.73 s, 3.69 s	3.71 s, 3.74 s	3.80 s		3.83 s
	3.73 s	3.74 s			
OCH_2O				5.93 d(1.4)	
				5.94 d(1.4)	
OH			7.50, 7.91, 7.93(3x br s)	5.37, 5.69(2x br s)	5.21, 5.56(2x br s)

Table 6-3-44: ^{1}H NMR spectroscopic data of lignans **6-3-137**~**6-3-141**.

H	6-3-137	6-3-138	6-3-139	6-3-140	6-3-141
2	6.84 s	7.28 d(2.4)	6.72 d(1.9)	6.55 d(1.8)	6.66 d(1.6)
5		6.97 d(8.0)	6.68 d(8.0)	6.63 d(8.0)	6.50 d(8.0)
6	6.84 s	7.15 dd(8.0, 2.0)	6.55 dd(1.9, 8.0)	6.41 dd(1.8, 8.0)	6.75 dd(8.0, 1.6)
7	7.53 d(1.6)	7.35 d(2.0)	2.79 dd(5.4, 13.7)	2.63 dd(6.1, 13.9)	2.54 dd(11.9, 6.1)
			2.74 dd(7.0, 13.7)	2.41 dd(5.7, 13.9)	2.89 dd(11.9, 4.1)

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Table 6-3-44 (continued)

H	6-3-137	6-3-138	6-3-139	6-3-140	6-3-141
8			2.70 m	2.78 m	2.45 m
9					
2′	6.38 s	6.86 s	6.70 d(1.9)	6.81 d(1.8)	6.57 d(1.6)
4′					7.05 d(1.5)
5′		6.77 s	6.94 d(8.0)	6.99 d(8.3)	
6′	6.38 s	6.77 s	6.59 dd(1.9, 8.0)	6.74 dd(1.8, 8.3)	6.49 d(1.6)
7′	2.66 dd(14.4, 10.4) 3.10 dd(14.4, 4.4)	2.62 dd(14.0, 10.0) 3.04 dd(14.0, 4.0)	2.47 m	4.30 d(6.1)	2.41 dd(10.1, 4.3)
8′	3.86 m	3.95 m	2.43 m	2.44 m	2.70 m
9′	4.29 dd(9.2, 2.4) 4.32 dd(9.2, 6.4)	4.21 dd(8.8, 2.4) 4.26 dd(8.8, 7.2)	4.08 dd(7.6, 8.9) 3.68 t(8.9)	4.11 dd(7.8, 8.8) 3.98 t(8.8)	4.10 dd(13.6, 6.6)
1″			5.20 d(1.7)	5.22 d(1.7)	4.85 d(7.4)
2″			3.83 dd(1.7, 3.4)	3.82 dd(1.7, 3.3)	4.49 d(7.4)
3″			3.64 dd(3.4, 9.6)	3.62 dd(3.3, 9.4)	3.30 t(7.4)
4″			3.27 t(9.6)	3.24 t(9.4)	4.41 t(7.8)
5″			3.58 dq(9.6, 6.2)	3.54 dq(6.3, 9.4)	3.89 ddd (12.0, 1.7, 8.0)
6″			1.08 d(6.2)	1.04 d(6.3)	3.31 dd(1.7, 12.0) 3.59 dd(7.8, 12.0)
OMe	3.83 s(3′,5′-OMe) 3.81 s(4′-OMe) 3.92 s(3,5-OMe)		3.72 s 3.71 s	3.71 s 3.67 s	3.78 s(4-OMe) 3.81 s(3′-OMe)
OCH_2O		5.97 s			
OH	5.86 br s	8.35 br s, 8.56 br s			

Table 6-3-45: ^{1}H NMR spectroscopic data of lignans **6-3-142**~**6-3-146**.

H	6-3-142	6-3-143	6-3-144	6-3-145	6-3-146
2	6.53 d(2.3)	7.03 d(2.0)	6.62 s	6.79 s	6.44 s
5	6.49 d(8.1)	6.99 d(8.0)			
6	6.69 dd(2.0, 7.8)	7.22 dd(2.0, 8.0)	6.62 s	6.79 s	6.34 s
7	2.71 dd(13.4, 6.4) 2.91 dd(13.4, 4.2)	7.53 d(2.0)	6.64 d(1.8)	7.53 d(1.5)	2.92 m
8	2.31 m				2.60 m
2′	6.64 d(1.7)	6.67 d(2.0)	6.71 d(1.8)	6.64 d(1.5)	6.44 s
5′	6.69 d(7.0)	6.81 d(8.0)	6.78 d(7.8)	6.74 d(7.8)	6.82 d(7.5)
6′	7.0 dd(2.0, 7.4)	6.74 dd(2.0, 8.0)	6.66 dd(7.8, 1.8)	6.60 dd(7.8, 1.5)	6.53 d(7.5)
7′	5.19 d(7.0)	3.08 dd(4.2, 14.5) 2.65 dd(10.0, 14.5)	2.82 dd(13.8, 9.0) 2.97 dd(13.8, 6.6)	2.66 dd(15.0, 10.0) 3.07 dd(15.0, 5.0)	2.65 dd(13.5, 6.5) 2.56 dd(13.5, 8.5)

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Table 6-3-45 (continued)

H	6-3-142	6-3-143	6-3-144	6-3-145	6-3-146
8′	2.73 m	3.83 m	3.42 m	3.86 m	2.48 m
9′	4.17 dd(12.0, 4.0)	4.28 d(4.0)	4.13 dd(9.0, 3.6) 4.36 dd(9.0, 7.2)	4.27 dd(9.0, 2.1) 4.33 dd(9.0, 6.3)	3.89 t(8.5) 4.19 dd(8.5, 7.5)
1″	4.87 d(8.1)				
2′	3.31 d(7.8)				
3″	3.39 t(7.8)				
4′	3.49 t(7.8)				
5′	3.34 ddd(1.7, 7.8, 10.8)				
6′	3.59 dd(1.7, 11.0) 3.62 dd(1.8, 10.5)				
OMe	3.47 s(3-OMe) 3.48 s(3′-OMe) 3.78 s(4′-OMe)	3.92 s(3-OMe) 3.86 s(3′,4′-OMe)	3.91 s(3,5-OMe) 3.93 s(4-OMe)	3.88 s(3,5-OMe) 3.92 s(4-OMe)	3.81 s(3,3′-OMe) 3.82 s(4-OMe) 3.81 s(5-OMe)
OCH_2O			5.97 d(1.2) 5.98 d(1.2)	5.95 d(1.2) 5.96 d(1.2)	
4-OH		5.9 br s			

Table 6-3-46: ^{1}H NMR spectroscopic data of lignans **6-3-147**~**6-3-151**.

H	6-3-147	6-3-148	6-3-149	6-3-150	6-3-151
2	6.38 d(1.7)	6.32 s	6.31 s	6.37 s	6.66 d(1.7)
3					6.83 d(7.8)
5	6.57 d(7.3)				
6	6.39 dd(7.3, 1.7)	6.32 s	6.31 s	6.37 s	6.62 dd(1.7, 7.8)
7	2.63 dd(13.6, 3.3) 2.95 dd(13.6, 4.5)	2.83 dd(13.8, 6.8) 2.88 dd(13.8, 5.2)	2.95 dd(5.0, 14.0) 2.82 dd(7.2, 14.0)	2.94 dd(5.4, 14.0) 2.90 dd(6.6, 14.0)	2.96 dd(5.1, 14.2) 2.88 dd(7.0, 14.2)
8	2.41 ddd(10.2, 4.5, 3.3)	2.58 m	2.54 ddd(5.0, 7.2, 7.5)	2.58 m	2.55 ddd(5.1, 7.0, 7.2)
2′	6.24 d(1.7)	6.71 d(1.9)	6.17 d(1.5)	6.17 br s	6.16 d(1.2)
5′	6.55 d(7.9)	6.46 d(8.0)			
6′	6.29 dd(7.9, 1.7)	6.36 dd(8.0, 2.0)	6.15 d(1.5)	6.16 br s	6.12 br s
7′	2.25 dd(16.5, 9.5) 2.62 dd(16.5, 10.4)	2.49 m 2.56 m	2.57 dd(5.0, 11.9) 2.49 dd(7.8, 11.9)	2.60 dd(6.1, 13.4) 2.52 dd(8.1, 13.4)	2.58 dd(9.8, 17.1) 2.47 m
8′	2.26 m	2.44 m	2.47 m	2.50 m	2.46 m
9′	5.00 d(1.6)	3.87 dd(9.2, 7.2) 4.18 dd(9.2, 7.1)	4.18 dd(7.0, 9.5) 3.88 dd(7.3, 9.5)	4.18 dd(7.3, 9.0) 3.88 dd(7.3, 9.0)	4.14 dd(7.1, 9.2) 3.86 dd(7.3, 9.2)
OMe	3.40 s(9′-OMe)	3.80 s(3,5-OMe) 3.83 s(4-OMe)	3.86 s(5,5′-OMe)	3.86 s(5′-OMe) 3.83 s(3,5-OMe) 3.82 s(4-OMe)	3.85 s(5′-OMe) 3.84 s(3-OMe)
OCH_2O	5.84 s, 5.86 s		5.95 m	5.93 m	5.94 s

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Table 6-3-47: ^{1}H NMR spectroscopic data of lignans **6-3-152**~**6-3-156**.

H	6-3-152	6-3-153	6-3-154	6-3-155	6-3-156
2	6.36 s	7.02 d(1.5)	7.24 s	8.07 d(2.0)	6.52~6.69 m
5		6.91 d(8.4)		6.82 d(8.4)	6.72 d(8.1) or 6.70 d(8.4)
6	6.36 s	7.19 dd(8.4, 1.5)	7.24 s	7.15 dd(8.4, 2.0)	6.52~6.69 m
7	2.93 dd(5.5, 14.0) 2.88 dd(6.7, 14.0)	7.50 s	6.60 d(1.5)	6.61 d(1.6)	2.90 m
8	2.57 m				2.80 m
2′	6.17 d(1.5)	6.62 d(1.5)	6.67 d(1.4)	6.68 d(1.6)	6.52~6.69 m
5′		6.69 d(7.8)	6.74 d(7.8)	6.74 d(7.9)	6.72 d(8.1) or 6.70 d(8.4)
6′	6.14 d(1.5)	6.59 dd(7.8, 1.5)	6.61 dd(7.8, 1.4)	6.62 dd(7.9, 1.6)	6.52~6.69 m
7′	2.58 dd(5.8, 16.6) 2.50 dd(8.0, 16.6)	*α* 2.58 dd(14.4, 10.3) *β* 3.01 dd(14.4, 4.1)	*α* 2.78 dd(13.7, 9.0) *β* 2.92 dd(13.7, 6.7)	*α* 2.77 dd(13.8, 9.0) *β* 2.92 dd(13.8, 6.7)	5.72 d(6.5)
8′	2.47 m	3.78 m	3.29 m	3.28 m	2.72 m
9′	4.17 dd(7.3, 9.0) 3.87 dd(7.6, 9.0)	*α* 4.24 m *β* 4.24 m	*α* 4.10 dd(9.0, 3.8) *β* 4.31 dd(9.0, 7.3)	*α* 4.09 dd(9.0, 3.8) *β* 4.30 dd(9.0, 7.3)	3.99 dd(10.0, 7.8) 3.92 dd(10, 6.0)
2″					2.24 d(7.0)
3″					2.09 m
4″					0.94 d(6.5)
5″					0.92 d(6.5)
OMe	3.86 s(3-OMe) 3.86 s(5-OMe) 3.85 s(5′-OMe)	3.88 s(3-OMe) 3.91 s(4-OMe)	3.87 s(3-OMe) 3.87 s(4-OMe) 3.87 s(5-OMe)	3.89 s(3-OMe) 3.92 s(4-OMe)	
OCH_2O	5.94 m	5.90 d(1.5)	5.93 d(1.3) 5.94 d(1.3)	5.93 d(1.4) 5.94 d(1.4)	5.94 m

Table 6-3-48: ^{1}H NMR spectroscopic data of lignans **6-3-157**~**6-3-161**.

H	6-3-157	6-3-158	6-3-159	6-3-160	6-3-161
2	6.79 d(1.7)	6.39 s	7.28 s	7.01 d(1.8)	7.01 s
5	6.81 d(7.8)		6.97 d(7.8)	7.21 d(7.8)	7.55 d(8.4)
6	6.70 dd(7.8, 1.7)	6.39 s	6.86 d(7.8)	6.95 dd(7.8, 1.8)	6.91 d(8.4)
7	3.03 d(14.1) 3.14 d(14.1)	2.48~2.69 m	3.04 dd(13.8, 6.6) 3.15 dd(13.8, 4.8)	3.09 dd(13.8, 6.6) 3.16 dd(13.8, 5.4)	3.08 d(6.0)
8		2.48~2.69 m	2.77 dd(9.0, 6.6)	2.79 ddd(9.0, 6.6, 5.4)	2.82 ddd(9.0, 6.0, 5.4)
2′	7.33 d(2.0)	6.82 d(1.7)	6.81 s	6.78 d(1.8)	6.79 s

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Table 6-3-48 (continued)

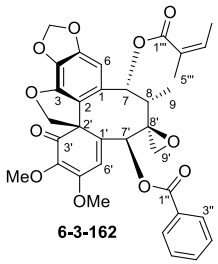
H	6-3-157	6-3-158	6-3-159	6-3-160	6-3-161
5′	6.87 d(8.3)	6.75 d(8.0)	7.52 d(7.8)	7.53 d(8.4)	7.21 d(7.8)
6′	7.09 dd(8.3, 2.0)	6.68 dd(8.0, 1.7)	6.66 d(7.8)	6.69 dd(8.4, 1.8)	6.73 d(7.8)
7′		2.94 dd(13.9, 5.47)	2.47 dd(13.8, 9.6)	2.51 dd(13.6, 9.0)	2.53 m
		3.82 dd(13.9, 6.50)	2.72 dd(13.8, 4.8)	2.73 dd(13.8, 5.4)	2.74 dd(12.6, 5.4)
8′	4.20 m	2.48~2.69 m	2.63 m	2.62 m	2.61 m
9′	4.22 m	4.12 dd(8.55, 7.2)	3.86 t(8.4)	3.87 t(9.0)	3.91 t(8.4)
	4.46 m	3.89 dd(8.61, 7.8)	4.07 t(8.4)	4.11 t(8.4)	4.16 t(8.4)
1″			4.36 m	4.40 m	4.38 m
2″			4.15 m	4.38 m	4.36 m
3″			4.35 m	4.34 m	4.32 m
4″			4.38 m	4.16 m	4.13 m
5″			4.40 m	4.41 m	4.40 m
			4.57 d(12.0)①		4.55 d(12.0)①
6″				4.57 dd(12.0, 1.8)	
OMe	3.80 s(3-OMe)	3.79 s(3′-OMe)	3.80 s(3′-OMe)	3.77 s(3′-OMe)	3.83 s(3′-OMe)
	3.90 s(3′-OMe)	3.76 s, 3.75 s	3.76 s(4-OMe)	3.81 s(3-OMe)	3.77 s(3-OMe)
OH	5.59 s(4-OH)				
	4.38 s(8-OH)				
	6.20 s(4′-OH)				

① Assignment errors maybe exist in the literature.

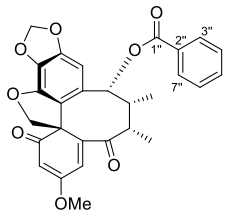
Table 6-3-49: Compounds, MFs, and test solvents of lignans **6-3-162**~**6-3-176**.

No.	Compounds	MFs	Test solvents	References
6-3-162	heteroclitin O	$C_{34}H_{32}O_{11}$	$CDCl_3$	[232]
6-3-163	kadsutherin C	$C_{28}H_{24}O_8$	$CDCl_3$	[233]
6-3-164	heteroclitin H	$C_{27}H_{30}O_8$	$CDCl_3$	[234]
6-3-165	interiotherin D	$C_{26}H_{26}O_8$	$CDCl_3$	[235]
6-3-166	kadsuphilol M	$C_{29}H_{32}O_{11}$	$CDCl_3$	[236]
6-3-167	schiarisanrin A	$C_{27}H_{32}O_8$	$CDCl_3$	[237]
6-3-168	schiarisanrin B	$C_{24}H_{26}O_8$	$CDCl_3$	[237]
6-3-169	schiarisanrin C	$C_{29}H_{28}O_8$	$CDCl_3$	[237]
6-3-170	schiarisanrin D	$C_{31}H_{30}O_8$	$CDCl_3$	[237]
6-3-171	kadsuphilol E	$C_{34}H_{34}O_{11}$	$CDCl_3$	[238]
6-3-172	kadsuphilol F	$C_{34}H_{34}O_{11}$	$CDCl_3$	[238]
6-3-173	kadsuphilol G	$C_{27}H_{30}O_{10}$	$CDCl_3$	[238]
6-3-174	kadsuphilol H	$C_{27}H_{30}O_{10}$	$CDCl_3$	[238]
6-3-175	kadsulignan C	$C_{31}H_{30}O_{11}$	$CDCl_3$	[239]
6-3-176	kadsulignan D	$C_{32}H_{36}O_{11}$	$CDCl_3$	[239]

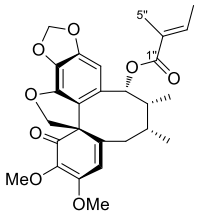
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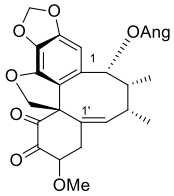
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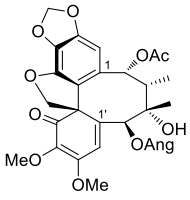
6-3-163



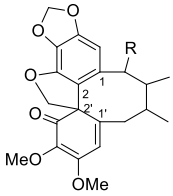
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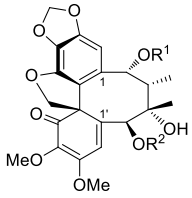
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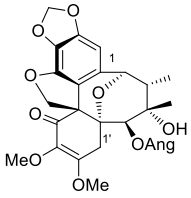
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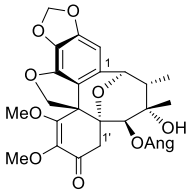
6-3-167	R = OMeBu
6-3-168	R = OAc
6-3-169	R = OBz
6-3-170	R = O-*E*-Cinn



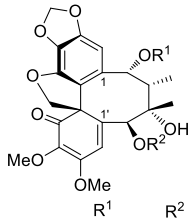
	R^1	R^2
6-3-171	Ang	Bz
6-3-172	Bz	Ang



6-3-173



6-3-174



	R^1	R^2
6-3-175	Bz	Ac
6-3-176	Ang	Ang

Table 6-3-50: ^{1}H NMR spectroscopic data of lignans **6-3-162**~**6-3-166**.

H	6-3-162	6-3-163	6-3-164	6-3-165	6-3-166
6	6.60 s	6.58 s	6.39 s	6.50 s	6.37 s
7	5.73 s	5.98 d(4.9)	5.58 d(7.0)	5.82 d(2.5)	5.79 s
8	2.64 q(7.2)	1.96~1.99 m	1.99 dq(7.0, 2.8)	1.88 m	2.10 q(7.2)
9	1.09 d(7.2)	1.12 d(7.0)	1.02 d(7.4)	1.04 d(6.0)	1.29 d(7.2)
4′		5.96 s			
6′	6.38 s	6.72 s	6.08 d(2.2)	6.67 s	6.48 s
7′	5.74 s		2.26 dd(15.7, 12.0) 2.58 ddd(15.7, 5.7, 2.4)	5.83 d(6.5)	5.67 s
8′		3.06~3.15 m	1.85 m	3.03 m	
9′	2.83 d(4), 2.81 d(4)	1.08 d(6.7)	0.89 d(6.8)	1.02 d(5.5)	1.24 s

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Table 6-3-50 (continued)

H	6-3-162	6-3-163	6-3-164	6-3-165	6-3-166
3″	7.54 d(7.2)	7.73 d(7.4)	6.44 dq(7.0, 1.3)	5.73 m	6.10 q(6.9)
4″	7.35 t(8)	7.22 t(7.4)	1.72 d(7.4)	1.63 m	1.89 dd(6.9, 1.2)
5″	7.55 t(7.2)	7.45 t(7.4)	1.69 m	1.78 m	1.28 s
6″	7.35 t(8)	7.22 t(7.4)			
7″	7.54 d(7.2)	7.73 d(7.4)			
3‴	5.89 dd(7.2, 2.1)①				
4‴	1.81 d(7.2)				
5‴	1.73 s				
OMe	3.70 s(4′-OMe)	3.83 s(5′-OMe)	3.65 s(4′-OMe)	3.80 s	3.76 s(4′-OMe)
	4.05 s(5′-OMe)		4.01 s(5′-OMe)		4.06 s(5′-OMe)
OCH_2O	6.03 br s	6.00, 6.04 AB(1.6)	5.95, 6.01 ABq(1.5))	6.02 AB(1.5, 17.0)	5.96 d(0.9)
	5.97 br s				5.91 d(0.9)
OCH_2	4.58 d(8.8)	4.81, 4.39 AB(9.4)	4.45, 4.24 ABq(8.7)	4.40, 4.84 AB(2.5, 9.0)	4.73 d(9.0)
	4.20 d(8.8)				4.09 d(9.0)
OAc					1.85 s

① The data are consistent with the original literature [232].

Table 6-3-51: ^{1}H NMR spectroscopic data of lignans **6-3-167**~**6-3-171**.

H	6-3-167	6-3-168	6-3-169	6-3-170	6-3-171
6	6.29 s	6.26 s	6.45 s	6.33 s	6.56 s
7	5.94 d(6.7)	5.94 d(6.6)	5.79 d(6.7)	6.03 d(6.8)	5.71 s
8	1.93 m	1.89 m	2.03 m	1.97 m	2.29 q(7.2)
9	0.87 d(7.3)	0.88 d(7.2)	1.10 d(7.2)	0.93 d(7.2)	1.36 d(7.2)
6′	6.09 d(1.9)	6.06 d(2.0)	6.12 d(1.9)	6.10 d(2.4)	6.55 s
7′	2.51 m	2.53 m	2.58 m	2.58 m	5.92 s
	2.16 dd(11.3, 3.1)	2.14 dd(11.8, 3.6)	2.31 dd(11.2, 2.6)	2.20 dd(11.4, 2.8)	
8′	1.76 m	1.72 m	1.90 m	1.81 m	
9′	0.84 d(7.3)	0.81 d(6.7)	0.90 d(7.2)	0.85 d(6.7)	1.29 s
2″	2.07 m	1.78 s		6.15ABq(16.0)	
3″	1.54 m, 1.33 m		7.78 d(7.6)	7.56 ABq(16.0)	7.54 t(7.0)
4″	0.89 t(7.5)		7.33 t(7.6)		7.32 m
5″	0.93 d(7.0)		7.47 t(7.6)	7.51 m	7.32 m
6″			7.33 t(7.6)	7.33 m	7.32 m
7″			7.78 d(7.6)	7.33 m	7.54 t(7.0)
8″				7.33 m	
9″				7.33 m	

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Table 6-3-51 (continued)

H	6-3-167	6-3-168	6-3-169	6-3-170	6-3-171
3‴					6.03 q(7.1)
4‴					1.87 d(7.1)
5‴					1.29 s
5′-OMe	3.72 s	3.72 s	2.96 s	3.66 s	4.05 s
4′-OMe	4.02 s	4.02 s	3.82 s	3.98 s	3.71 s
OCH_2O	5.95, 5.96 ABq(17.6)	5.93, 5.96 ABq(16.2)	5.97 d(17.8)	5.97 d(17.8)	5.97 s, 5.92 s
OCH_2	4.27, 4.54 ABq(8.8)	4.27, 4.54 ABq(8.8)	4.24, 4.46 ABq(8.8)	4.29, 4.57 ABq(8.8)	4.62 d(9.0)
					4.02 d(9.0)

Table 6-3-52: ^{1}H NMR spectroscopic data of lignans **6-3-172**~**6-3-176**.

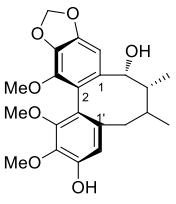
H	6-3-172	6-3-173	6-3-174	6-3-175	6-3-176
6	6.49 s	6.16 s	6.15 s	6.49 s	6.40 s
7	5.84 s	4.73 s	4.76 s	5.82 s	5.60 s
8	2.23 q(7.2)	1.84 q(7.3)	1.76 q(7.3)	2.19 q(7.2)	2.13 q(7.2)
9	1.29 d(7.2)	1.31 d(7.3)	1.29 d(7.3)	1.36 d(7.2)	1.32 d(7.2)
6′	6.52 s	3.08 s	2.88 d(17.3)	6.45 d(1.3)	6.50 s
			3.12 d(17.3)		
7′	5.79 s	5.26 s	5.24 s	5.69 d(1.3)	5.69 s
9′	1.32	0.94 s	0.91 s	1.30 s	1.25 s
2″				7.69 dd(8.3, 1.2)	
3″	6.10 q(7.4)	6.09 q(7.0)	7.07 q(7.1)	7.37 dd(8.3, 7.5)	6.00 br q(7.1)
4″	1.90 d(7.4)	1.90 d(7.0)	1.90 d(7.1)	7.54 dddd(7.5, 7.5, 1.2, 1.2)	1.84 br d(7.1)
5″	1.35 s	1.39 s	1.39 m	7.37 dd(8.3, 7.5)	1.71 s
6″				7.69 dd(8.3, 1.2)	
3‴	7.70 d(7.5)				6.08 br q(7.1)
4‴	7.37 t(7.5)				1.89 br d(7.1)
5‴	7.54 t(7.5)				1.33 br s
6‴	7.37 t(7.5)				
7‴	7.70 d(7.5)				
3′-OMe			4.02 s		
4′-OMe	3.16 s	3.66 s	3.65 s	3.15 s	3.70 s
5′-OMe	3.89 s	4.06 s		3.87 s	4.02 s
OCH_2O	5.98 s, 5.93 s	5.94 s, 5.91 s	5.94 s, 5.91 s	6.02 d(1.4), 5.95 d(1.4)	5.95 d(1.3), 5.91 d(1.3)
OCH_2	4.63 d(9.0)	4.58 d(9.6)	4.58 d(9.6)	4.64 d(9.1)	4.64 d(8.9)
	4.06 d(9.0)	4.51 d(9.6)	4.51 d(9.6)	4.04 d(9.1)	4.03 d(8.9)
OAc				1.78 s	

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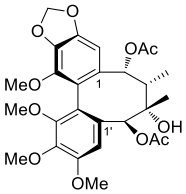
Table 6-3-53: Compounds, MFs, and test solvents of lignans **6-3-177**~**6-3-216**.

No.	Compounds	MFs	Test solvents	References
6-3-177	kadsuralignan A	$C_{22}H_{26}O_7$	$CDCl_3$	[240]
6-3-178	kadsuralignan B	$C_{27}H_{32}O_{11}$	$CDCl_3$	[240]
6-3-179	kadsuralignan I	$C_{27}H_{32}O_8$	$CDCl_3$	[241]
6-3-180	kadsuralignan J	$C_{27}H_{34}O_8$	$CDCl_3$	[241]
6-3-181	kadsuralignan K	$C_{29}H_{30}O_8$	$CDCl_3$	[241]
6-3-182	longipedunin A	$C_{31}H_{32}O_8$	$CDCl_3$	[242]
6-3-183	longipedunin B	$C_{25}H_{30}O_8$	$CDCl_3$	[242]
6-3-184	kadsuphilin A	$C_{32}H_{34}O_8$	$CDCl_3$	[243]
6-3-185	1-demethylkadsuphilin A	$C_{31}H_{32}O_8$	$CDCl_3$	[243]
6-3-186	6-*epi*-gomisin	$C_{22}H_{24}O_7$	$CDCl_3$	[243]
6-3-187	kadsuphilin B	$C_{22}H_{26}O_7$	$CDCl_3$	[243]
6-3-188	kadsuphilin C	$C_{31}H_{32}O_{11}$	$CDCl_3$	[244]
6-3-189	kadsuphilin E	$C_{32}H_{36}O_{11}$	$CDCl_3$	[244]
6-3-190	propinquanin E	$C_{31}H_{36}O_{11}$	$CDCl_3$	[245]
6-3-191	propinquanin F	$C_{28}H_{36}O_9$	$CDCl_3$	[245]
6-3-192	schisandrene	$C_{29}H_{26}O_8$	$CDCl_3$	[246]
6-3-193	ananosin A	$C_{28}H_{34}O_9$	$CDCl_3$	[247]
6-3-194	acetylepigomisin R	$C_{24}H_{26}O_8$	CD_3OD	[248]
6-3-195	kadsuphilol I	$C_{25}H_{32}O_9$	$CDCl_3$	[236]
6-3-196	kadsuphilol J	$C_{30}H_{38}O_{11}$	$CDCl_3$	[236]
6-3-197	kadsuphilol K	$C_{29}H_{30}O_{10}$	$CDCl_3$	[236]
6-3-198	kadsuphilol L	$C_{33}H_{34}O_{11}$	$CDCl_3$	[236]
6-3-199	schilancifolignan A	$C_{24}H_{30}O_7$	C_5D_5N	[249]
6-3-200	schilancifolignan B	$C_{23}H_{28}O_7$	C_5D_5N	[249]
6-3-201	schilancifolignan C	$C_{24}H_{28}O_8$	C_5D_5N	[249]
6-3-202	marlignan A	$C_{21}H_{26}O_6$	C_5D_5N	[250]
6-3-203	marlignan B	$C_{21}H_{26}O_6$	C_5D_5N	[250]
6-3-204	marlignan C	$C_{21}H_{26}O_6$	C_5D_5N	[250]
6-3-205	marlignan D	$C_{22}H_{28}O_7$	$CDCl_3$	[250]
6-3-206	marlignan E	$C_{24}H_{30}O_8$	C_5D_5N	[250]
6-3-207	marlignan F	$C_{24}H_{30}O_7$	$CDCl_3$	[250]
6-3-208	marlignan G	$C_{29}H_{32}O_8$	C_5D_5N	[250]
6-3-209	marlignan H	$C_{22}H_{26}O_7$	C_5D_5N	[250]
6-3-210	marlignan I	$C_{26}H_{34}O_8$	$CDCl_3$	[250]
6-3-211	marlignan J	$C_{26}H_{36}O_7$	$CDCl_3$	[250]
6-3-212	marlignan K	$C_{22}H_{28}O_7$	C_5D_5N	[250]
6-3-213	marlignan L	$C_{22}H_{28}O_7$	C_5D_5N	[250]
6-3-214	renchangianin A	$C_{31}H_{34}O_{11}$	$CDCl_3$	[251]
6-3-215	renchangianin B	$C_{34}H_{38}O_{11}$	$CDCl_3$	[251]
6-3-216	renchangianin C	$C_{36}H_{40}O_{10}$	$CDCl_3$	[251]

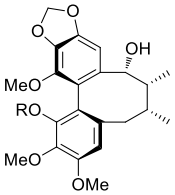
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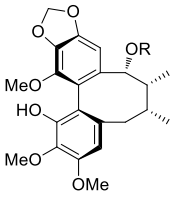
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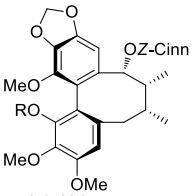
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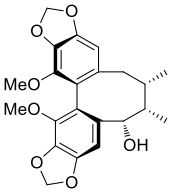
6-3-179 R = Ang
6-3-180 R = MeBu
6-3-181 R = Bz



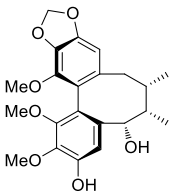
6-3-182 R = *Z*-Cinn
6-3-183 R = Propionyl



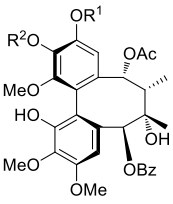
6-3-184 R = Me
6-3-185 R = H



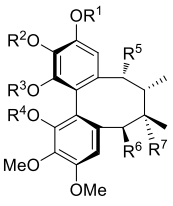
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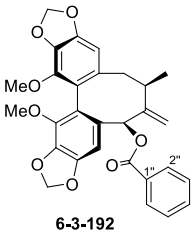
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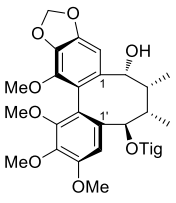
	R^1	R^2
6-3-188	CH_2	
6-3-189	Me	Me



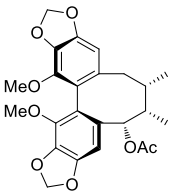
	R^1	R^2	R^3	R^4	R^5	R^6	R^7
6-3-190	CH_2		H	H	OAng	OAng	OH
6-3-191	Me	Me	Me	OAng	OH	H	H



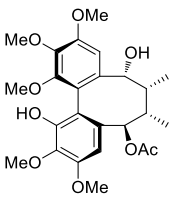
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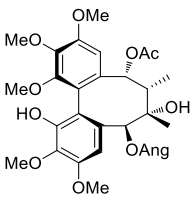
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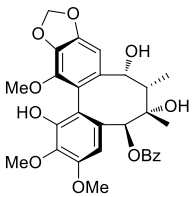
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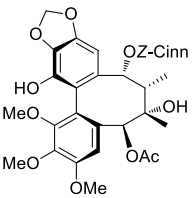
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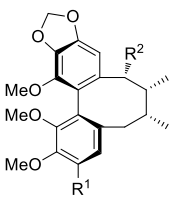
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6-3-197

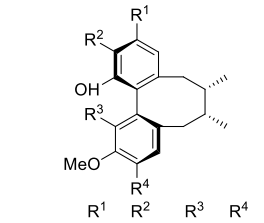


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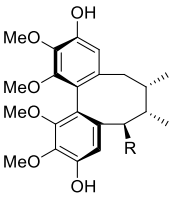


	R^1	R^2
6-3-199	OMe	OMe
6-3-200	OH	OMe
6-3-201	OH	OAc

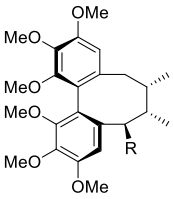
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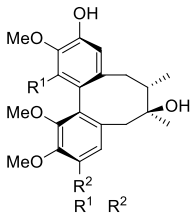
	R^1	R^2	R^3	R^4
6-3-202	OH	OMe	OMe	OH
6-3-203	OMe	OMe	OH	OH
6-3-204	OMe	OH	OH	OMe



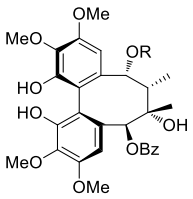
6-3-205 R = OH
6-3-206 R = OAc
6-3-207 R = OMe
6-3-208 R = OBz
6-3-209 R = =O



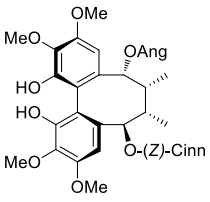
6-3-210 R = OAc
6-3-211 R = OEt



6-3-212 OH OMe
6-3-213 OMe OH



6-3-214 R = Ac
6-3-215 R = Ang



6-3-216

Table 6-3-54: ^{1}H NMR spectroscopic data of lignans **6-3-177**~**6-3-181**.

H	6-3-177	6-3-178	6-3-179	6-3-180	6-3-181
6	6.34 s	6.45 s	6.32 s	6.33 s	6.27 s
7	4.61 d(11.7)	5.66 s	4.75 s	4.73 s	4.76 s
8	1.91 m	2.08 dd(11, 5)	1.85 m	1.80 m	1.84 m
9	1.16 d(6.9)	1.23 d(9)	1.17 d(7.4)	1.16 d(7.4)	1.18 d(7.4)
6′	6.67 s	6.74 s	6.73 s	6.72 s	6.77 s
7′	2.59 m	5.65 s	2.65 m	2.63 m	2.66 m
8′	2.07 m		2.00 m	2.00 m	2.02 m
9′	0.93 d(7.5)	1.30 s	1.00 d(7.4)	1.00 d(7.4)	1.02 d(7.4)
2″				2.41 m	
3″			6.00 m	1.40 m, 1.57 m	8.05 m
4″			1.80 m	0.81 d(7.4)	7.43 m
5″			1.85 m	0.92 d(6.9)	7.57 m
6″					7.43 m
7″					8.05 m
OMe	3.63 s(3′-OMe)	3.62 s(3′-OMe)	3.84 s(3-OMe)	3.87 s(3-OMe)	3.86 s(3-OMe)
	3.95 s(4′-OMe)	3.85 s(4′-OMe)	3.80 s(4′-OMe)	3.79 s(4′-OMe)	3.80 s(4′-OMe)
	3.79 s(3-OMe)	3.91 s(5′-OMe)	3.90 s(5′-OMe)	3.89 s(5′-OMe)	3.92 s(5′-OMe)
		3.88 s(3-OMe)			
OAc		1.62 s, 1.58 s			
OCH_2O	5.97 s	5.94 d(1.4)	5.91 d(1.4)	5.94 d(1.4)	5.74 d(1.6)
		5.96 d(1.4)	5.92 d(1.4)	5.91 d(1.4)	5.85 d(1.6)
OH	5.76 s(3-OH)				

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Table 6-3-55: ^{1}H NMR spectroscopic data of lignans **6-3-182**~**6-3-186**.

H	6-3-182	6-3-183	6-3-184	6-3-185	6-3-186
6	6.56 s	6.50 s	6.54 s	6.56 s	6.45 s
7	5.72 br s	5.56 br s	5.93 s	5.73 s	2.12 dd(13.5, 10.0)
					1.96 d(13.5)
8	2.12 m	2.05 m	2.10 m	2.12 m	1.91 m
9	1.13 d(7.0)	1.08 d(7.0)	1.11 d(6.9)	1.13 d(6.9)	1.00 d(7.0)
6′	6.46 s	6.39 s	6.66 s	6.46 s	6.91 s
7′	2.69 m	2.63 m	2.71 m	2.69 br d(4.7)	4.52 d(1.5)
8′	2.12 m	2.05 m	2.10 m	2.12 m	2.00 m
9′	1.01 d(7.0)	0.91 d(7.0)	1.00 d(6.9)	1.01 d(6.9)	0.70 d(7.0)
2″	5.86 d(16.5)	1.74, 1.86	5.93 d(16.0)	5.87 d(16.0)	
3″	7.07 d(16.5)	0.85 t(7.6)	6.92 d(16.0)	7.07 d(16.0)	
5″-9″	7.34 m		7.36 br s	7.35 br s	
OMe	3.84 s(3-OMe)	3.84 s(3-OMe)	3.44 s(3′-OMe)	3.56 s(4′-OMe)	3.87 s(3-OMe)
	3.55 s(4′-OMe)	3.90 s(4′-OMe)	3.67 s(4′-OMe)	3.94 s(5′-OMe)	3.85 s(3′-OMe)
	3.93 s(5′-OMe)	3.90 s(5′-OMe)	3.95 s(5′-OMe)	3.84 s(3-OMe)	
			3.81 s(3-OMe)		
OCH_2O	5.95 d(1.0)	5.94 d(1.4)	5.98 s	5.95 d(1.1)	5.94 br s(4, 5-OCH_2O)
	5.99 d(1.0)	5.98 d(1.4)	5.99 s	6.00 d(1.1)	
					5.98 d(1.0)
					5.99 d(1.0)(4′, 5′-OCH_2O)
3′-OH	5.49 s			5.48 s	

Table 6-3-56: ^{1}H NMR spectroscopic data of lignans **6-3-187**~**6-3-191**.

H	6-3-187	6-3-188	6-3-189	6-3-190	6-3-191
6	6.46 s	6.56 s	6.69 s	6.45 s	6.39 s
7	2.12 dd(13.5, 9.0)	5.69 s	5.81 s	5.63 s	4.79 s
	1.96 d(13.5)				
8	1.98 m	2.34 q(7.0)	2.38 q(7.0)	2.25 m	1.86 m
9	1.00 d(7.0)	1.34 d(7.0)	1.36 d(7.0)	1.31 d(6.8)	1.22 d(7.2)
6′	7.04 s	6.70 s	6.72 s	6.71 s	6.73 s
7′	4.54 d(1.5)	5.86 s	5.99 s	5.55 s	2.65 m
8′	2.00 m				2.05 m
9′	0.70 d(7.0)	1.41 s	1.39 s	1.41 s	1.03 d(7.2)
3″		7.49 d(7.5)	7.37 d(7.2)	5.96 dd(7.2)	5.96 dd(7.2)
4″		7.33 t(7.5)	7.27 t(7.2)	1.85 d(7.2)	1.77 d(7.2)
5″		7.52 t(7.5)	7.48 t(7.2)	1.45 s	1.82 s
6″		7.33 t(7.5)	7.27 t(7.2)		
7″		7.49 d(7.5)	7.37 d(7.2)		
3‴				5.96 dd(7.2)	

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Table 6-3-56 (continued)

H	6-3-187	6-3-188	6-3-189	6-3-190	6-3-191
4‴				1.88 d(7.2)	
5‴				1.33 s	
OMe	3.52 s(3′-OMe)	3.93 s(4′-OMe)	3.94 s(4′-OMe)	3.90 s(4′-OMe)	3.80 s(4′-OMe)
	3.96 s(4′-OMe)	3.96 s(5′-OMe)	3.97 s(5′-OMe)	3.93 s(5′-OMe)	3.90 s(5′-OMe)
	3.83 s(3-OMe)	3.40 s(3-OMe)	4.07 s(5-OMe)		3.86 s(5-OMe)
			3.35 s(4-OMe)		3.83 s(4-OMe)
			3.24 s(3-OMe)		3.59 s(3-OMe)
OCH_2O	5.95 s	5.62 d(1.2), 5.78 d(1.2)		5.96 br s, 5.94 br s	
OAc		1.56 s	1.58 s		
3-OH′	5.75 s	5.62 s	5.75 s		

Table 6-3-57: ^{1}H NMR spectroscopic data of lignans **6-3-192**~**6-3-196**.

H	6-3-192	6-3-193	6-3-194	6-3-195	6-3-196
6	6.50 s	6.34 s	6.51 s	6.43 s	6.54 s
7	*β* 2.53 dd(2.0, 2.0)	4.66 br s	2.13 dd(13.5, 9.5)	4.71 d(5.1)	5.70 s
	α 2.25 dd(6.8, 6.8)		2.01 m		
8	2.64 m	2.14 m	1.94 m	2.09 m	2.18 q(7.2)
9	1.23 d(4.4)	1.14 d(7.1)	1.03 d(7.0)	1.09 d(7.2)	1.30 d(7.2)
6′	6.75 s	6.71 s	6.71 s	6.57 s	6.65 s
7′	6.46 s	5.81 d(7.0)	5.45 d(1.0)	5.71 d(7.7)	5.73 s
8′		2.14 m	2.00 m	2.05 m	
9′	5.06 s, 4.78 s	0.95 d(7.1)	0.76 d(7.0)	0.92 d(6.9)	1.33 s
2″	7.63 d(5.2)				
3″	7.23 t	6.21 m			5.93 q(6.6)
4″	7.48 t	1.67 s			1.81 d(6.6)
5″	7.23 t	1.61 s			1.29 s
6″	7.63 d(5.2)				
OMe	3.79 s	3.64 s	3.80 s(3′-OMe)	3.89 s(4′-OMe)	3.92 s(4′-OMe)
	3.59 s	3.76 s	3.75 s(3-OMe)	3.92 s(5′-OMe)	3.93 s(5′-OMe)
		3.90 s		3.89 s(5-OMe)	3.86 s(5-OMe)
				3.90 s(4-OMe)	3.81 s(4-OMe)
				3.75 s(3-OMe)	3.53 s(3-OMe)
OCH_2O	5.79 d(8.0)	5.98 d(1.4)	5.99 d(1.2)		
		5.95 d(1.4)	5.98 d(1.2)(4′, 5′-OCH_2O)		
OCH_2O	5.83 s, 5.75 s		5.96 d(1.2)		
			5.95 d(1.2)(4, 5-OCH_2O)		
OAc			2.04 s	1.76 s(7′-OAc)	1.54 s(7-OAc)

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Table 6-3-58: ^{1}H NMR spectroscopic data of lignans **6-3-197**~**6-3-201**.

H	6-3-197	6-3-198	6-3-199	6-3-200	6-3-201
6	6.42 s	6.49 s	6.73 s	6.81 s	6.73 s
7	4.95 s	5.91 s	4.09 d(8.2)	4.22 d(8.3)	5.66 d(8.4)
8	2.18 q(7.6)	2.24 q(7.2)	1.99~2.06 (ov)	2.14 m	2.21~2.26 (ov)
9	1.43 d(7.6)	1.29 d(7.2)	0.99 d(7.0)	1.02 d(7.5)	0.93 d(7.7)
6′	6.68 s	6.94 s	6.99 s	6.97 s	7.02 s
7′	5.91 s	5.68 s	*α* 2.79 dd(15.0, 6.3)	*α* 2.53 dd(15.8, 6.6)	*α* 2.74 dd(15.1, 6.8)
			β 2.45 d(11.0)	*β* 2.38 d(11.5)	*β* 2.56 d(11.8)
8′			1.99~2.06 (ov)	2.02 m	2.21~2.26 (ov)
9′	1.35 s	1.36 s	0.82 d(6.9)	0.93 d(6.7)	0.83 d(6.9)
2″		5.71 d(15.7)			
3″	7.52 d(8.0)	7.08 d(15.7)			
4″	7.31 t(8.0)				
5″	7.45 t(8.0)	7.37 br s			
6″	7.31 t(8.0)	7.37 br s			
7″	7.52 d(8.0)	7.37 br s			
8″		7.37 br s			
9″		7.37 br s			
OMe	3.92 s(4′-OMe)	3.47 s(3′-OMe)	3.09 s(7-OMe)	3.02 s(7-OMe)	3.73 s
	3.95 s(5′-OMe)	3.70 s(4′-OMe)	3.79 s, 3.86 s	3.83 s, 3.91 s	3.82 s
	3.37 s(3-OMe)	3.99 s(5′-OMe)	3.89 s, 3.93 s	3.98 s	3.85 s
OCH_2O	5.80 d(1.0)	6.03 d(1.0)	5.89 s	6.09 s	5.92 s
	5.64 d(1.0)	6.00 d(1.0)	5.99 s	6.18 s	5.99 s
OAc		1.63 s			2.03 s

Table 6-3-59: ^{1}H NMR spectroscopic data of lignans **6-3-202**~**6-3-206**.

H	6-3-202	6-3-203	6-3-204	6-3-205	6-3-206
6	6.34 s	6.62 s	6.50 s	6.52 s	6.98 s
7*α*	2.07 d(13.0)	2.14 d(13.0)	1.86 d(13.0)	1.94 (ov)	2.20 dd(16.1, 6.9)
7*β*	2.48 dd(9.2, 13.2)	2.51 (ov)	2.52 dd(9.2, 13.3)	2.26 m	2.47 m
8	1.82~1.87 (ov)	1.87 m	1.86~1.88 (ov)	2.19 m	2.04~2.07(ov)
9	0.89 d(6.8)	0.92 d(7.0)	0.92 d(6.8)	0.97 d(6.7)	0.84(ov)
6′	7.02 s	6.96 s	6.59 s	6.71 s	7.42 s
7′	*α* 2.63 dd(13.4, 7.0)	*α* 2.51 (ov)	*α* 2.56 dd(13.5, 7.0)	5.82 d(7.6)	5.94 d(9.8)
	β 2.67 d(13.3)	*β* 2.66 d(13.4)	*β* 2.70 d(13.0)		
8′	1.82~1.87(ov)	1.81 m	1.86~1.88 (ov)	1.95 (ov)	2.04~2.07 (ov)
9′	0.77 d(6.8)	0.74 d(7.0)	0.77 d(6.8)	0.78 d(6.6)	0.84 (ov)
OMe	3.84 s, 3.89 s	3.84 s, 3.88 s	3.69 s, 3.76 s	3.65 s, 3.66 s	3.72 s, 3.88 s
	3.90 s	3.90 s	3.80 s	3.87 s, 3.89 s	3.92 s, 3.93 s
OAc					1.80 s
OH	10.43 s, 10.61 s, 11.16 s	10.13 s, 10.46 s, 11.11 s	9.87 s, 10.08 s, 10.63 s		11.8 s, 11.68 s

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Table 6-3-60: ^{1}H NMR spectroscopic data of lignans **6-3-207**~**6-3-211**.

H	6-3-207	6-3-208	6-3-209	6-3-210	6-3-211
6	6.50 s	7.08 s	7.05 s	6.52 s	6.34 s
7α	2.00 dd(7.9, 15.0)	2.23 m	2.68 m	2.43 m	2.56 dd(13.6, 8.1)
7β	2.39 m	2.41 m	2.38 dd(12.4, 11.2)	2.12 dd(8.0, 15.2)	2.23 d(13.0)
8	1.96 m	1.89 m	3.04 m	1.85~1.87 (ov)	1.85~1.88 m
9	0.88 (ov)	0.91 d(6.8)	1.02 d(6.5)	0.96 d(7.0)	0.84 d(7.6)
6′	6.74 s	7.32 s	8.20 s	6.70 s	6.74 s
7′	3.94 d(8.5)	6.28 d(8.1)		5.64 d(8.2)	4.06 d(8.2)
8′	1.64 br s	2.09 m	1.82 m	1.85~1.87 (ov)	1.99~2.02 m
9′	0.88 (ov)	0.83 d(6.8)	0.81 d(6.6)	0.85 d(6.8)	0.76 d(6.9)
1″					3.14~3.23 m
2″					0.95 t(7.0)
3″, 7″		7.92 d(8.3)			
4″, 6″		7.32 m			
5″		7.39 m			
OMe	3.76 s, 3.87 s 3.88 s, 3.89 s 3.01 s	3.72 s, 3.74 s 3.87 s, 3.89 s	3.70 s, 3.91 s 3.93 s, 4.00 s	3.75 s, 3.78 s 3.84 s, 3.86 s 3.91 s, 3.93 s	3.79 s, 3.81 s 3.82 s, 3.86 s 3.87 s, 3.90 s
OH		10.63 s, 10.32 s			

Table 6-3-61: ^{1}H NMR spectroscopic data of lignans **6-3-212**~**6-3-216**.

H	6-3-212	6-3-213	6-3-214	6-3-215	6-3-216
6	6.77 s	6.79 s	6.79 s	6.83 s	6.79 s
7	α 2.62 d(10.8) β 2.51 dd(14.6, 6.6)	α 2.09 d(11.1) β 2.45 dd(14.0, 6.4)	5.74 s	5.76 s	5.76 s
8	2.17 m	1.82 m	2.38 q(7.2)	2.43 q(7.2)	2.38 m
9	0.72 d(8.8)	0.73 d(8.4)	1.27 d(7.1)	1.38 d(7.2)	1.26 d(7.1)
6′	7.02 s	7.04 s	6.72 s	6.71 s	6.55 s
7′	α 2.83 d(13.8) β 3.22 d(13.1)	α 2.56 d(13.8) β 3.03 d(13.1)	5.96 s	5.97 s	5.97 d(7.6)
8′					2.22 m
9′	1.39 s	1.05 s	1.38 s	1.36 s	0.99 d(7.1)
2″					6.03 d(16.0)
3″			7.42 d(7.6)	7.42 d(7.2)	7.15 d(16.0)
4″			7.28 t(7.5)	7.26 t(7.7)	
5″			7.49 t(7.3)	7.49 d(7.2)	7.40 m
6″			7.28 t(7.5)	7.26 t(7.7)	7.34 m
7″			7.42 d(7.6)	7.42 d(7.2)	7.34 m
8″					7.34 m
9″					7.40 m
3‴				5.97 m	5.78 dq(7.2, 1.2)
4‴				1.90 d(7.2)	1.87 d(7.2)
5‴				1.32 s	1.34 s

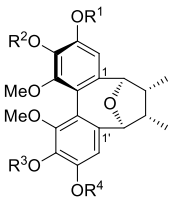
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Table 6-3-61 (continued)

H	6-3-212	6-3-213	6-3-214	6-3-215	6-3-216
OMe	3.70 s	3.75 s	3.93 s(4′-OMe)	3.87 s(4′-OMe)	3.87 s(4′-OMe)
	3.88 s	3.83 s	3.96 s(5′-OMe)	3.95 s(5′-OMe)	3.90 s(5′-OMe)
	3.89 s	3.85 s	3.25 s(5-OMe)	3.21 s(5-OMe)	3.77 s(5-OMe)
	3.90 s	3.95 s	3.24 s(4-OMe)	3.32(4-OMe)	3.53 s(4-OMe)
OAc			1.60 s		
OH	5.01 s, 10.26 s, 11.05 s	5.18 s, 11.22 s, 11.40 s	5.85 br s(3-OH)	7.27 br s(3-OH)	5.90 br s(3-OH)
			5.78 br s(3′-OH)	6.49 br s(3′-OH)	5.54 br s(3′-OH)
			2.13 br s(8′-OH)	2.35 br s(8′-OH)	

Table 6-3-62: Compounds, MFs, and test solvents of lignans **6-3-217**~**6-3-220**.

No.	Compounds	MFs	Test solvents	References
6-3-217	kadsulignan L	$C_{23}H_{26}O_7$	$CDCl_3$	[252]
6-3-218	kadsulignan M	$C_{22}H_{24}O_7$	$CDCl_3$	[252]
6-3-219	kadsulignan N	$C_{24}H_{30}O_7$	$CDCl_3$	[252]
6-3-220	–	$C_{22}H_{22}O_7$	$CDCl_3$	[252]



	R^1	R^2	R^3	R^4
6-3-217	CH_2		Me	Me
6-3-218	CH_2		Me	H
6-3-219	Me	Me	Me	Me
6-3-220	CH_2		CH_2	

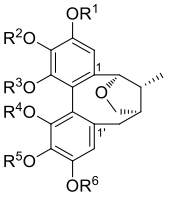
Table 6-3-63: ^{1}H NMR spectroscopic data of lignans **6-3-217**~**6-3-220**.

H	6-3-217	6-3-218	6-3-219	6-3-220
6	6.30 s	6.31 s	6.33 s	6.31 s
7	4.90 s	4.96 s	4.96 s	4.90 s
8	2.06 qd(6.9, 6.9)	2.04 qd(6.9, 6.9)	2.07 qd(6.9, 6.9)	2.08 qd(6.9, 6.9)
9	1.05 d(6.9)	1.04 d(6.9)	1.07 d(6.9)	1.01 d(6.9)
6′	6.49 s	6.53 s	6.48 s	6.44 s
7′	4.33 d(6.9)	4.29 d(6.9)	4.35 d(6.9)	4.31 d(6.9)
8′	2.66 dd(6.9, 6.9, 6.9)	2.63 qdd(6.9, 6.9, 6.9)	2.64 qdd(6.9, 6.9, 6.9)	2.65 qdd(6.9, 6.9, 6.9)
9′	1.05 d(6.9)	1.02 d(6.9)	1.07 d(6.9)	1.01 d(6.9)
OMe	3.48 s(3′-OMe)	3.43 s(3′-OMe)	3.50 s(3,3′-OMe)	3.76 s(3′-OMe)
	3.90 s(4′,5′-OMe)	3.96 s(4′-OMe)	3.85 s(4,4′-OMe)	3.85 s(3-OMe)
	3.85 s(3-OMe)	3.85 s(3-OMe)	3.88 s(5,5′-OMe)	
OCH_2O	5.93 s, 5.95 s	5.90 s, 5.96 s		5.92 s, 5.97 s

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Table 6-3-64: Compounds, MFs, and test solvents of lignans **6-3-221**~**6-3-224**.

No.	Compounds	MFs	Test solvents	References
6-3-221	pyramidatin A	$C_{24}H_{30}O_7$	$CDCl_3$	[253]
6-3-222	pyramidatin C	$C_{23}H_{28}O_7$	$CDCl_3$	[253]
6-3-223	pyramidatin D	$C_{23}H_{28}O_7$	$CDCl_3$	[253]
6-3-224	pyramidatin H	$C_{22}H_{22}O_7$	$CDCl_3$	[253]



	R^1	R^2	R^3	R^4	R^5	R^6
6-3-221	Me	Me	Me	Me	Me	Me
6-3-222	Me	Me	Me	H	Me	Me
6-3-223	Me	Me	H	Me	Me	Me
6-3-224	CH_2		Me	Me	CH_2	

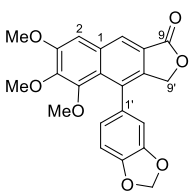
Table 6-3-65: ^{1}H NMR spectroscopic data of lignans **6-3-221**~**6-3-224**.

H	6-3-221	6-3-222	6-3-223	6-3-224
6	6.39 s	6.43 s	6.23 s	6.36 s
7	4.75 s	4.76 s	4.77 s	4.71 s
8	2.08 m	2.09 m	2.09 m	2.03 m
9	1.20 d(7.2)	1.20 d(7.3)	1.21 d(7.2)	1.17 d(7.3)
6′	6.46 s	6.29 s	6.52 s	6.41 s
7′	2.89 dd(10.9, 14.0)	2.90 dd(10.9, 14.0)	2.90 dd(10.9, 14.0)	2.85 dd(10.9, 14.0)
	2.35 d(14.0)	2.33 d(14.0)	2.38 d(14.0)	2.48 d(14.0)
8′	2.08 m	2.09 m	2.09 m	2.03 m
9′	3.64 dd(4.3, 8.5)	3.64 dd(4.3, 8.5)	3.64 dd(4.3, 8.5)	3.62 dd(4.1, 8.5)
	3.26 d(8.5)	3.33 d(8.5)	3.26 d(8.5)	3.33 d(8.5)
OMe	3.51 s, 3.55 s	3.56 s, 3.85 s	3.56 s, 3.88 s	3.75 s
	3.84 s, 3.88 s	3.88 s, 3.89 s	3.88 s, 3.90 s	3.65 s
	3.90 s, 3.90 s	3.91 s	3.90 s	
OCH_2O				5.96 s, 5.96 s
OH		5.73 s	5.77 s	

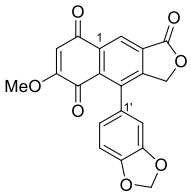
Table 6-3-66: Compounds, MFs, and test solvents of lignans **6-3-225**~**6-3-230**.

No.	Compounds	MFs	Test solvents	References
6-3-225	chaihunaphthone	$C_{22}H_{18}O_7$	$CDCl_3$	[227]
6-3-226	justicidone	$C_{20}H_{12}O_7$	$CDCl_3$	[254]
6-3-227	5,3′-dihydroxy-4,4′-dimethoxy-2,7′-cycloligna-7,7′-diene-9,9′-lactone	$C_{20}H_{16}O_6$	DMSO-d_6	[255]
6-3-228	–	$C_{21}H_{18}O_6$	$CDCl_3$	[256]
6-3-229	–	$C_{21}H_{18}O_6$	$CDCl_3$	[256]
6-3-230	(8′*R*, 7′*S*)-(–)-8-hydroxy-α-conidenfrin	$C_{20}H_{20}O_7$	$CDCl_3$	[257]

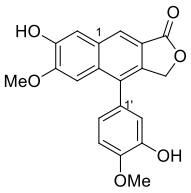
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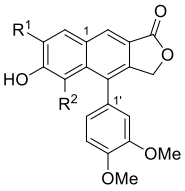
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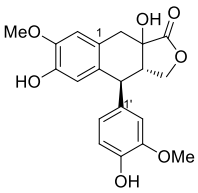
6-3-226



6-3-227



	R^1	R^2
6-3-228	H	OMe
6-3-229	OMe	H



6-3-230

Table 6-3-67: ^{1}H NMR spectroscopic data of lignans **6-3-225**~**6-3-227**.

H	6-3-225	6-3-226	6-3-227
2	7.14 s		7.47 s
3		8.72 s	
5			7.17 s
7	8.29 s	6.26 s	8.25 s
2′	6.75 d(1.6)	6.61 s	6.92 d(1.5)
5′	6.86 d(7.8)	6.90 d(8.4)	7.09 d(8.1)
6′	6.71 dd(7.8, 1.6)	6.62 dd(8.4, 1.6)	6.90 dd(8.1, 1.5)
9′	5.02 d(15.0), 5.10 d(15.0)	α 5.17 d(16.4), β 5.06 d(16.4)	5.22 d(14.8), 5.31 d(14.8)
OMe	4.01 s(3-OMe)	3.86 s(4-OMe)	3.74 s(4-OMe)
	3.92 s(4-OMe)		3.86 s(4′-OMe)
	3.36 s(5-OMe)		
OCH_2O	6.02 d(1.4), 6.03 d(1.4)	6.05 d(10.8)	

Table 6-3-68: ^{1}H NMR spectroscopic data of lignans **6-3-228**~**6-3-230**.

H	6-3-228	6-3-229	6-3-230
2	7.85 d(8.9)	7.32 s	6.66 s
3	7.39 d(8.9)		
5		7.26 s	6.44 s
7	8.43 s	8.31 s	3.09 d(16.9)
			3.16 d(16.9)
2′	6.90 br s	6.86 d(1.7)	6.60 d(1.83)
5′	6.97 br s	7.03 d(8.2)	6.88 d(8.1)
6′	6.97 s	6.91 dd(8.2, 1.7)	6.69 dd(8.1, 1.8)

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Table 6-3-68 (continued)

H	6-3-228	6-3-229	6-3-230
7′			4.15 d(11.4)
8′			2.53 m
9′	5.11 ABq(15.3)	5.23 m, 5.22 m	4.11 dd(8.4, 7.0)
	5.27		4.34 dd(8.4, 10.6)
OMe	3.98 s(4′-OMe)	4.09 s(3-OMe)	3.83 s(3′-OMe)
	3.87 s(3′-OMe)	3.98 s(4′-OMe)	3.89 s(3-OMe)
	3.18 s(5-OMe)	3.88 s(3′-OMe)	
OH		6.15 s(7-OH)	2.31 s, 5.42 s, 5.57 s

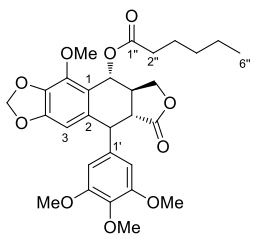
Table 6-3-69: Compounds, MFs, and test solvents of lignans **6-3-231**~**6-3-280**.

No.	Compounds	MFs	Test solvents	References
6-3-231	6-methoxypodophyllotoxin-7-*O*-*n*-hexanoate	$C_{29}H_{34}O_{10}$	$CDCl_3$	[258]
6-3-232	phyllanthuspermin A	$C_{21}H_{16}O_7$	$CDCl_3$	[259]
6-3-233	phyllanthuspermin C	$C_{26}H_{24}O_{11}$	$CDCl_3$	[259]
6-3-234	5-hydroxyjusticidin A	$C_{22}H_{18}O_8$	CD_3COCD_3	[260]
6-3-235	mananthoside C	$C_{33}H_{36}O_{16}$	CD_3OD	[260]
6-3-236	taxodiifoloside	$C_{36}H_{40}O_{17}$	$CDCl_3$	[261]
6-3-237	linoxepin	$C_{21}H_{16}O_6$	$CDCl_3$	[262]
6-3-238	7,8-dihydroisojusticidin B	$C_{21}H_{18}O_6$	$CDCl_3$	[262]
6-3-239	7,8-dihydroretrohelioxanthin	$C_{20}H_{14}O_6$	$CDCl_3$	[262]
6-3-240	7,8-dihydrotaiwanin C	$C_{20}H_{14}O_6$	$CDCl_3$	[262]
6-3-241	burseranin	$C_{21}H_{18}O_7$	$CDCl_3$	[263]
6-3-242	picropolygamain	$C_{20}H_{16}O_6$	$CDCl_3$	[263]
6-3-243	5-methoxy-4-epipodophyllotoxin	$C_{23}H_{24}O_9$	$CDCl_3$	[264]
6-3-244	podophyllotoxin	$C_{22}H_{22}O_8$	MeCN-d_3	[265]
6-3-245	–	$C_{21}H_{18}O_8$	$CDCl_3$	[266]
6-3-246	isojusticidin B	$C_{21}H_{16}O_6$	$CDCl_3$	[267]
6-3-247	cleistanone	$C_{22}H_{18}O_8$	$CDCl_3$	[268]
6-3-248	(1*S*,2*S*,3*R*)-(+)-isopicrodeoxypodophyllotoxin	$C_{22}H_{22}O_7$	$CDCl_3$	[269]
6-3-249	(7*R*,8*S*,7′*R*,8′*R*)-(+)-7′-acetyl-5′-methoxypicropodophyllin	$C_{25}H_{26}O_{10}$	$CDCl_3$	[270]
6-3-250	(7*R*,8*S*,7′*R*,8′*R*)-(+)-7′-acetylpicropodophyllin	$C_{24}H_{24}O_9$	$CDCl_3$	[270]
6-3-251	2′,4-dihydroxyretrohelioxanthin	$C_{20}H_{12}O_8$	DMSO-d_6	[271]
6-3-252	–	$C_{26}H_{22}O_{12}$	DMSO-d_6	[271]
6-3-253	2′-*O*-*β*-D-quinovopyranosylaglycone	$C_{26}H_{22}O_{12}$	DMSO-d_6	[271]
6-3-254	cilinaphthalide A	$C_{22}H_{20}O_7$	$CDCl_3$	[272]
6-3-255	cilinaphthalide B	$C_{23}H_{22}O_7$	$CDCl_3$	[272]
6-3-256	chinensinaphthol	$C_{21}H_{16}O_7$	DMSO-d_6	[227]
6-3-257	tetrahydrojusticidin B	$C_{21}H_{20}O_6$	$CDCl_3$	[273]
6-3-258	6-methoxydiphyllin	$C_{22}H_{18}O_8$	$CDCl_3$	[273]
6-3-259	procumbenoside A	$C_{31}H_{32}O_{15}$	CD_3OD	[274]
6-3-260	7′-*O*-*β*-D-glucopyranosyl-(1→6)-*β*-D-glucopyranoside	$C_{34}H_{42}O_{18}$	C_5D_5N	[275]

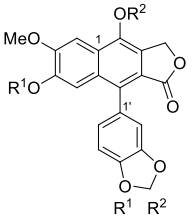
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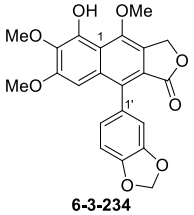
No.	Compounds	MFs	Test solvents	References
6-3-261	4-demethyl-picropodophyllotoxin 7′-*O*-*β*-D-glucopyranoside	$C_{27}H_{30}O_{13}$	CD_3OD	[275]
6-3-262	4′-demethylpicropodophyllone	$C_{21}H_{18}O_8$	C_6D_6	[276]
6-3-263	5-methoxyjusticidin A	$C_{23}H_{20}O_8$	$CDCl_3$	[277]
6-3-264	piscatorin	$C_{21}H_{16}O_7$	$CDCl_3$	[278]
6-3-265	patentiflorin A	$C_{27}H_{26}O_{11}$	$CDCl_3$	[279]
6-3-266	patentiflorin B	$C_{27}H_{26}O_{11}$	$CDCl_3$	[279]
6-3-267	4″-*O*-acetylpatentiflorin B	$C_{29}H_{28}O_{12}$	$CDCl_3$	[279]
6-3-268	4″-*O*-acetylmananthoside B	$C_{36}H_{38}O_{18}$	CD_3OD	[279]
6-3-269	erlangerin A	$C_{27}H_{28}O_{11}$	$CDCl_3$	[280]
6-3-270	erlangerin B	$C_{24}H_{24}O_9$	$CDCl_3$	[280]
6-3-271	erlangerin C	$C_{24}H_{24}O_9$	$CDCl_3$	[280]
6-3-272	erlangerin D	$C_{24}H_{24}O_{10}$	$CDCl_3$	[280]
6-3-273	patavine	$C_{36}H_{40}O_{19}$	CD_3OD	[281]
6-3-274	diphyllin	$C_{21}H_{16}O_7$	CD_3OD	[281]
6-3-275	tuberculatin	$C_{26}H_{24}O_{11}$	CD_3OD	[281]
6-3-276	majidine	$C_{31}H_{34}O_{15}$	CD_3OD	[281]
6-3-277	*α*-peltatin	$C_{21}H_{20}O_8$	$CDCl_3$	[282]
6-3-278	*α*-peltatin 5-*O*-glucoside	$C_{27}H_{30}O_{13}$	CD_3OD	[282]
6-3-279	*β*-peltatin	$C_{22}H_{22}O_8$	$CDCl_3$	[282]
6-3-280	*β*-peltatin 5-*O*-glucoside	$C_{28}H_{32}O_{13}$	CD_3OD	[282]



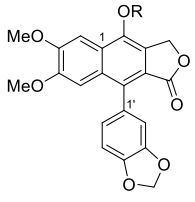
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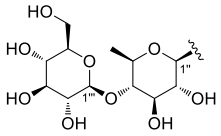
6-3-232 H Me
6-3-233 Me Ara



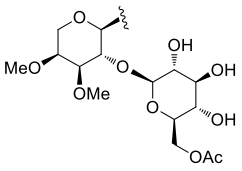
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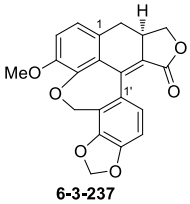


6-3-235 R=



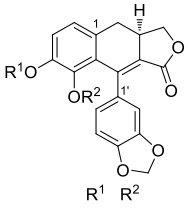
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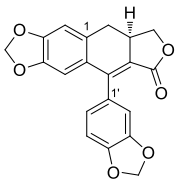


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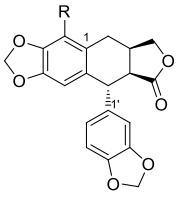
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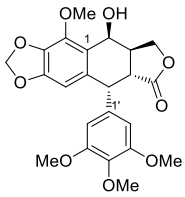
	R^1	R^2
6-3-238	Me	Me
6-3-239	CH_2	



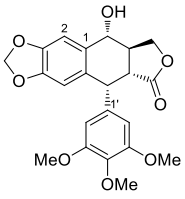
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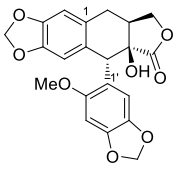
6-3-241 R = OMe
6-3-242 R = H



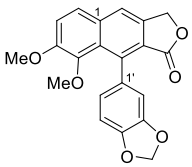
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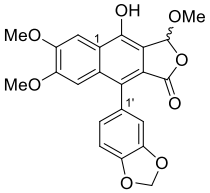
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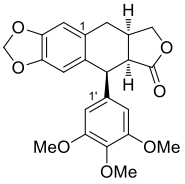
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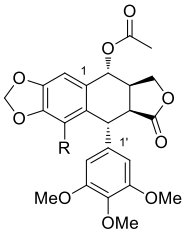
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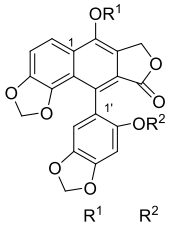
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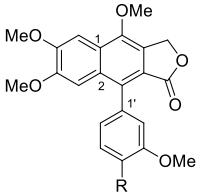
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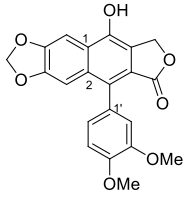
6-3-249 R = OMe
6-3-250 R = H



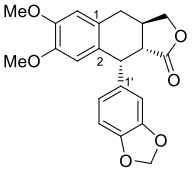
	R^1	R^2
6-3-251	H	H
6-3-252	α-L-Rha	H
6-3-253	H	β-D-Qui



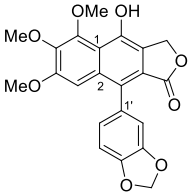
6-3-254 R = OH
6-3-255 R = OMe



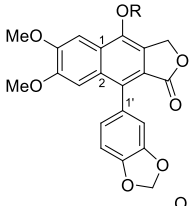
6-3-256



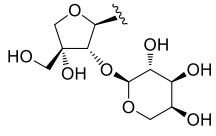
6-3-257

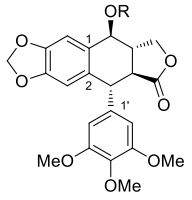


6-3-258

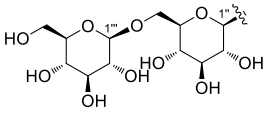


6-3-259 R =

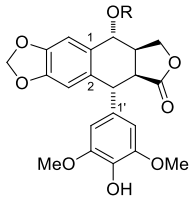




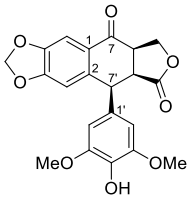
6-3-260 R =



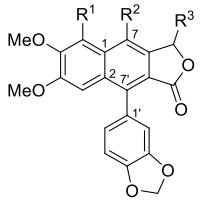
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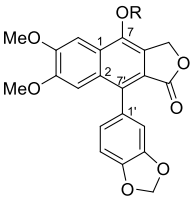
6-3-261 R = β-D-Glc



6-3-262

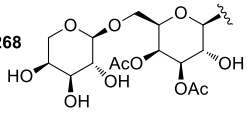


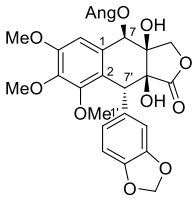
	R^1	R^2	R^3
6-3-263	OMe	OMe	H
6-3-264	H	H	OH



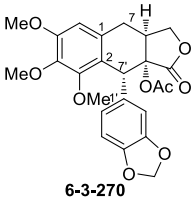
6-3-265 R = Qui
6-3-266 R = Fuc
6-3-267 R = 4-*O*-Ac-Fuc

6-3-268

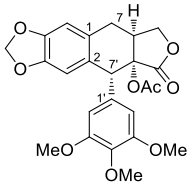




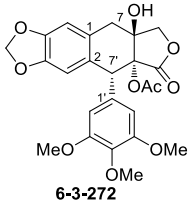
6-3-269



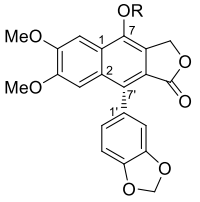
6-3-270



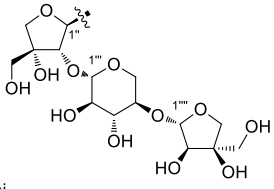
6-3-271



6-3-272



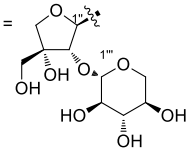
6-3-273 R =

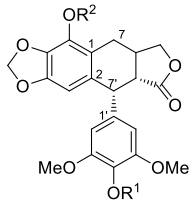


6-3-274 R = H

6-3-275 R =Api

6-3-276 R =





	R^1	R^2
6-3-277	H	H
6-3-278	H	Glc
6-3-279	Me	H
6-3-280	Me	Glc

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Table 6-3-70: ^{1}H NMR spectroscopic data of lignans **6-3-231**~**6-3-235**.

H	6-3-231	6-3-232	6-3-233	6-3-234	6-3-235
3	6.32 s	7.21 s	7.09 s	6.67 s	7.05 s
6		7.56 s	7.92 s		8.12/8.11 s
7	6.10 d(8)				
8	2.76 m				
9	4.41 dd(7, 9)	5.54 s	5.43 d(15.3)	5.64 s	5.58 d(15.1)
	4.19 dd(9, 10)		5.55 d(15.3)		5.45 d(15.1)
2′	6.47 s	6.78 s	6.84 d(1.4)	6.77 d(1.5)	6.78 d(1.5)
5′		6.94 d(7.7)	6.96 d(8.2)	6.95 d(7.8)	6.95 d(7.8)
6′	6.47 s	6.76 d(7.7)	6.81 dd(8.2, 1.4)	6.66 dd(7.8, 1.5)	6.77 dd(7.8, 1.5)
7′	6.10 d(4)				
8′	2.76 dd(4, 15)				
1″			4.76 d(8.0)		4.82 d(7.9)
2″	2.31 m(7)		3.68 dd(8.0, 7.6)		3.69 m
3″	1.63 m(7)		4.10 dd(7.6, 3.2)		3.57 m
4″	1.31 m		4.00 br s		3.33 m
5″	1.32 m		3.51 dd(12.8, 2.8)		3.47 m
			4.08 d(12.8)		
6″	0.89 t(7)				1.41 d(6.0)
1‴					4.41 d(7.9)
2‴					3.22 m
3‴					3.36 m
4‴					3.29 m
5‴					3.38 m
6‴					3.92 dd(11.9, 1.8)
					3.67 d(11.9)
OMe	4.00 s(6-OMe)	4.09 s(5-OMe)	3.81 s(4-OMe)	4.28 s(7-OMe)	4.01 s(5-OMe)
	3.77 s(3′, 5′-OMe)	4.13 s(7-OMe)	4.05 s(5-OMe)	3.85 s(5-OMe)	3.72 s(4-OMe)
	3.81 s(4′-OMe)			3.69 s(4-OMe)	
OCH_2O	5.95 br d(1)	6.04 s	6.08 s	6.08 s	6.05 s
	5.96 br d(1)	6.06 s	6.09 s	6.07 s	6.04 s
OH		5.94 s	2.50 s, 2.67 s, 3.02 s		

Table 6-3-71: ^{1}H NMR spectroscopic data of lignans **6-3-236**~**6-3-240**.

H	6-3-236	6-3-237	6-3-238	6-3-239	6-3-240
3	7.08 s				6.51 s
5		6.80 d(8.1)	6.87 d(8.2)	6.74 d(7.8)	
6	7.932 s	6.85 dd(1.0, 8.1)	6.96 dd(0.8, 8.2)	6.72 dd(0.6, 7.8)	6.76 s
	7.927 s				
7		3.00 dd(5.7, 14.7)	2.91 dd(5.9, 14.6)	2.95 dd(6.1, 14.6)	2.92 dd(6.8, 15.0)
		2.66 dt(1.0, 15)	2.72 dt(0.8, 15)	2.72 dt(0.6, 15)	2.78 t(15)

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Table 6-3-71 (continued)

H	6-3-236	6-3-237	6-3-238	6-3-239	6-3-240
8		3.28 ddt(5.7, 9, 15)	3.28 ddt(5.9, 8~9, 15)	3.37 dd t(6.1, 9, 15)	3.38 ddt(6.8, 9, 15)
9	5.557, 5.556 d(15)①	4.68 t(8.9)	4.65 t(9.1)	4.68 t(9.0)	4.69 t(8.8)
	5.424, 5.418 d(15)①	4.04 t(8.7)	3.99 dd(7.8, 8.9)	4.00 t(8.6)	3.99 t(8.7)
2′	6.84, 6.82 d(1.6)①			6.83 br s	6.76 (ov)
5′	6.96 d(8.0)	6.74 d(8.1)	6.80 m	6.82 d(8.0)	6.87 d(7.8)
6′	6.79 dd(8.0, 1.6)	6.87 d(8.1)		6.86 br d(8)	6.75 dd(2.8, 8)
1″	4.996, 4.993 d(7.0)①				
2″	3.937, 3.934 dd(8.3, 7.0)①				
3″	3.43 t(8.3)				
4″	3.46				
5″	4.037, 4.034 dd(12.1, 4.6)①				
	3.132, 3.131 dd(12.1, 8.8)①				
1‴	4.68 d(7.6)				
2‴	3.48 dd(9.1, 7.6)				
3‴	3.64 t(9.1)				
4‴	3.40 t(9.1)				
5‴	3.51 ddd(9.1, 4.7, 2.0)				
6‴	4.38 dd(12.3, 4.7)				
	4.09				
3-OMe			3.22 s		
4-OMe	3.81 s	3.85 s	3.81 s		
5-OMe	4.11 s				
3″-OMe	3.74 s				
4″-OMe	3.47 s				
OCH_2O	6.099, 6.097 d(1.4)①	6.03 d(1.6), 6.03 d(1.6)(3, 4′-OCH_2)	5.97 d(1.5), 5.96 d(1.5)(3′, 4′-OCH_2O)	5.71d(1.1), 5.69 d(1.1) (3, 4-OCH_2O)	5.96 d(1.3), 5.96 d(1.3)(4, 5-OCH_2O)
	6.055, 6.053 d(1.4)①			6.01 d(1.4), 5.99 d(1.4)(3′, 4′-OCH_2O)	6.03 d(1.3), 6.01 d(1.3)(3′, 4′-OCH_2O)
OCH_2		5.40 d(12.5)			
		5.14 d(12.5)			
OAc	1.79 s				
OH	4.69 br, 3.34 br, 3.29 br				

① A doubling of signals was observed due to restricted rotation.

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Table 6-3-72: ^{1}H NMR spectroscopic data of lignans **6-3-241**~**6-3-245**.

H	6-3-241	6-3-242	6-3-243	6-3-244	6-3-245
3	6.33 s	6.59 s	6.29 s	6.44 s	6.62 s
6		6.64 s		7.12 d(0.9)	6.21 s
7	2.66 dd(5.5, 16.1) 2.70 dd(6.5, 16.1)	2.46 dd(5.1, 15.3) 2.81 dd(6.3, 15.3)	5.16 d(3.9)	4.67 dd(9.5, 7.3)	2.58 dd(16.6, 2.9) 3.34 dd(16.6, 7.9)
8	2.97 m	3.01 m	2.75 m	2.73 dddd (14.4, 10.4, 9.5, 7.2)	2.82 m
9	3.94 dd(3.0, 9.1) 4.41 dd(7.1, 9.1)	3.96 dd(3.0, 9.6) 4.43 dd(7.5, 9.6)	4.48 dd(9.3, 8.6) 4.34 dd(8.2, 8.0)	4.51 dd(8.5, 7.2) 4.08 dd(8.5, 10.4)	3.90 dd(8.0, 8.0) 4.57 dd(8.0, 5.0)
2′	6.59 s	6.60 s	6.33 s	6.39 s	
3′					6.66 s
5′	6.72 d(8.1)	6.73 d(8.4)			
6′	6.60 d(8.1)	6.60 br d(8.4)	6.33 s	6.39 s	6.52 s
7′	4.33 d(3.0)	4.36 d(3.0)	4.60 d(4.9)	4.54 br d(5.2)	4.90 s
8′	3.25 dd(3.0, 9.5)	3.30 dd(3.0, 9.9)	3.26 dd(14.1, 4.9)	2.97 dd(14.4, 5.2)	
OMe	3.99 s(6-OMe)		4.17 s(6-OMe) 3.82 s(4′-OMe) 3.79 s(3′, 5′-OMe)	3.69 s(3′, 5′-OMe) 3.67 s(4′-OMe)	3.88 s
OCH_2O	5.88 br s, 5.89 br s (4, 5-OCH_2O) 5.92 s(3′, 4′-OCH_2O)	5.91 d(1.5), 5.92 d(1.5) (4, 5-OCH_2O) 5.93 s(3′, 4′-OCH_2O)	5.95 s	5.94 d(2.0) 5.93 d(2.0)	5.89 m 5.89 m
7-OH				3.84 d(7.3)	4.18 s

Table 6-3-73: ^{1}H NMR spectroscopic data of lignans **6-3-246**~**6-3-250**.

H	6-3-246	6-3-247	6-3-248	6-3-249	6-3-250
3		7.07 s, 7.06 s①	6.58 s		6.55 s
5	7.50 d(9.1)				
6	7.72 d(9.1)	7.58 s	6.67 s	6.57 s	6.75 s
7	7.82 s		2.48 dd(5.5, 15.3) 2.89 dd(6.2, 15.3)	5.67 d(2.4)	5.73 d(4.8)
8			3.03 m	3.04 m	2.98 m
9	5.37 (2H, 2 s, $\Delta\upsilon$=1.3 Hz)	6.42 s	3.97 dd(3.2, 9.2)	4.24 dd(3.1, 9.7)	4.30 dd(2.9, 9.7)
		6.41 s	4.44 dd(7.5, 9.2)	4.43 dd(7.3, 9.7)	4.42 dd(6.9, 9.7)
2′		6.81br d(1.5)	6.32 s	6.40 s	6.40 s

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Table 6-3-73 (continued)

H	6-3-246	6-3-247	6-3-248	6-3-249	6-3-250
5′	6.89 d(7.9)	6.93 br d(8.0)			
6′	6.82 dd(1.6, 7.9)	6.83 dd(8.0, 1.5) 6.79 dd(8.0, 1.5)	6.32 s	6.40 s	6.40 s
7′			4.36 d(3.0)	4.98 s	4.40 d(3.6)
8′			3.33 dd(3.0, 9.5)	3.34 dd(1.9, 9.2)	3.28 dd(3.6, 9.2)
OMe	3.97 s(4-OMe)	4.07 s(5-OMe)	3.78 s(3′, 5′-OMe)	3.79 s(3′, 5′-OMe)	3.80 s(3′, 5′-OMe)
	3.33 s(3-OMe)	3.81 s, 3.801 s(4-OMe)①	3.82 s(4′-OMe)	3.81 s(4′-OMe)	3.83 s(4′-OMe)
		3.69 s, 3.68 s(9-OMe)①		3.89 s(3-OMe)	
OCH_2O	6.04 d(1.3), 6.03 d(1.6)	6.08 br s, 6.04 t(1.3)	5.92 d(1.4)	5.99 d(1.3)	5.97 d(1.4)
				5.97 d(1.3)	5.95 d(1.4)
OAc				1.82 s	2.00 s

① A doubling of signals was observed due to restricted rotation.

Table 6-3-74: ^{1}H NMR spectroscopic data of lignans **6-3-251**~**6-3-255**.

H	6-3-251	6-3-252	6-3-253	6-3-254	6-3-255
3				7.11 s	7.09 s
5	7.45 d(8.9)	7.50 d(8.9)	7.45 d(8.9)		
6	7.97 d(8.9)	8.01 d(8.9)	7.96 d(8.9)	7.55 s	7.55 s
9	5.54 br s	5.61 br s	5.55 br s	5.54 s	5.55 s
2′				6.87 d(2.0)	6.88 d(1.6)
3′	6.54 s	6.53 s	6.62 s		
5′				7.06 d(8.4)	7.02 d(8.0)
6′	7.10 s	7.11 s	7.17 s	6.86 dd(8.4, 2.0)	6.93 dd(8.0, 1.6)
1″		5.01 d(1.9)	4.84 d(8.3)		
2″		3.89 dd(1.9, 2.5)	3.73 dd(8.3, 9.9)		
3″		3.71 dd(2.5, 9.5)	3.56 dd(9.9, 9.7)		
4″		4.32 t(9.5)	3.39 t(9.7)		
5″		4.13 dq(9.5, 6.5)	3.48 dq(9.7, 6.6)		
6″		1.31 d(6.5)	1.39 d(6.6)		
OMe				3.79 s(4-OMe) 3.88 s(3′-OMe) 4.07 s(5-OMe) 4.13 s(7-OMe)	3.77 s(4-OMe) 3.87 s(4′-OMe) 3.98 s(3′-OMe) 4.07 s(5-OMe) 4.13 s(7-OMe)
3,4-OCH_2O	5.89 s, 5.91 s	5.90 s, 5.92 s	5.91 s, 5.93 s		
4′, 5′-OCH_2O	6.02 s, 6.04 s	6.01 s, 6.04 s	6.05 s, 6.08 s		
OH				5.76 s	

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Table 6-3-75: ^{1}H NMR spectroscopic data of lignans **6-3-256**~**6-3-260**.

H	6-3-256	6-3-257	6-3-258	6-3-259	6-3-260
3	6.84 s	6.51 s	6.86 s	6.81 s	6.56 s
6	7.60 s	6.69 s		7.38 s	8.01 s
7		3.11 br d(11.0), 2.82 m			5.30 d(10.1)
8		2.80 m			3.11 m
9	5.34 s	3.92 t(8.4) 4.49 dd(8.3, 5.9)	5.29 s	5.30 d(15.0) 5.36 d(15.0)	4.75 dd(10.4, 5.1) 5.00 dd(10.4, 3.7)
2′	6.81 d(1.2)	6.63 br s	6.72 d(1.6)	6.50 d(1.5)	7.03 s
3′					
4′					
5′	7.04 d(8.0)	6.71 d(8.0)	6.87 d(7.9)	6.79 d(8.4)	
6′	6.76 dd(8.0, 1.2)	6.62 br d(8.0)	6.70 dd(7.9, 1.6)	6.56 dd(8.4, 1.5)	7.03 s
7′		4.63 d(4.3)			4.60 d(7.6)
8′		2.76 dd(13.8, 4.7)			3.78 dd(7.6, 9.5)
1″				5.45 d(3.0)	5.10 d(8.3)
2″				4.62 d(3.0)	4.16 dd(8.3, 9.1)
3″					4.08 t(9.1)
4″				3.79 d(9.6), 4.20 d(9.6)	3.95 t(9.1)
5″				3.62 d(11.5), 3.67 d(11.5)	4.12 ddd(9.1, 6.4, 1.9)
6″					4.25 dd(12.5, 6.4) 4.52 dd(12.5, 1.9)
1‴				4.44 d(7.6)	5.02 d(7.4)
2‴				3.21 t(7.6)	3.32 dd(8.9, 7.4)
3‴				3.28 m	3.50 t(8.9)
4‴				3.42 m	4.08 t(8.9)
5‴				3.18 m, 3.73 m	3.77 ddd(8.9, 5.5, 1.8)
6‴					4.30 dd(11.9, 5.5) 4.47 dd(11.9, 1.8)
OMe	3.69 s(3′-OMe) 3.83 s(4′-OMe)	3.78 s(4-OMe) 3.92 s(5-OMe)	3.70 s(4-OMe) 3.92 s(5-OMe) 4.12 s(6-OMe)	3.56 s(4-OMe) 3.87 s(5-OMe)	3.76 s(3′,5′-OMe) 3.89 s(4′-OMe)
OCH_2O	6.14 br s	5.92 d(1.4) 5.93 d(1.4)	5.97 d(1.4) 6.02 d(1.4)	5.91 s 5.93 s	6.00 d(1.2) 6.12 d(1.2)
OH			9.77 s		

Table 6-3-76: ^{1}H NMR spectroscopic data of lignans **6-3-261**~**6-3-265**.

H	6-3-261	6-3-262	6-3-263	6-3-264	6-3-265
3	6.46 s	6.32 s	6.97 s	7.25 s	7.11 s
6	7.37 s	7.53 s		7.12 s	7.92 s
7	5.06 d(9.1)			7.90 s	

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Table 6-3-76 (continued)

H	6-3-261	6-3-262	6-3-263	6-3-264	6-3-265
8	2.96 m	2.61 ddd(9.5, 9.5, 8.4)			
9	4.21 dd(9.5, 2.3) 4.69 dd(9.5, 4.1)	3.92 dd(9.2, 18.3) 3.75 dd(8.4, 16.9)	5.42 s	6.67 s	5.53 d(15) 5.63 d(15)
2′	6.40 s	6.43 s	6.79 d(1.7)	6.86 m	6.85 d(1.0)
5′			6.95 d(9.6)	6.98 d(7.9)	7.00 d(7.8)
6′	6.40 s	6.43 s	6.78 dd(9.6)	6.82 m	6.81 dd(7.8, 1.0)
7′	4.56 br s	4.10 d(5.9)			
8′	2.98 m	2.82 dd(9.9, 5.9)			
1″	4.39 d(7.3)				4.84 d(7.8)
2″	3.30 dd(7.3, 8.9)				3.87 dd(7.8, 9.1)
3″	3.83 t(8.9)				3.57 dd(9.1, 9.1)
4″	3.39 t(8.9)				3.38 m
5″	3.31 ddd(8.9, 5.5, 1.7)				3.35 m
6″	3.74 dd(11.8, 5.5) 3.90 dd(11.8, 1.7)				1.35 d(7.9)
OMe	3.71 s(3′, 5′-OMe)	3.35 s	4.03 s(7-OMe) 3.99 s(5 or 6-OMe) 3.97 s(5 or 6-OMe) 3.76 s(4-OMe)	3.83 s(5-OMe) 4.07 s(4-OMe)	3.80 s(4-OMe) 4.05 s(5-OMe)
OCH_2O	5.91 d(1.4) 6.00 d(1.4)	5.05 s 5.13 s	6.03 d(1.3) 6.08 d(1.3)	6.09 d(13.6)	6.07 s 6.11 s

Table 6-3-77: ^{1}H NMR spectroscopic data of lignans **6-3-266**~**6-3-270**.

H	6-3-266	6-3-267	6-3-268	6-3-269	6-3-270
3	7.11 s	7.09 s	7.04 s		
6	7.98 s	7.99 s	8.14 s	6.98 br s	6.55 s
7				5.76 br s	2.45 dd(15.0, 1.7) 3.33 dd(15.0, 5.6)
8					3.05 m
9	5.46 d(15) 5.55 d(15)	5.46 dd(15.5, 1) 5.54 d(15.5)	5.71 d(15) 5.47 d(15)	4.35 d(10.6) 3.57 dd(10.6, 1.3)	3.79 dd(8.6, 3.4) 4.76 t(8.6)
2′	6.85 d(1.0)	6.84 d(1.4)	6.82 d(1.5)	6.53 br s	6.81 m
5′	6.97 d(7.8)	6.97 d(7.9)	6.96 d(8.2)	6.68 d(8.2)	6.70 d(8.3)
6′	6.82 dd(7.8, 1.0)	6.81 dd(7.9, 1.4)	6.76 dd(8.2, 1.5)	6.49 br d(8.2)	6.69 br d(8.3)
7′				4.95 br s	5.12 br s
1″	4.80 d(7.8)	4.82 d(7.8)	4.98 d(7.8)		
2″	4.03 m	4.07 dd(7.8, 9.7)	4.09 dd(7.8, 10.2)		

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Table 6-3-77 (continued)

H	6-3-266	6-3-267	6-3-268	6-3-269	6-3-270
3″	3.66 m	3.86 dd(9.7, 3.5)	4.44 dd(3.4, 10.2)	6.24 qq(6.2, 1.1)	
4″	3.80 m	5.17 br d(3.5, 1)	5.44 d(3.4)	2.06 br d(6.2)	
5″	3.64 m	3.72 br d(6.5)	4.10 dd(7.8, 10.1)	2.04 d(1.1)	
6″	1.38 d(6.2)	1.25 d(6.5)	3.80 d(10.1), 3.7 m		
1‴			4.16 d(6.4)		
2‴			3.40 m		
3‴			3.40 m		
4‴			3.70 m		
5‴			3.46 d(12.4), 3.77 d(12.4)		
4-OMe	3.82 s	3.77 s	3.97 s	3.86 s	3.82 s
5-OMe	4.06 s	4.06 s	3.68 s	3.89 s	3.86 s
3-OMe				3.65 s	3.76 s
OCH_2O	6.06 s, 6.11 s	6.06 s, 6.10 s	6.04 s	5.91 s	5.91 s
OAc		2.28 s(4″-OAc)	2.06 s(3″-OAc) 2.20 s(4″-OAc)		2.14 s

Table 6-3-78: ^{1}H NMR spectroscopic data of lignans **6-3-271**~**6-3-275**.

H	6-3-271	6-3-272	6-3-273	6-3-274	6-3-275
3	6.61 s	6.40 s	7.07 s	7.06 s	7.11 s
6	6.72 s	6.62 s	7.67 s	7.47 s	7.75 s
7	2.50 dd(4.2, 15.1) 3.26 dd(6.0, 15.1)	2.89 d(16.3) 3.40 d(16.3)			
8	2.99 m				
9	3.87 dd(8.7, 3.8) 4.74 t(8.7)	4.2 d(9.3) 4.3 d(9.3)	5.51 d(15.5) 5.53 d(15.5)	5.24 s	5.54 d(13.0) 5.60 d(13.0)
2′	6.49 s	5.98 s	6.97 d(1.7)	6.83 d(1.5)	6.85 d(2.0)
5′			6.81 d(8.0)	6.97 d(8.0)	6.99 d(8.0)
6′	6.49 s	7.16 s	6.78 dd(1.5, 8.0)	6.79 dd(1.5, 8.0)	6.81 dd(2.0, 8.0)
7′	4.35 br s	4.59 br s			
1″			5.67 d(1.8)		5.57 d(1.5)
2″			4.74 d(1.8)		4.56 d(1.5)
4″			3.93 d(10.0)		3.97 d(10.0)
			4.34 d(10.0)		4.38 d(10.0)
5″			3.75 d(11.0), 3.79 d(11.0)		3.71 br s
1‴			4.57 d(7.5)		
2‴			3.37 dd(7.5, 9.0)		
3‴			3.50 dd(9.0, 9.0)		

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Table 6-3-78 (continued)

H	6-3-271	6-3-272	6-3-273	6-3-274	6-3-275
4‴			3.59 ddd(4.5, 9.0, 11.0)		
5‴			3.32 dd(11.0, 11.0) 4.02 dd(4.5, 11.0)		
1⁗			5.06 d(2.0)		
2⁗			3.93 d(2.0)		
4⁗			3.81 d(10.0), 4.13 d(10.0)		
5⁗			3.60 br s		
OMe	3.76 s(3′-OMe)	3.90 s(3′-OMe)	4.05 s(5-OMe)	3.99 s(5-OMe)	4.06 s(5-OMe)
	3.82 s(4′-OMe)	3.82 s(4′-OMe)	3.74 s(4-OMe)	3.72 s(4-OMe)	3.77 s(4-OMe)
	3.76 s(5′-OMe)	3.64 s(5′-OMe)			
OCH_2O	5.90 d(1.3)	5.89 d(1.3)	6.07 s	5.92 s	6.07 s
	5.92 d(1.3)		6.09 s	5.98 s	6.09 s
OAc	2.09 s	1.85 s			

Table 6-3-79: ^{1}H NMR spectroscopic data of lignans **6-3-276**~**6-3-280**.

H	6-3-276	6-3-277	6-3-278	6-3-279	6-3-280
3	7.06 s	6.24	6.29	6.24	6.28
6	7.65 s				
7		*α* 3.20 m, *β* 2.5 m	*α* 2.82 dd(13.3, 4.5) *β* 2.6 m	*α* 3.22 m, *β* 2.5 m	*α* 2.85 dd(13.5, 4.6) *β* 2.6 m
8		2.7 m	2.65 m	2.7 m	2.6 m
9	5.50 d(15.4)	*α* 4.48 dd(8.6, 6.2)	*α* 4.47 dd(8.0, 6.7)	*α* 4.48 dd(8.5, 6.4)	*α* 4.48 dd(7.7, 6.9)
	5.52 d(15.4)	*β* 3.95 dd(10.5, 8.6)	*β* 3.98 dd(9.8, 8.3)	*β* 3.96 dd(10.4, 8.5)	*β* 3.99 dd(9.4, 8.8)
2′	6.96 d(1.5)	6.37	6.37	6.36	6.40
5′	6.78 d(8.0)				
6′	6.76 dd(1.5, 8.0)	6.37	6.37	6.36	6.40
7′		4.60 d(3.7)	4.54 d(4.7)	4.61 d(3.7)	4.57 d(4.8)
8′		2.7 m	2.65 m	2.7 m	2.6 m
1″	6.65 d(1.8)		5.28 d(7.4)		5.29 d(6.2)
2″	4.75 d(1.8)		3.4 m		3.4 m
3″			3.4 m		3.4 m
4″	3.93 d(10.0), 4.35 d(10.0)		3.4 m		3.4 m
5″	3.75 d(11.0), 3.79 d(11.0)		3.4 m		3.4 m

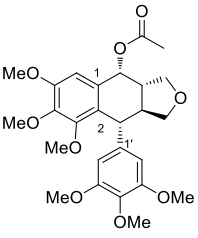
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Table 6-3-79 (continued)

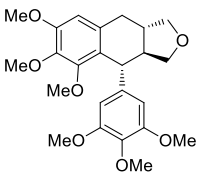
H	6-3-276	6-3-277	6-3-278	6-3-279	6-3-280
6″			3.80 dd(12.1, 2.2)		3.79 dd(11.8, 2.0)
			3.68 (ov)		3.67 (ov)
1‴	4.56 d(7.5)				
2‴	3.33 dd(7.5, 9.0)				
3‴	3.40 dd(9.0, 9.0)				
4‴	3.50 ddd(4.5, 9.0, 11.0)				
5‴	3.27 dd(11.0, 11.0)				
	3.84 dd(4.5, 11.0)				
OMe	4.03 s(5-OMe)	3.79 s(3′, 5′-OMe)	3.72 s(3′, 5′-OMe)	3.81 s(4′-OMe)	3.72 s(4′-OMe)
	3.73 s(4-OMe)			3.76 s(3′, 5′-OMe)	3.71 s(3, 5-OMe)
OCH_2O	6.07 s	5.96 d(1.4)	5.92 d(0.8)	5.95 d(1.5)	5.92 d(0.8)
	6.09 s	5.94 d(1.4)	5.90 d(0.8)	5.94 d(1.5)	5.90 d(0.8)

Table 6-3-80: Compounds, MFs, and test solvents of lignans **6-3-281**~**6-3-290**.

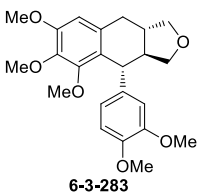
No.	Compounds	MFs	Test solvents	References
6-3-281	aglacin A	$C_{26}H_{32}O_9$	$CDCl_3$	[283]
6-3-282	aglacin B	$C_{24}H_{30}O_7$	$CDCl_3$	[283]
6-3-283	aglacin C	$C_{23}H_{28}O_6$	$CDCl_3$	[283]
6-3-284	aglacin D	$C_{24}H_{28}O_8$	$CDCl_3$	[283]
6-3-285	aglacin I	$C_{26}H_{32}O_{10}$	$CDCl_3$	[284]
6-3-286	aglacin J	$C_{24}H_{30}O_8$	$CDCl_3$	[284]
6-3-287	gaultherin C	$C_{22}H_{26}O_7$	$CDCl_3$	[285]
6-3-288	gaultherin D	$C_{21}H_{24}O_6$	$CDCl_3$	[285]
6-3-289	aglacin E	$C_{24}H_{30}O_8$	$CDCl_3$	[286]
6-3-290	aglacin F	$C_{24}H_{30}O_8$	$CDCl_3$	[286]



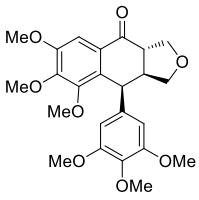
6-3-281



6-3-282

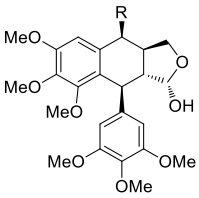


6-3-283

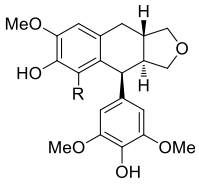


6-3-284

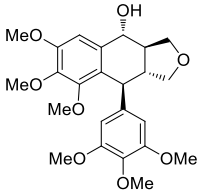
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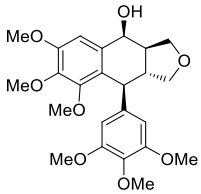
6-3-285 R = OAc
6-3-286 R = H



6-3-287 R = OMe
6-3-288 R = H



6-3-289



6-3-290

Table 6-3-81: ^{1}H NMR spectroscopic data of lignans **6-3-281**~**6-3-285**.

H	6-3-281	6-3-282	6-3-283	6-3-284	6-3-285
6	6.77 s	6.49 s	6.48 s	7.43 s	6.77 s
7	*β* 6.11 d(2.5)	*α* 2.73 dd(15.1, 11.7) *β* 2.91 dd(15.5, 4.1)	*α* 2.73 dd(15.1, 12.0) *β* 2.90 dd(15.1, 4.4)		6.13 d(2.6)
8	2.25 m	2.11 m	2.10 m	2.02 m	2.64 m
9*α*	4.06 br t(7.9)	4.16 br t(7.6)	4.16 br t(7.6)	4.29 br d(8.8)	4.18 t(8.2)
9*β*	3.48 dd(10.7, 7.9)	3.49 dd(10.1, 7.9)	3.49 br t(9.5)	3.98 dd(8.8, 6.3)	3.57 t(8.9)
2′	6.32 s	6.27 s	6.58 br s	6.24 br s	6.42 s
5′			6.76 d(8.2)		
6′	6.32 s	6.27 s	6.61 br d(8.2)	6.24 s	6.42 s
7′	3.77 d(8.0)	3.82 d(7.7)	3.86 d(8.0)	4.52 br s	4.24 d(10.8)
8′	2.60 m	2.02 m	2.02 m	2.02 m	2.46 m
9′	3.94 br t(7.6) 3.59 dd(10.4, 7.6)	3.91 br t(7.6) 3.60 dd(10.1, 7.6)	*α* 3.88 br t(7.6) *β* 3.59 dd(10.1, 7.6)	*α* 4.19 br t(8.8) *β* 3.45 br t(9.5)	5.23 d(4.4)
5-OMe	3.86 s	3.86 s	3.87 s	3.94 s	3.87 s
4-OMe	3.76 s	3.73 s	3.74 s	3.93 s	3.76 s
3-OMe	3.15 s	3.15 s	3.10 s	3.53 s	3.18 s
3′, 5′-OMe	3.79 s	3.77 s	3.81 s	3.75 s	3.79 s
4′-OMe	3.81 s	3.81 s	3.85 s	3.80 s	3.82 s
OAc	2.12 s				2.12 s

Table 6-3-82: ^{1}H NMR spectroscopic data of lignans **6-3-286**~**6-3-290**.

H	6-3-286	6-3-287	6-3-288	6-3-289	6-3-290
3			6.26 s		
6	6.47 s	6.46 s	6.70 s	7.05 s	6.71 s
7	2.96 dd(15.2, 4.2) 2.69 dd(15.5, 12.0)	*α* 2.69 dd(15.0, 11.3) *β* 2.89 dd(15.0, 4.0)	*α* 2.65 dd(15.3, 11.6) *β* 2.94 dd(15.3, 4.5)	4.76 t(9.0)	4.83 d(3.2)

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Table 6-3-82 (continued)

H	6-3-286	6-3-287	6-3-288	6-3-289	6-3-290
8	2.43 m	2.10 m	2.21 m	2.16 m	2.18 m
9α	4.28 t(7.6)	3.47 dd(9.9, 7.7)	3.42 dd(10.1, 7.7)	4.32 t(7.4)	4.09 t(7.7)
9β	3.54 t(8.6)	4.14 m	4.07 m	3.74 t(7.9)	3.87 dd(10.5, 7.7)
2′	6.37 s	6.30 s	6.47 s	6.23 s	6.30 s
6′	6.37 s	6.30 s	6.47 s	6.23 s	6.30 s
7′	4.30 d(7.9)	3.84 d(8.4)	3.66 d(7.6)	3.86 d(9.2)	3.74 d(9.5)
8′	1.83 m	2.03 m	2.01 m	2.16 m	2.61 m
9′	5.19 d(4.1)	α 3.88 m β 3.56 dd(9.9, 7.7)	α 3.82 m β 3.45 dd(10.1, 7.6)	α 3.92 t(7.1) β 3.66 dd(9.8, 7.9)	α 3.94 t(7.6) β 3.61 dd(10.4, 7.6)
5-OMe	3.86 s	3.89 s	3.78 s	3.91 s	3.91 s
4-OMe	3.74 s			3.75 s	3.76 s
3-OMe	3.18 s	3.21 s		3.15 s	3.15 s
3′, 5′-OMe	3.77 s	3.81 s	3.76 s	3.77 s	3.78 s
4′-OMe	3.81 s			3.81 s	3.82 s

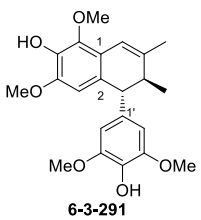
Table 6-3-83: Compounds, MFs, and test solvents of lignans **6-3-291**~**6-3-340**.

No.	Compounds	MFs	Test solvents	References
6-3-291	sacidumlignan B	$C_{22}H_{26}O_6$	CD_3COCD_3	[287]
6-3-292	sacidumlignan C	$C_{22}H_{26}O_8$	CD_3COCD_3	[287]
6-3-293	(7′*S*∗,8′*R**)-4,4′,9′-trihydroxy-3,3′,5,5′-tetramethoxy-7,8-dehydro-9-al-2,7′-cyclolignan	$C_{22}H_{26}O_8$	CD_3OD	[288]
6-3-294	vitecannasides A	$C_{26}H_{30}O_{11}$	DMSO-d_6	[289]
6-3-295	vitecannasides B	$C_{26}H_{30}O_{11}$	DMSO-d_6	[289]
6-3-296	rupestrin A	$C_{34}H_{38}O_{18}$	C_5D_5N	[290]
6-3-297	rupestrin B	$C_{32}H_{36}O_{17}$	C_5D_5N	[290]
6-3-298	rupestrin C	$C_{35}H_{40}O_{19}$	C_5D_5N	[290]
6-3-299	(+)-lyoniresinol-4,4′-bis-*O*-β-D-glucopyranoside	$C_{34}H_{48}O_{18}$	CD_3OD	[291]
6-3-300	9-acetoxyisolariciresinol	$C_{22}H_{26}O_7$	$CDCl_3$	[292]
6-3-301	polystachyol	$C_{22}H_{28}O_8$	CD_3OD	[293]
6-3-302	(+)-cycloolivil-4′-*O*-β-D-glucopyranoside	$C_{26}H_{34}O_{12}$	CD_3OD	[294]
6-3-303	rhusemialin A	$C_{31}H_{34}O_{11}$	CD_3OD	[295]
6-3-304	lyoniresinol	$C_{22}H_{28}O_8$	CD_3COCD_3	[295]
6-3-305	rhusemialin B	$C_{38}H_{46}O_{16}$	CD_3COCD_3	[295]
6-3-306	rhusemialin C	$C_{48}H_{54}O_{19}$	CD_3COCD_3	[295]
6-3-307	brugunin A	$C_{25}H_{32}O_8$	$CDCl_3$	[296]
6-3-308	trigonotin A	$C_{35}H_{40}O_{19}$	CD_3OD	[297]
6-3-309	trigonotin C	$C_{33}H_{38}O_{18}$	CD_3OD	[297]
6-3-310	trigonotin B	$C_{34}H_{38}O_{18}$	CD_3OD	[297]
6-3-311	bridelioside	$C_{25}H_{32}O_{10}$	CD_3OD	[298]

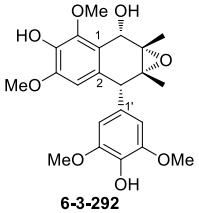
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Table 6-3-83 (continued)

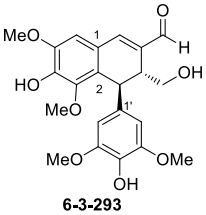
No.	Compounds	MFs	Test solvents	References
6-3-312	rostellulin A	$C_{25}H_{28}O_9$	$CDCl_3$	[299]
6-3-313	(–)-4,4′,9′-trihydroxy-3′,5′-dimethoxy-2,7′-cyclolignan 9-*O*-*β*-glucopyranoside	$C_{26}H_{34}O_{11}$	CD_3OD	[300]
6-3-314	(+)-isolariciresinol-9′-*β*-glucopyranoside	$C_{26}H_{34}O_{11}$	CD_3OD	[300]
6-3-315	ilexin C	$C_{30}H_{36}O_{10}$	DMSO-d_6	[301]
6-3-316	8′-epiaristotetralone	$C_{21}H_{22}O_5$	$CDCl_3$	[302]
6-3-317	8′-epiaristoligone	$C_{22}H_{26}O_5$	$CDCl_3$	[302]
6-3-318	hypophyllanthin	$C_{24}H_{30}O_7$	$CDCl_3$	[303]
6-3-319	(+)-lyoniresinol 3*α*-*O*-*β*-D-apiofuranosyl-(1→2)-*β*-D-glucopyranoside	$C_{33}H_{46}O_{17}$	CD_3OD	[304]
6-3-320	aviculin	$C_{26}H_{34}O_{10}$	CD_3OD	[305]
6-3-321	(+)-8,8′-*epi*-aristoligone	$C_{22}H_{26}O_5$	$CDCl_3$	[306]
6-3-322	(+)-holostylone	$C_{21}H_{24}O_5$	$CDCl_3$	[306]
6-3-323	(–)-8,8′-epiholostylone	$C_{21}H_{24}O_5$	$CDCl_3$	[306]
6-3-324	(–)-8′-*epi*-aristoligone	$C_{22}H_{26}O_5$	$CDCl_3$	[306]
6-3-325	(–)8,8′-epiholostylone	$C_{21}H_{24}O_5$	$CDCl_3$	[306]
6-3-326	(–)-4′-*O*-methylenshicine	$C_{21}H_{22}O_5$	$CDCl_3$	[306]
6-3-327	sodium (–)-lyoniresinol-2a-sulfate	$C_{22}H_{27}NaO_{11}S$	D_2O	[307]
6-3-328	sodium (+)-isolaricireinol-2a-sulfate	$C_{20}H_{23}NaO_9S$	CD_3OD+D_2O	[307]
6-3-329	negundin B	$C_{20}H_{22}O_6$	CD_3OD	[308]
6-3-330	(+)-isolarisiresinol 2a-*O*-*β*-D-glucopyranoside	$C_{26}H_{34}O_{11}$	CD_3OD	[309]
6-3-331	urinatetralin	$C_{22}H_{24}O_6$	$CDCl_3$	[145]
6-3-332	neonirtetralin	$C_{24}H_{30}O_7$	$CDCl_3$	[310]
6-3-333	gaultherin A	$C_{25}H_{30}O_9$	CD_3COCD_3	[311]
6-3-334	gaultherin B	$C_{26}H_{32}O_{10}$	CD_3COCD_3	[311]
6-3-335	epiphyllic acid-7-*O*-*β*-glucoside-10-methyl ester	$C_{25}H_{26}O_{13}$	CD_3OD	[312]
6-3-336	epiphyllic acid-7-*O*-*β*-glucoside-10,5‴-*O*-shikimic acid ester	$C_{32}H_{34}O_{17}$	CD_3OD	[312]
6-3-337	epiphyllic acid-7-*O*-*β*-glucoside-9,1⁗-*O*-heptitol ester-10,5‴-*O*-shikimic acid ester	$C_{38}H_{46}O_{23}$	CD_3OD	[312]
6-3-338	acanfolioside	$C_{37}H_{46}O_{17}$	C_5D_5N	[313]
6-3-339	fernandoside	$C_{36}H_{44}O_{16}$	CD_3OD	[314]
6-3-340	trilobatin D	$C_{25}H_{24}O_{13}$	CD_3OD	[315]



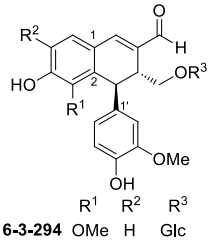
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6-3-292

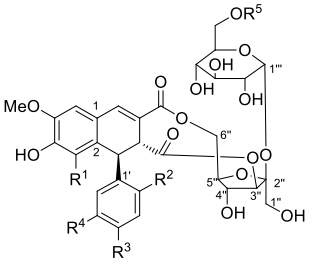


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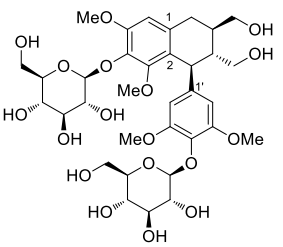


	R^1	R^2	R^3
6-3-294	OMe	H	Glc
6-3-295	H	OMe	Glc

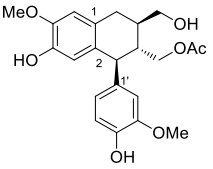
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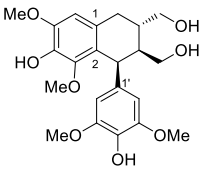
	R^1	R^2	R^3	R^4	R^5
6-3-296	OMe	H	OH	H	Ac
6-3-297	OMe	H	OH	H	H
6-3-298	OH	OMe	H	OMe	Ac



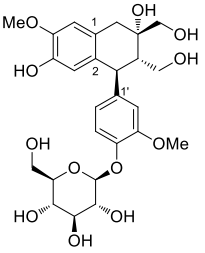
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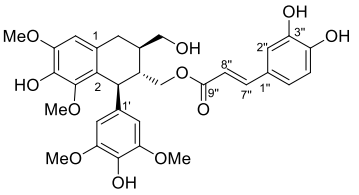
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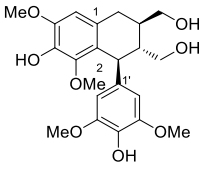
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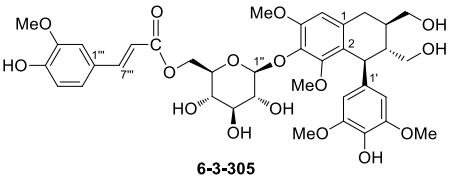
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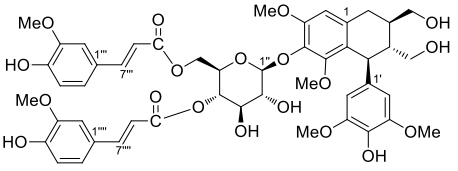
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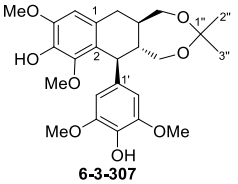
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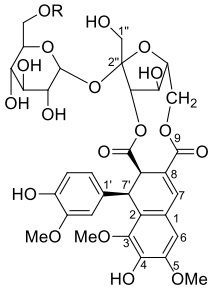
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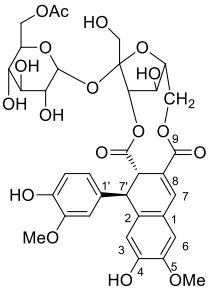
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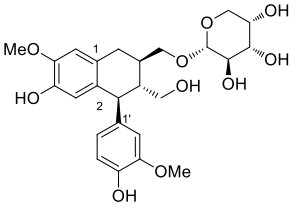
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6-3-308 R = Ac
6-3-309 R = H

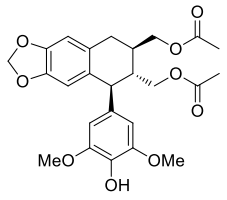


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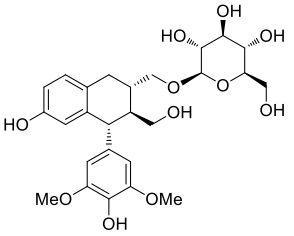


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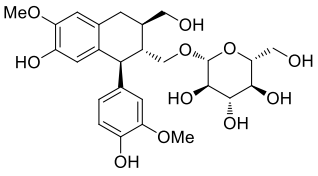
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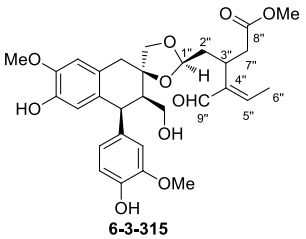
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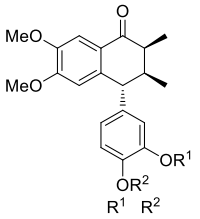
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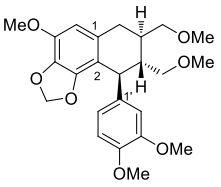
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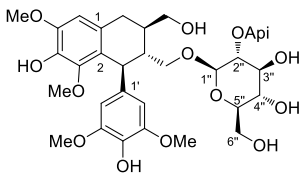
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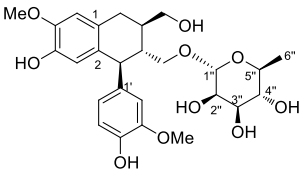
6-3-316 CH_2
6-3-317 Me Me



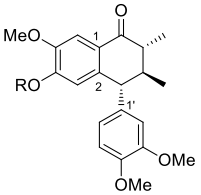
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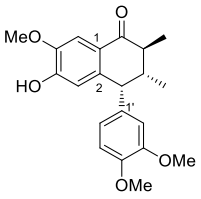
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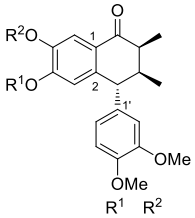
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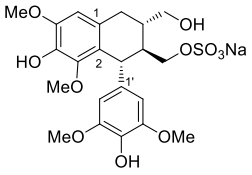
6-3-321 R = Me
6-3-322 R = H



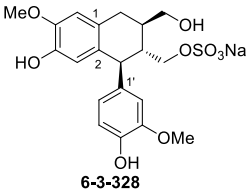
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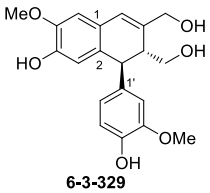
6-3-324 Me Me
6-3-325 H Me
6-3-326 CH_2



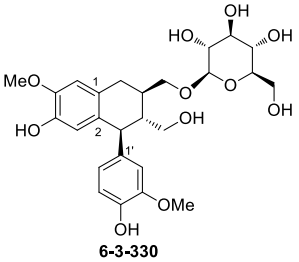
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6-3-328

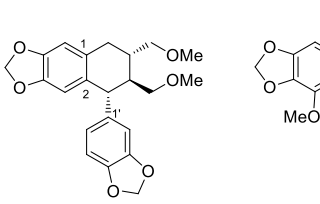


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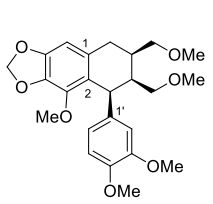


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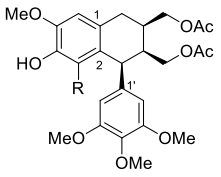
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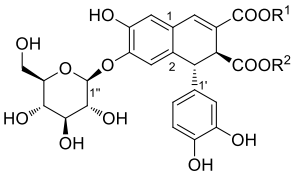
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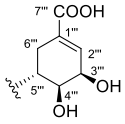
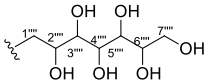
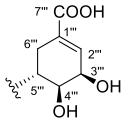


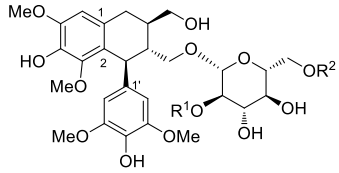
6-3-332

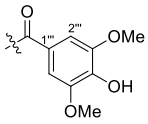


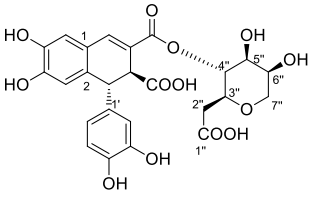
6-3-333 R = H
6-3-334 R = OMe



	R^1	R^2
6-3-335	H	Me
6-3-336	H	
6-3-337		



	R^1	R^2
6-3-338		H
6-3-339	H	Van



6-3-340

Table 6-3-84: ^{1}H NMR spectroscopic data of lignans **6-3-291**~**6-3-295**.

H	6-3-291	6-3-292	6-3-293	6-3-294	6-3-295
3	6.47 s	6.49 s			
5				6.89 d(8.0)	
6			6.96 s	7.19 d(8.0)	7.13 s
7	6.43 d(1.2)	5.21 s	7.48 s	7.56 s	7.58 s
9	1.80 d(1.2)	1.58 s	9.46 s	9.48 s	9.46 s
2′	6.39 s	7.03 s	6.28 s	6.62 d(2.0)	6.61 d(2.0)
5′				6.54 d(8.0)	6.54 d(8.0)
6′	6.39 s	7.03 s	6.28 s	6.27 dd(2.0, 8.0)	6.23 dd(2.0, 8.0)
7′	3.64 d(3.0)	4.09 s	4.79 d(1.1)	4.78 s	4.39 s

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Table 6-3-84 (continued)

H	6-3-291	6-3-292	6-3-293	6-3-294	6-3-295
8′	2.04 dq(7.0, 3.0)		3.20 ddd(10.1, 4.2, 1.1)	3.22 dd(3.5, 10.1)	3.18
9′	1.02 d(7.0)	1.20 s	3.46 dd(10.1, 4.2)	3.59 dd(3.5, 10.0)	3.65
			3.08 t(10.1)	2.95 dd(10.0, 10.0)	2.97 dd(10.0, 10.0)
1″				4.09 d(8.0)	4.05 d(8.0)
2″				3.08 dd(8.0, 9.0)	3.07 dd(8.0, 9.0)
3″				3.14 dd(9.0, 9.0)	3.18 dd(9.0, 9.0)
4″				3.13 dd(9.0, 9.0)	3.09 dd(9.0, 9.0)
5″				3.05 m	3.06
6″				3.64 dd(2.0, 11.5)	3.61 dd(4.5, 10.0)
				3.44 dd(5.5, 11.5)	3.46 dd(5.5, 10.0)
OMe	3.79 s(6-OMe)	3.86 s(6-OMe)	3.93 s(5-OMe)	3.57 s(3-OMe)	3.65 s(5-OMe)
	3.68 s(3′, 5′-OMe)	3.75 s(3′, 5′-OMe)	3.69 s(3′, 5′-OMe)	3.65 s(3′-OMe)	3.81 s(3′-OMe)
	3.72 s(4-OMe)	3.62 s(4-OMe)	3.55 s(3-OMe)		

Table 6-3-85: ^{1}H NMR spectroscopic data of lignans **6-3-296**~**6-3-300**.

H	6-3-296	6-3-297	6-3-298	6-3-299	6-3-300
3					6.33 s
6	6.89 s	6.86 s	6.89 s	6.57 s	6.61 s
7	8.15 s	8.03 s	8.13 s	2.61 dd(15.0, 4.7)	2.77~2.83 m
				2.43 dd(15.0, 11.5)	
8				1.48 m	1.78~1.82 m
9				3.63 m, 3.48 m	α 3.49 dd(11, 4)
					β 3.72 dd(11, 4)
2′	7.37 d(8)	7.45 d(8.5)		6.37 s	6.65 d(2)
3′	7.19 d(8)	7.22 d(8.5)	7.23 d(8.0)		
4′			7.06 d(8.5)		
5′	7.19 dd(8)	7.22 dd(8.5)			6.85 d(6)
6′	7.37 dd(8)	7.45 dd(8.5)	7.11 s	6.37 s	6.68 dd(10, 1.5)
7′	5.22 br s	5.29 br s	5.19 br s	4.28 d(5.6)	3.75 d(10)
8′	4.78 br s	4.73 br s	4.76 br s	1.88 m	2.29~2.33 m
9′				3.31 m	α 4.33 dd(11, 5)
					β 4.14 dd(11, 4)
1″	4.37 br d(9.5)	4.44 br d(12)	4.37 br s	4.74 d(8.1)	
	4.73 br d(7)	4.70 br s	4.71 m		
2″				3.51 m	
3″	5.66 br s	5.65 br s	5.67 br s	3.24~3.46 m	
4″	4.63 br s	4.62 br s	4.62 br s	3.24~3.46 m	
5″	4.68 br s	4.64 br s	4.65 br s	3.24~3.46 m	

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Table 6-3-85 (continued)

H	6-3-296	6-3-297	6-3-298	6-3-299	6-3-300
6″	4.40 br d(12.5)	4.27 br d(12)	4.40 br s	3.85 dd(11.9, 1.9)	
	5.27 dd(12.5, 2.5)	5.23 br dd(12.5, 2.5)	5.29 dd(12, 2)	3.65 dd(11.9, 5.3)	
1‴	6.13 br d(4)	6.17 br d(3.5)	6.13 d(3.5)	4.82 d(7.9)	
2‴	4.27 br d(9.5)	5.05 br d(9.5)	4.26 dd(8.5, 3)	3.51 m	
3‴	4.81 t(9)	4.27 t(9)	4.75 m	3.24~3.46 m	
4‴	5.23 t(9)	4.46 t(9)	5.13 t(8)	3.24~3.46 m	
5‴	4.02 br t(9)	4.29 m	4.00 t(9)	3.24~3.46 m	
6‴	4.76 d(7)	4.38 dd(12, 2.5)	4.68 m	3.79 dd(11.8, 2.1)	
	4.88 br d(11)	4.05 dd(12, 4)	4.83 br d(11)	3.61 dd(11.8, 4.8)	
OMe	3.65 s(3-OMe)	3.69 s(3-OMe)	3.72 s(5-OMe)	3.82 s(5-OMe)	3.84 s
	3.74 s(5-OMe)	3.74 s(5-OMe)	3.66 s(2′-OMe)	3.36 s(3-OMe)	3.85 s
			3.86 s(5′-OMe)	3.72 s(3′, 5′-OMe)	
OAc	1.72 s		1.77 s		

Table 6-3-86: ^{1}H NMR spectroscopic data of lignans **6-3-301**~**6-3-305**.

H	6-3-301	6-3-302	6-3-303	6-3-304	6-3-305
3		6.11 s			
6	6.58 s	6.59 s	6.61 s	6.55 s	6.61 s
7	2.57 dd(15.2, 11.3)	3.17 d(16.8)	2.63 dd(15.0, 11.2)	2.59 dd(15.2, 11.5)	2.62 br d(8.4)
	2.69 dd(15.2, 4.8)	2.57 d(16.8)	2.79 dd(15.0, 4.8)	2.66 dd(15.2, 5.6)	4.29 d(6.4)
8	1.58~1.65 m		1.75 m ($W_{1/2}$=23)	1.67 m ($W_{1/2}$=26)	1.63 m
9	3.48 dd(11.0, 7.3)	3.75	3.52 dd(10.8, 6.4)	3.55 d(11.0)	3.54 (ov)
	3.59 dd(11.0, 4.8)	3.55 d(11.2)	3.64 dd(10.8, 6.4)		
2′	6.37 s	6.75 d(1.9)	6.34 s	6.41 s	6.47 s
5′		7.08 d(8.3)			
6′	6.37 s	6.72 dd(8.3, 1.9)	6.34 s	6.41 s	6.47 s
7′	4.30 d(5.8)	4.03 br d(11.5)	4.28 d(6.0)	4.24 d(6.0)	4.25 d(6.2)
8′	1.93~1.98 m	2.00 br d(11.5)	2.24 m	1.96 m	1.98 m
9′	3.46~3.50 m	3.75	4.08 dd(10.8, 5.6)	3.51 d(11.3)	3.57 (ov)
		3.49 dd(11.2, 4.2)	4.27 dd(10.8, 5.6)		
1″		4.83 d(7.3)			4.99 d(7.7)
2″		3.43 dd(8.3, 7.3)	7.02 d(2.4)		3.03 (ov)
3″		3.42 dd(9.0, 8.3)			3.37 (ov)
4″		3.36 dd(9.0, 8.3)			3.26 t(9.0)
5″		3.26 m	6.76 d(8.0)		3.40 (ov)

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Table 6-3-86 (continued)

H	6-3-301	6-3-302	6-3-303	6-3-304	6-3-305
6″		3.84 br d(12.0) 3.65 dd(12.0, 5.6)	6.93 dd(8.0, 2.4)		4.23 m
7″			7.51 d(16.0)		
8″			6.28 d(16.0)		
2‴					7.30 d(1.6)
5‴					6.83 d(7.9)
6‴					7.15 dd(7.9, 1.6)
7‴					7.60 d(16.0)
8‴					6.38 d(16.0)
OMe	3.36 s(3-OMe) 3.73 s(3′, 5′-OMe) 3.85 s(5-OMe)	3.75 s(5-OMe) 3.74 s(3′-OMe)	3.86 s(5-OMe) 3.35 s(3-OMe) 3.71 s(3′, 5′-OMe)	3.82 s(5-OMe) 3.24 s(3-OMe) 3.71 s(3′, 5′-OMe)	3.80 s(5-OMe) 3.34 s(3-OMe) 3.71 s(3′, 5′-OMe) 3.88 s(3‴-OMe)

Table 6-3-87: ^{1}H NMR spectroscopic data of lignans **6-3-306**~**6-3-310**.

H	6-3-306	6-3-307	6-3-308	6-3-309	6-3-310
3					6.14 d(1.1)
6	6.64 s	6.38 s	6.89 br s	6.87 br s	6.94 s
7	2.63 br d(8.4) 4.27 d(6.4)	2.52 br d(7.1)	7.74 br d(0.9)	7.70 br d(0.9)	7.55 d(2.5)
8	1.61 m	1.64 m			
9	3.54(ov)	3.57 m, 3.68 m			
2′	6.43 s	6.29 s	6.61 br s	6.65 d(2.0)	6.88 d(1.8)
5′			6.60 d(7.7)	6.69 d(8.1)	6.87 d(8.0)
6′	6.43 s	6.29 s	6.66 dd(7.7, 0.9)	6.61 dd(8.1, 2.0)	6.82 dd(8.0, 1.8)
7′	4.27 d(6.4)	3.51 d(10.0)	4.77 d(1.3)	4.76 d(2.1)	4.34 dd(15.3, 1.1)
8′	1.98 m	1.60 m	4.09 br d(1.3)	3.95 dd(2.1, 0.9)	4.20 dd(15.3, 2.5)
9′	3.59(ov)	3.65 m			
1″	4.98 d(7.6)		3.94 d(12.4) 3.73 d(12.4)	3.91 d(12.0) 3.78 d(12.0)	3.88 d(12.5) 3.72 d(12.5)
2″	3.63(ov)	1.29 s			
3″	3.77(ov)	1.33 s	4.85 s	4.85 s	4.61 s
4″	5.06 t(10.0)		3.87 s	3.91 s	4.68 s
5″	3.80(ov)		4.16 br d(2.9)	4.16 br d(2.8)	4.24 br d(2.4)
6″	4.19 m		4.91 dd(13.0, 2.9) 4.07 br d(13.0)	4.88 dd(12.8, 2.8) 4.08 br d(12.8)	4.64 dd(12.0, 2.4) 4.06 br d(12.0)

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Table 6-3-87 (continued)

H	6-3-306	6-3-307	6-3-308	6-3-309	6-3-310
1‴			5.41 d(3.6)	5.40 d(3.7)	5.31 d(3.7)
2‴	7.31 d(1.6)		3.48 dd(9.5, 3.6)	3.48 dd(9.2, 3.7)	3.41 dd(9.4, 3.7)
3‴			3.76 dd(9.5, 9.5)	3.74 dd(9.2, 9.2)	3.63 dd(9.4, 9.2)
4‴			3.23 dd(9.5, 9.1)	3.43 dd(10.1, 9.2)	3.30 m
5‴	6.84 d(8.0)		4.30 ddd(9.1, 7.3, 1.7)	4.03 br dt(10.1, 3.5)	4.27 m
6‴	7.11 dd(8.0, 1.6)		4.17 dd(11.8, 1.7)	3.58 dd(11.9, 4.0)	4.22 br d(11.8)
			4.01 dd(11.8, 7.3)	3.54 dd(11.9, 3.1)	4.09 dd(11.8, 5.6)
7‴	7.62 d(15.6)				
8‴	6.40 d(15.6)				
2⁗	7.25 d(1.6)				
5⁗	6.82 d(8.1)				
6⁗	7.04 dd(8.1, 1.6)				
7⁗	7.52 d(16.0)				
8⁗	6.28 d(16.0)				
3-OMe	3.32 s	3.09 s	3.47 s	3.49 s	
5-OMe	3.82 s	3.85 s	3.90 s	3.90 s	3.86 s
OMe	3.70 s(3′, 5′-OMe)	3.80 s(3′, 5′-OMe)	3.72 s(3′-OMe)	3.74 s(3′-OMe)	3.85 s(3′-OMe)
3‴-OMe	3.87 s				
3⁗-OMe	3.85 s				
OAc			1.64 s		1.91 s

Table 6-3-88: ^{1}H NMR spectroscopic data of lignans **6-3-311**~**6-3-315**.

H	6-3-311	6-3-312	6-3-313	6-3-314	6-3-315
3	6.19 s	6.22 s	6.97 d(1.9)	6.16 br s	6.18 s
5			6.85 dd(8.6, 1.9)		
6	6.65 s	6.60 s	6.79 d(8.6)	6.64 br s	6.60 s
7	2.80 m	2.79 m	3.46~3.51 m	2.84 dd(16.0, 10.4)	2.83 d(16.2)
			1.93 m	2.79 dd(16.0, 6.0)	2.64 d(16.2)
8	2.19 m	2.24 m	2.70 t-like(7.1)	2.08 m	
9	3.64 dd(10, 6)	4.19 dd(11.5, 3.5)	3.46~3.51 m	3.76 dd(11.2, 4.0)	3.51~3.54 m
	3.91 dd(10, 6)	4.04 m		3.71 dd(11.2, 6.3)	
2′	6.68 d(2)	6.31 s	6.77 s	6.77 d(1.9)	6.61 br s
5′	6.74 d(8)			6.73 d(8.1)	6.64 d(8.0)
6′	6.61 dd(8, 2)	6.31 s	6.77 s	6.61 dd(8.1, 1.9)	6.33 d(8.0)
7′	3.86 br d(10)	3.70 d(10.5)	3.79 br d(7.1)	4.07 brd(10.8)	3.93 d(6.5)

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Table 6-3-88 (continued)

H	6-3-311	6-3-312	6-3-313	6-3-314	6-3-315
8′	1.78 ddt(10, 10, 3)	1.97 m	1.93 m	1.85 tt-like(10.8,3.6, 2.4)	2.08~2.10 m
9′	3.38 dd(11, 3)	4.05 dd(11.5, 3.5)	3.93 dd(5.5, 6.4)	4.05 dd(10.2, 2.4)	3.62~3.65 m
	3.72 dd(11, 3)	3.98 dd(11.5, 3.5)	3.54 dd(10.0, 5.5)	3.23 dd(10.2, 3.6)	3.23~3.25 m
1″	4.23 d(6)		4.27 d(7.8)	4.11 d(7.8)	4.74~4.75 m
2″				3.17~3.20 m	1.73~1.75 m 1.86~1.88 m
3″			3.24~3.40 m	3.35 t-like(9.0)	3.14~3.16 m
4″			3.24~3.40 m	3.26 t-like(9.0)	
5″	3.87 dd(12, 4)		3.24~3.40 m	3.17~3.20 m	6.73 q(6.9)
6″			3.87 m	3.82 dd(12.0, 2.4)	1.85 d(6.9)
			3.67 dd(11.1, 5.2)	3.64 dd(12.0, 5.4)	
7″					2.60~2.61 m 2.55~2.56 m
9″					9.24 s
OMe	3.78 s(5-OMe)	3.80 s(3′, 5′-OMe)	3.88 s(3′-OMe)	3.80 s(6-OMe)	3.50 s(COOMe)
OMe	3.80 s(3′-OMe)		3.83 s(6-OMe)	3.79 s(3′-OMe)	3.72 s(5-OMe)
OMe					3.68 s(3′-OMe)
OCH_2O		5.80 s			
OAc		2.0 s, 2.0 s			

Table 6-3-89: ^{1}H NMR spectroscopic data of lignans **6-3-316**~**6-3-320**.

H	6-3-316	6-3-317	6-3-318	6-3-319	6-3-320
3	6.40 s	6.41 s			6.16 s
6	7.53 s	7.54 s	6.31 s	6.57 s	6.66 s
7			2.71 dd(15.9, 10.8) 2.79 dd(15.9, 5.4)	2.62 dd(11.7, 14.6) 2.72 dd(4.4, 14.6)	2.83 d(7.8)
8	2.75 dq(7.0, 4.0)	2.75 dq(7.1, 4.1)	1.94 m	1.72 m	2.02 m
9	1.10 d(7.0)	1.11 d(7.0)	3.36 dd(9.6, 6.2) 3.41 dd(9.6, 4.2)	3.56 m 3.59~3.62 (ov)	3.62~3.63 (ov) 3.71 dd(11.0, 3.7)
2′	6.52 d(1.6)	6.59 d(1.9)	6.65 d(2.0)	6.42 s	6.63 d(1.8)
5′	6.71 d(7.9)	6.76 d(8.2)	6.72 d(8.0)		6.75 d(7.9)
6′	6.49 dd(7.9, 1.6)	6.52 dd(8.2, 1.9)	6.62 dd(8.0, 2.0)	6.42 s	6.59 dd(7.9, 1.8)
7′	3.91 d(5.2)	3.95 d(5.4)	4.07 d(7.8)	4.42 d(6.3)	3.85 d(10.4)
8′	2.36 m	2.40 m	1.87 m	2.04 m	1.86 br t(10.2)

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Table 6-3-89 (continued)

H	6-3-316	6-3-317	6-3-318	6-3-319	6-3-320
9′	0.96 d(7.0)	0.97 d(7.0)	3.22 dd(9.6, 3.5) 3.34 dd(9.6, 1.0)	3.38 (ov) 3.79~3.81 (ov)	3.10 m 3.80~3.82 (ov)
1″				4.33 d(7.9)	4.51 d(1.5)
2″				3.23 dd(7.9, 9.2)	3.84 dd(3.4, 1.6)
3″				3.38 (ov)	3.63 dd(9.3, 3.3)
4″				3.31 (ov)	3.34 t(9.0)
5″				3.59~3.62 (ov)	3.51 dq(9.0, 6.0)
6″				3.59~3.62 (ov), 3.79~3.81 (ov)	1.18 d(6.0)
1‴				5.41 d(2.0)	
2‴				3.99 d(2.0)	
4‴				3.47 d(9.8) 3.59~3.62(ov)	
5‴				3.63 d(9.8), 4.02 d(9.8)	
OMe	3.77 s(4-OMe) 3.92 s(5-OMe)	3.75 s(4-OMe) 3.92 s(5-OMe)	3.29 s(9′-OMe) 3.31 s(9-OMe)	3.30 s(3-OMe) 3.75 s(3′,5′-OMe)	3.77 s 3.81 s
		3.78 s(3′-OMe) 3.84 s(4′-OMe)	3.85 s(5-OMe) 3.78 s(3′-OMe) 3.82 s(4′-OMe)	3.85 s(5-OMe)	
OCH_2O	5.92 s		5.63 d(1.4), 5.71 d(1.4)		

Table 6-3-90: ^{1}H NMR spectroscopic data of lignans **6-3-321**~**6-3-325**.

H	6-3-321	6-3-322	6-3-323	6-3-324	6-3-325
3	6.13 s	6.20 s	6.57 s	6.36 s	6.44 s
6	7.48 s	7.48 s	7.53 s	7.49 s	7.51 s
8	2.33 dq(12.5, 6.5)	2.31 dq(12.0, 7.0)	2.39 dq(11.5, 7.0)	2.70 dq(4.2, 6.9)	2.71 dq(4.5, 7.0)
9	1.27 d(6.5)	1.25 d(7.0)	1.15 d(7.0)	1.06 d(6.9)	1.07 d(7.0)
2′	6.53 d(2.0)	6.50 d(2.0)	6.48 d(2.0)	6.54 d(1.8)	6.55 d(2.0)
5′	6.81 d(8.0)	6.78 d(8.0)	6.68 d(8.0)	6.71 d(8.4)	6.72 d(8.0)
6′	6.70 dd(8.0, 2.0)	6.66 dd(8.0, 2.0)	6.45 dd(8.0, 2.0)	6.47 dd(8.4, 1.8)	6.49 dd(8.0, 2.0)
7′	3.65 d(11.5)	3.60 d(10.5)	4.02 d(5.0)	3.91 d(5.4)	3.85 d(6.5)
8′	2.03 ddq(12.5, 11.5, 6.0)	2.03 ddq(12.0, 10.5, 7.0)	2.27 ddq(11.5, 5.0, 7.0)	2.35 ddq(5.4, 4.2, 6.9)	2.37 ddq(6.5, 4.5, 7.0)
9′	0.89 d(6.0)	0.86 d(7.0)	0.90 d(7.0)	0.92 d(6.9)	0.91 d(7.0)
OMe	3.76 s(3′-OMe) 3.86 s(4′-OMe) 3.57 s(4-OMe) 3.87 s(5-OMe)	3.74 s(3′-OMe) 3.83 s(4′-OMe) 3.87 s(5-OMe)	3.72 s(3′-OMe) 3.77 s(4′-OMe) 3.90 s(5-OMe)	3.75 s(3′-OMe) 3.79 s(4′-OMe) 3.70 s(4-OMe) 3.88 s(5-OMe)	3.75 s(3′-OMe) 3.80 s(4′-OMe) 3.90 s(5-OMe)
OH		5.83 br s			5.94 br s

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Table 6-3-91: ^{1}H NMR spectroscopic data of lignans **6-3-326**~**6-3-330**.

H	6-3-326	6-3-327	6-3-328	6-3-329	6-3-330
3	6.35 s		6.39 s	6.44 s	6.19 s
6	7.45 s	6.78 s	6.88 s	6.75 s	6.65 s
7		2.83 dd(15.6, 4.4)	3.02 m	6.56 s	2.84 m
		2.70 dd(15.6, 12.1)			
8	2.71 dq(4.5, 7.0)	1.81 m	2.23 m		2.18 m
9	1.06 d(7.0)	3.74 dd(11.2, 3.9)	3.97 dd(11.0, 3.3)	4.01 dd(5.5, 1)	3.68 dd(5, 10)
		3.59 dd(11.2, 6.8)	3.88 dd(11.0, 6.5)		4.00 dd(4, 10)
2′	6.55 d(2.0)	6.51 s	6.95 d(1.8)	6.65 d(1.8)	6.68 d(2)
5′	6.72 d(8.5)		6.94 d(8.1)	6.61 d(8.5)	6.74 d(8)
6′	6.49 dd(8.5, 2.0)	6.51 s	6.79 dd(8.1, 1.8)	6.41 dd(8.5, 1.8)	6.61 dd(2, 8)
7′	3.86 d(5.5)	4.23 d(7.1)	4.12 d(10.3)	4.11 br s	3.86 br d(10)
8′	2.35 ddq(5.5, 4.5, 7.0)	2.13 m	2.10 ddt(9.9, 10.3, 2.8)	2.51 m	1.80 tt(3, 10)
9′	0.91 d(7.0)	4.08 dd(10.3, 3.6)	4.28 dd(9.9, 2.9)	3.57 m	3.39 dd(3, 12)
		4.04 dd(10.3, 5.7)	4.06 dd(9.9, 2.8)	3.30 m	3.73 dd(3, 12)
1″					4.29 d(8)
2″					3.21 dd(8, 9)
6″					3.66 dd(6, 12)
					3.87 dd(2, 12)
OMe	3.76 s(4-OMe)	3.87 s(5-OMe)	4.01 s(5-OMe)	3.71 s(5-OMe)	3.77 s(5-OMe)
	3.80 s(5-OMe)	3.42 s(3-OMe)	3.99 s(3′-OMe)	3.85 s(3′-OMe)	3.80 s(3′-OMe)
		3.78 s(3′-OMe)			
		3.78 s(5′-OMe)			
OCH_2O	5.93 d($W_{1/2}$ 1.5)				

Table 6-3-92: ^{1}H NMR spectroscopic data of lignans **6-3-331**~**6-3-335**.

H	6-3-331	6-3-332	6-3-333	6-3-334	6-3-335
3	6.21 s		6.22 s		6.90 s
6	6.56 s	6.37	6.69 s	6.60 s	6.89 s
7	2.78 m	2.69	2.82 dd(15.5, 5.9)	2.60 dd(14.9, 4.9)	7.59 s
		2.55	2.06 dd(15.0, 10.3)	2.20 dd(14.6, 11.5)	
8	2.13 m	1.81	2.21 m	1.36 m	
9	3.40 dd(6.5, 9.3)	3.24	4.07 m	4.11 m	
	3.45 dd(4.0, 9.3)	3.26	4.19 m	4.20 m	
2′	6.55 d(1.7)	6.68	6.47 s	6.39 s	6.49 d(2.1)
5′	6.74 d(7.9)	6.68			6.63 d(8.2)

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Table 6-3-92 (continued)

H	6-3-331	6-3-332	6-3-333	6-3-334	6-3-335
6′	6.64 dd(7.9, 1.7)	6.53	6.47 s	6.39 s	6.41 dd(8.2, 2.1)
7′	3.93 d(10.8)	4.26	3.96 d(9.2)	4.19 d(6.3)	4.41 d(4.4)
8′	1.78 ddt(10.8, 10.8, 3.2)	1.98	1.86 m	1.96 m	3.90 d(4.4)
9′	3.10 dd(9.6, 3.4), 3.36 m	3.24, 3.31	3.92 m	3.97 m	
1″					4.76 d(7.1)
2″					3.45 (ov)
3″					3.44 (ov)
4″					3.42 (ov)
5″					3.30 m
6″					3.73 dd(12.3, 2.4)
					3.67 dd(12.3)
OMe	3.35 s(9-OMe)	3.26(9-OMe)	3.77 s(3′-OMe)	3.73 s(3′-OMe)	3.58 s
	3.26 s(9′-OMe)	3.31(9′-OMe)	3.77 s(5′-OMe)	3.73 s(5′-OMe)	
		3.45(3-OMe)	3.81 s(5-OMe)	3.99 s(5-OMe)	
		3.79(3′-OMe)		3.34 s(3-OMe)	
		3.79(4′-OMe)			
OCH_2O	5.83 s(4,5-OCH_2O)	5.82			
	5.93 s(3′,4′-OCH_2O)				
OAc			2.02 s, 2.06 s	1.97 s, 2.06 s	
OH			7.04 s, 7.21 s	7.13 s, 7.35 s	

Table 6-3-93: ^{1}H NMR spectroscopic data of lignans **6-3-336**~**6-3-340**.

H	6-3-336	6-3-337	6-3-338	6-3-339	6-3-340
3	6.85 s	6.82 s			6.56 s
6	6.87 s	6.94 s	6.65 s	6.50 s	6.86 s
7	7.57 s	7.70 s	3.06 dd(15.0, 11.5)	2.64 dd(15.1, 4.9)	7.62 s
			2.96 dd(15.0, 4.6)	2.53 dd(15.1, 11.5)	
8			2.16 m	1.61 m	
9			4.03 dd(10.5, 4.3)	3.58 dd(11.0, 4.4)	
			3.98 d(10.5)	3.48 dd(11.0, 6.8)	
2′	6.49 d(2.1)	6.54 d(1.8)	6.82 s	6.37 s	6.43 d(2.2)

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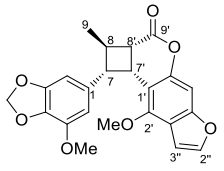
Table 6-3-93 (continued)

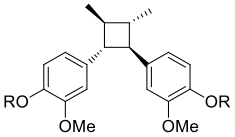
H	6-3-336	6-3-337	6-3-338	6-3-339	6-3-340
5′	6.64 d(8.2)	6.68 d(8.2)		3.52 m	6.60 d(8.1)
6′	6.41 dd(8.2, 2.1)	6.41 dd(8.2, 1.8)	6.82 s	6.37 s	6.37 dd(8.1, 2.2)
7′	4.34 d(4.9)	4.35 d(4.5)		4.33 d(11.5)	4.44 d(2.6)
8′	3.88 d(4.9)	3.95 d(4.5)	2.70 m	2.09 m	3.86 d(2.6)
9′			4.32~4.58 (ov)	3.41 dd(9.8, 4.2)	
			3.84 dd(9.6, 4.3)	3.37 m	
1″	4.79 d(7.5)	4.84 d(7.3)	5.16 d(8.0)	4.28 d(7.8)	
2″	3.46 (ov)	3.52 (ov)	5.93 t(8.4)	3.24 dd(7.8, 7.8)	2.36 dd(15.7, 10.5)
					2.47 br d(15.7)
3″	3.46 (ov)	3.52 (ov)	4.32~4.58 (ov)	3.37 m	3.74 dd(9.6, 2.2)
4″	3.42 (ov)	3.48 (ov)	4.32~4.58 (ov)	3.84 dd(10.2, 9.3)	4.99 t(9.7)
5″	3.30 m	3.36 (ov)	4.32~4.58 (ov)	3.52 m	3.77 dd(9.7, 3.3)
6″	3.73 dd(12.2, 2.5)	3.69 (ov)	4.32~4.58 (ov)	4.56 dd(12.0, 2.1)	3.89 m
	3.67 dd(12.2, 4.6)	3.69 (ov)		4.31 dd(12.0, 6.3)	
7″					3.60 d(12.0)
					3.87 dd(12.0, 2.5)
2‴	6.68 br s	6.65 br s	7.76 s	7.48 d(2.0)	
3‴	4.09 br s	4.06 br s			
4‴	3.71 br s	3.72 (ov)			
5‴	5.05 dd(9.8, 4.0)	5.04 dd(9.9, 4.1)		6.77 d(8.1)	
6‴	2.56 br d(19.0)	2.56 br d(18.3)	7.76 s	7.50 dd(8.1, 2.0)	
	2.17 br d(19.0)	2.14 br d(18.3)			
1⁗		4.40 dd(11.8, 2.8)			
		4.28 dd(11.8, 6.9)			
2⁗		4.06 br s			
3⁗		3.80 (ov)			
4⁗		3.80 (ov)			
5⁗		3.90 dd(14.3, 4.6)			
6⁗		3.80 (ov)			
7⁗		3.69 (ov)			
		3.62 dd(11.5, 6.0)			
OMe			3.73 s(5-OMe)	3.79 s(5-OMe)	
			3.72 s(3‴, 5‴-OMe)	3.78 s(3‴-OMe)	
			3.69 s(3-OMe)	3.30 s(3-OMe)	
			3.68 s(3′, 5′-OMe)	3.68 s(3′, 5′-OMe)	

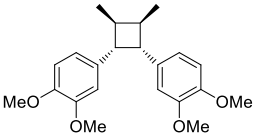
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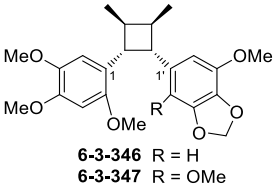
Table 6-3-94: Compounds, MFs, and test solvents of lignans **6-3-341**~**6-3-350**.

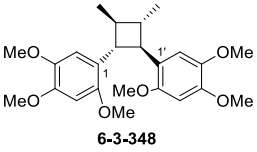
No.	Compounds	MFs	Test solvents	References
6-3-341	lindleyanin	$C_{23}H_{20}O_7$	$CDCl_3$	[316]
6-3-342	endiandrin A	$C_{20}H_{24}O_4$	DMSO-d_6	[317]
6-3-343	di-*O*-acetylendiandrin A	$C_{24}H_{28}O_6$	DMSO-d_6	[317]
6-3-344	di-*O*-methylendiandrin A	$C_{22}H_{28}O_4$	DMSO-d_6	[317]
6-3-345	cinbalansan	$C_{22}H_{28}O_4$	$CDCl_3$	[318]
6-3-346	moslolignan A	$C_{23}H_{28}O_6$	CD_3COCD_3	[319]
6-3-347	moslolignan B	$C_{24}H_{30}O_7$	CD_3COCD_3	[319]
6-3-348	magnosalin	$C_{24}H_{32}O_6$	$CDCl_3$	[320]
6-3-349	andamanicin	$C_{24}H_{32}O_6$	$CDCl_3$	[320]
6-3-350	impecyloside	$C_{34}H_{40}O_{18}$	C_5D_5N	[321]

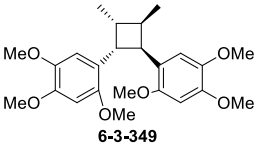












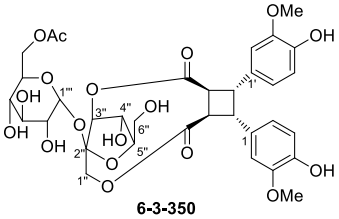


Table 6-3-95: ^{1}H NMR spectroscopic data of lignans **6-3-341**~**6-3-345**.

H	6-3-341	6-3-342	6-3-343	6-3-344	6-3-345
2	5.74 d(1.5)	6.73 d(2.4)	6.95 d(1.5)	6.77 d(1.8)	6.35 d(2)
5		6.67 d(8.4)	6.96 d(8.5)	6.84 d(8.4)	6.65 d(8.1)
6	6.15 d(1.5)	6.61 d(8.4, 2.4)	6.82 dd(8.5, 1.5)	6.73 dd(8.4, 1.8)	6.56 dd(8.1, 2)
7	3.50 dd(8.5, 10.2)	2.70 d(9.0)	2.94 d(9.0)	2.77 d(9.0)	3.43 d

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Table 6-3-95 (continued)

H	6-3-341	6-3-342	6-3-343	6-3-344	6-3-345
8	2.87 m	1.71 m	1.84 m	1.75 m	2.8 m
9	1.27 d(6.6)	1.12 d(6.0)	1.17 d(6.0)	1.13 d(6.0)	1.19 d
2′		6.73 d(2.4)	6.95 d(1.5)	6.77 d(1.8)	6.35 d(2)
5′	6.94 d(1.0)	6.67 d(8.4)	6.96 d(8.5)	6.84 d(8.4)	6.65 d(8.1)
6′		6.61 dd(8.4, 2.4)	6.82 dd(8.5, 1.5)	6.73 dd(8.4, 1.8)	6.56 dd(8.1, 2)
7′	4.13 dd(8.5, 8.7)	2.70 d(9.0)	2.94 d(9.0)	2.77 d(9.0)	3.43 d
8′	3.17 dd(8.7, 8.9)	1.71 m	1.84 m	1.75 m	2.8 m
9′		1.12 d(6.0)	1.17 d(6.0)	1.13 d(6.0)	1.19 d
2″	7.47 d(2.3)				
3″	6.71 dd(2.3, 1.0)				
OMe	3.42 s(2′-OMe)	3.72 s(3-OMe)	3.74 s(3, 3′-OMe)	3.69 s(4, 4′-OMe)	3.78 s(4, 4′-OMe)
	3.42 s(3-OMe)	3.72 s(3′-OMe)		3.71 s(3, 3′-OMe)	3.63 s(3, 3′-OMe)
OCH_2O	5.85 d(1.4), 5.85 d(1.4)				
4,4′-OAc			2.21 s		
OH		8.64 br s(4, 4′-OH)			

Table 6-3-96: ^{1}H NMR spectroscopic data of lignans **6-3-346**~**6-3-350**.

H	6-3-346	6-3-347	6-3-348	6-3-349	6-3-350
2					6.76 br s
3	6.47 s	6.49 s	6.46 s	6.30 s	
5					7.03 d(8.0)
6	6.71 s	6.57 s	6.94 s	6.55 s	6.94 br d(8.0)
7	3.74 m	3.77 m	3.26 d(9.0)	3.80 br s	4.57 dd(5.2, 9.6)
8	2.94 m	2.78 m	1.75 br s	2.72 br s	4.49 dd(5.2, 11.2)
9	1.15 d(6.5)	1.16 d(7.0)	1.19 d(5.5)	1.17 dd(4.56, 2.04)	
2′	6.18 d(1.5)				6.88 br s
3′			6.46 s	6.30 s	
5′					6.97 d(8.0)
6′	6.25 d(1.5)	6.27 s	6.94 s	6.55 s	6.71 br d(8.0)
7′	3.37 m	3.77 m	3.26 d(9.03)	3.80 br s	4.80 dd(5.2, 9.6)
8′	2.71 m	2.74 m	1.75 br s	2.72 br s	4.37 dd(5.2, 11.2)
9′	1.19 d(6.5)	1.14 d(7.0)	1.19 d(5.5)	1.17 dd(4.56, 2.04)	
1″					5.26 d(12.0), 4.33 d(12.0)
3″					5.68 s
4″					4.66 br s
5″					5.13 dd(3.8, 5.6)
6″					4.47 dd(3.8, 12.4), 4.50 dd(4.4, 12.4)
1‴					6.18 d(3.2)

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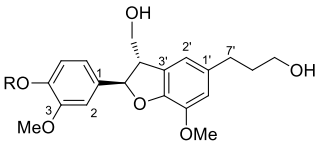
Table 6-3-96 (continued)

H	6-3-346	6-3-347	6-3-348	6-3-349	6-3-350
2‴					4.22 dd(3.2, 8.8)
3‴					4.78 dd(8.8, 8.4)
4‴					4.28 dd(8.4, 8.8)
5‴					5.24 ddd(8.8, 3.2, 4.4)
6‴					4.93 dd(4.4, 12.0), 5.26 dd(3.2, 12.0)
OMe	3.65 s(2-OMe)	3.58 s(2-OMe)	3.68 s	3.51 s	3.73 s(3-OMe)
	3.73 s(4-OMe)	3.77 s(4-OMe)	3.84 s	3.64 s	3.71 s(3′-OMe)
	3.67 s(5-OMe)	3.64 s(5-OMe)	3.86 s	3.79 s	
	3.68 s(3′-OMe)	3.57 s(2′-OMe)			
		3.66 s(5′-OMe)			
OCH_2O	5.79 d(1.0)	5.84 d(1.0)			
	5.79 d(1.0)	5.84 d(1.0)			
OAc					1.88 s

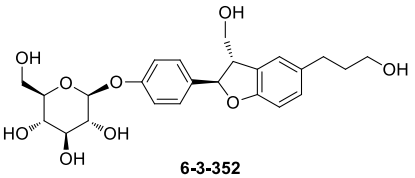
Table 6-3-97: Compounds, MFs, and test solvents of lignans **6-3-351**~**6-3-372**.

No.	Compounds	MFs	Test solvents	References
6-3-351	symplolignanoside A	$C_{31}H_{42}O_{15}$	C_5D_5N	[322]
6-3-352	cupressoside B	$C_{24}H_{30}O_9$	CD_3OD	[323]
6-3-353	davidioside A	$C_{33}H_{38}O_{15}$	CD_3OD	[324]
6-3-354	davidioside B	$C_{25}H_{32}O_{10}$	CD_3OD	[324]
6-3-355	(7*S*, 8*R*)-balanophonin 4-*O*-*β*-D-glucopyranoside	$C_{26}H_{30}O_{11}$	CD_3OD	[325]
6-3-356	(+)-morrisonicolanin	$C_{18}H_{16}O_4$	$CDCl_3$	[326]
6-3-357	spicatolignan A	$C_{27}H_{30}O_{13}$	DMSO-d_6	[327]
6-3-358	*E*-3-[3-benzoyloxymethyl-2-(4-hydroxy-3-methoxy-phenyl)-7-methoxy-2,3-dihydrobenzofuran-5-yl]propenyl benzoate	$C_{34}H_{30}O_8$	CD_3COCD_3	[328]
6-3-359	4-*O*-rhamnosyl-7*S*,8*R*-7′,8′-*erythro*-sisymbrifolin	$C_{26}H_{34}O_{12}$	CD_3OD	[329]
6-3-360	–	$C_{27}H_{34}O_{11}$	CD_3OD	[330]
6-3-361	(–)-simulanol	$C_{21}H_{24}O_7$	$CDCl_3$	[331]
6-3-362	machilusol A	$C_{21}H_{24}O_5$	$CDCl_3$	[332]
6-3-363	machilusol B	$C_{20}H_{22}O_6$	$CDCl_3$	[332]
6-3-364	machilusol C	$C_{20}H_{24}O_6$	$CDCl_3$	[332]
6-3-365	machilusol D	$C_{21}H_{26}O_6$	$CDCl_3$	[332]
6-3-366	machilusol E	$C_{21}H_{26}O_7$	$CDCl_3$	[332]
6-3-367	machilusol F	$C_{20}H_{22}O_5$	$CDCl_3$	[332]
6-3-368	hyoscyamal	$C_{20}H_{18}O_6$	$CDCl_3$	[333]
6-3-369	bennettin	$C_{21}H_{26}O_9$	CD_3OD	[334]
6-3-370	flacoside A	$C_{26}H_{34}O_{13}$	CD_3OD	[334]
6-3-371	(7*S*,8*R*) dehydrodiconiferyl alcohol 9′-*β*-gluco-pyranoside	$C_{26}H_{32}O_{11}$	CD_3OD	[335]
6-3-372	7(*R*),8(*S*)-3,3′-dimethoxy-4,9,9′-trihydroxy-4′,7-epoxy-5′8-lignan-4,9-bis-*O*-*β*-D-glucopyranoside	$C_{32}H_{44}O_{16}$	DMSO-d_6	[336]

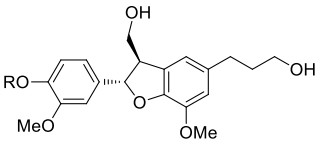
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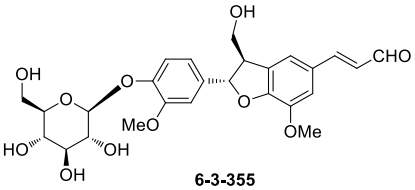
6-3-351 R = Api(1→6)Glc



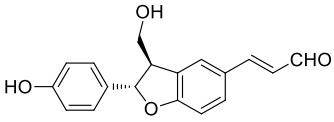
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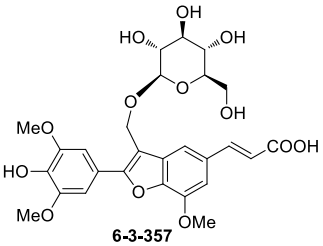
6-3-353 R = 6-*O*-Gall-Glc
6-3-354 R = Xyl



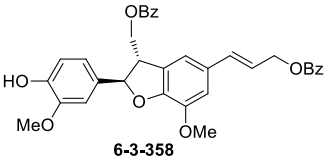
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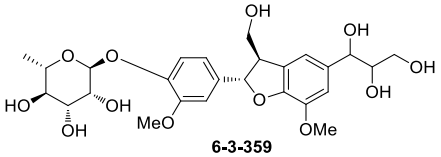
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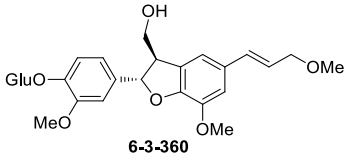
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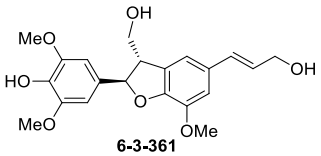
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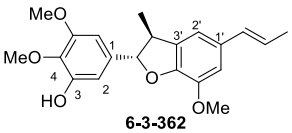
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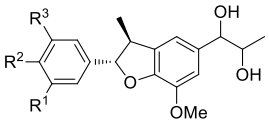
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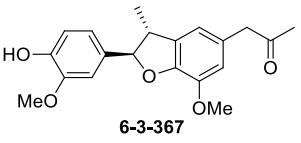
6-3-361



6-3-362

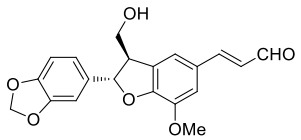


	R^1	R^2	R^3
6-3-363	OCH_2O		H
6-3-364	OMe	OH	H
6-3-365	OMe	OMe	H
6-3-366	OH	OMe	OMe

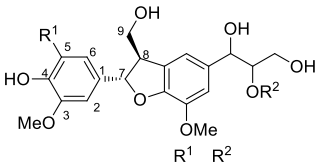


6-3-367

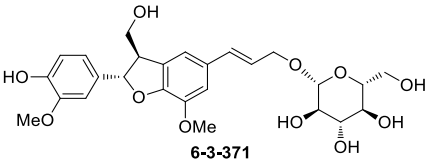
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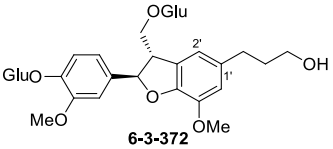
6-3-368



	R^1	R^2
6-3-369	OMe	H
6-3-370	H	Glc



6-3-371



6-3-372

Table 6-3-98: ^{1}H NMR spectroscopic data of lignans **6-3-351**~**6-3-355**.

H	6-3-351	6-3-352	6-3-353	6-3-354	6-3-355
2	7.26 d(1.5)	7.28 d(8.6)	6.99 d(2.0)	7.02 d(1.7)	7.03 d(2.0)
3		7.06 d(8.6)			
5	7.63 d(7.0)	7.06 d(8.6)	7.04 d(8.3)	6.70 d(8.3)	7.16 d(8.0)
6	7.32 dd(7.0, 1.5)	7.28 d(8.6)	6.79 dd(8.3, 2.0)	6.90 dd(8.3, 1.7)	6.94 dd(8.0, 2.0)
7	6.14 d(7.0)	5.49 d(5.6)	5.48 d(5.9)	5.54 d(6.0)	5.66 d(6.0)
8	3.86 m	3.39 m	3.89 m	3.90 m	3.54 q(6.0)
9	4.13 m, 4.23 m	3.83 m	3.81 m, 3.74 m	3.43 m	3.91~3.86 (ov)
2′	7.01 s	7.05 d(1.6)	6.71 br s(ov)	6.72 br s	7.27 br s
5′		6.71 d(8.1)			
6′	6.89 s	6.99 dd(1.6, 8.1)	6.70 br s(ov)	6.72 br s	7.23 d(1.5)
7′	2.85 br t(7.0)	2.61 t(7.1)	2.60 t(7.9)	2.61 t(7.7)	7.61 d(16.0)
8′	2.06 q(7.0)	1.79 m	1.80 m	1.80 m	6.67 dd(16.0, 8.0)
9′	3.91 m	3.55 t(6.5)	3.56 t(6.4)	3.83(ov)	9.58 d(8.0)
1″	5.43 d(7.0)	4.88 d(7.6)	4.88 d(7.8)	4.85 d(7.2)	4.89 d(8.0)
2″	4.25 m	3.44 t(3.7)	3.50 t(7.8)	3.42(ov)	3.49 t(8.0)
3″	4.28 m	3.39 m	3.52 t(9.3)	3.31(ov)	3.45 t(8.0)
4″	4.12 m	3.36 m	3.42 t(9.3)	3.55 t(6.4)	3.39(ov)
5″	4.20 m	3.42 m	3.70 m	3.29(ov)	3.39(ov)
6″	4.18 m, 4.68 m	3.85 m	4.53 br d(12.0)		3.84(ov)
			4.41 dd(12.0, 7.2)		3.68 dd(12.0, 4.0)
1‴	5.71 d(2.0)				
2‴	4.72 d(2.0)		7.09 s		
4‴	4.52 d(9.5)				
5‴	4.13 m				
6‴			7.09 s		
OMe	3.82 s(5′-OMe)		3.84 s(3-OMe)	3.89 s(3-OMe)	3.83 s(3-OMe)
	3.55 s(3-OMe)		3.84 s(5′-OMe)	3.84 s(5′-OMe)	3.92 s(5′-OMe)

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Table 6-3-99: ^{1}H NMR spectroscopic data of lignans **6-3-356**~**6-3-360**.

H	6-3-356	6-3-357	6-3-358	6-3-359	6-3-360
2	7.21 d(8.4)	7.15 s	7.08 d(2.3)	7.03 d(2.0)	7.03 d(2.0)
3	6.80 d(8.4)				
5	6.80 d(8.4)		6.83 d(8.1)	7.08 d(8.3)	7.15 d(8.0)
6	7.21 d(8.4)	7.15 s	6.95 dd(1.9, 8.1)	6.91 dd(8.3, 2.0)	6.93 dd(8.0, 2.0)
7	5.60 d(6.3)		5.68 d(6.9)	5.60 d(5.9)	5.58 d(7.0)
8	3.59 m		3.99 q(7.2, 7.1, 5.4)	3.46 m	3.48 m
9	3.93 m	4.86 d(11.5)	4.61 dd(11.0, 7.4)	3.86 m	3.85(ov)
		5.03 d(11.5)	4.75 dd(11.0, 5.2)	3.77 m	3.78 dd(11.0, 7.0)
2′	7.45 s	7.65 s	7.17 br s	6.90 br s	6.97 s
5′	6.88 d(8.5)				
6′	7.41 d(8.5)	7.32 s	7.11 br s	6.95 br s	6.95 s
7′	7.40 d(15.8)	7.67 d(16.0)	6.78 br d(15.8)	4.57 d(5.9)	6.56 d(16.0)
8′	6.68 dd(15.8, 7.8)	6.62 d(16.0)	6.38 dt(15.7, 6.6)	3.68 m	6.16 dt(16.0, 6.0)
9′	9.62 d(7.8)		4.95 dd(5.2, 1.3)	3.53 dd(11.5, 4.2)	4.05 dd(6.0, 1.5)
				3.39 dd(11.2, 6.4)	
1″		4.39 d(7.6)		5.34 d(1.5)	4.88 d(7.5)
2″		3.06 m	7.94 dd(8.4, 1.4)	4.06 dd(3.2, 1.7)	3.48(ov)
3″		3.15 m	7.48 t(7.6)	3.86 m	3.47(ov)
4″		3.06 m	7.63 m	3.46 m	3.39(ov)
5″		3.12 m	7.48 t(7.6)	3.77 m	3.38(ov)
6″		3.49 m, 3.75 d(11.1)	7.94 dd(8.4, 1.4)	1.22 d(6.4)	3.87(ov), 3.68 m
2‴			8.06 dd(1.4, 8.4)		
3‴			7.53 t(7.6)		
4‴			7.63 m		
5‴			7.53 t(7.6)		
6‴			8.06 dd(1.4, 8.4)		
OMe		4.02 s(5′-OMe)	3.77 s	3.80 s(3-OMe)	3.89 s
		3.87 s(3-OMe)	3.90 s	3.89 s(5′-OMe)	3.83 s
		3.87 s(5-OMe)			3.36 s

Table 6-3-100: ^{1}H NMR spectroscopic data of lignans **6-3-361**~**6-3-365**.

H	6-3-361	6-3-362	6-3-363	6-3-364	6-3-365
2	6.65 s	6.65 d(2.0)	6.93 d(1.6)	6.97 d(1.2)	6.99 d(2.0)
5			6.78 d(8.0)	6.90 d(8.4)	6.85 d(8.0)
6	6.65 s	6.58 d(2.0)	6.88 dd(8.0, 1.6)	6.89 dd(8.4, 1.2)	6.95 dd(8.0, 2.0)
7	5.58 d(7.5)	5.07 d(9.2)	5.11 d(9.2)	5.12 d(9.6)	5.14 d(9.6)
8	3.64 br q(6.0)	3.44 dq(9.2, 6.8)	3.42 dq(9.2, 7.2)	3.47 dq(9.6, 6.8)	3.48 dq(9.6, 6.4)
9	3.94 dd(11.4, 6.0)	1.40 d(6.8)	1.38 d(7.2)	1.38 d(6.8)	1.39 d(6.8)
	4.00 dd(11.4, 6.0)				
2′	6.90 br s	6.75 br s	6.74 d(2.0)	6.76 d(2.0)	6.76 d(2.0)
6′	6.89 br s	6.78 br s	6.79 d(2.0)	6.80 d(2.0)	6.80 d(2.0)

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Table 6-3-100 (continued)

H	6-3-361	6-3-362	6-3-363	6-3-364	6-3-365
7′	6.57 d(15.5)	6.35 dd(15.6, 1.6)	4.34 d(6.8)	4.34 dd(6.8, 3.2)	4.35 dd(7.2, 3.2)
8′	6.25 dt(15.0, 6.0)	6.10 dq(15.6, 6.8)	3.86 dq(6.8, 6.4)	3.88 dq(6.8, 6.4)	3.89 dq(7.2, 6.4)
9′	4.32 d(6.0)	1.87 dd(6.8, 1.6)	1.10 d(6.4)	1.08 d(6.4)	1.10 d(6.4)
OMe	3.87 s(3, 5-OMe) 3.91 s(5′-OMe)	3.85 s(5-OMe) 3.89 s(4-OMe) 3.90 s(5′-OMe)	3.90 s(5′-OMe)	3.89 s(3-OMe) 3.90 s(5′-OMe)	3.88 s(3-OMe) 3.89 s(4-OMe) 3.90 s(5′-OMe)
OCH_2O			5.96 s		
OH	5.54 br s(2×OH)	5.76 br s(3-OH)	2.42 br s, 2.53 br s	5.46 s(4-OH) 2.42 d(3.2) 2.55 d(3.2)	2.41 d(3.2) 2.54 d(3.2)

Table 6-3-101: ^{1}H NMR spectroscopic data of lignans **6-3-366**~**6-3-370**.

H	6-3-366	6-3-367	6-3-368	6-3-369	6-3-370
2	6.65 d(2.0)	6.90 br s	6.85 s	6.61 br s	6.89 d(2.0)
5		6.60 br s	6.78 d(7.8)		6.71 d(7.5)
6	6.58 d(2.0)	6.90 br s	6.86 d(7.9)	6.61 br s	6.77 dd(2.0, 7.5)
7	5.09 d(8.8)	5.11 d(9.6)	5.64 d(6.5)	5.48 d(6.5)	5.48 d(6.5)
8	3.45 dq(8.8, 6.8)	3.46 dq(9.6, 6.8)	3.63 q	3.43 m	3.44 q(5.5)
9	1.40 d(6.8)	1.37 d(6.8)	3.95 dd(5.2, 10.9) 3.99 dd(6.3, 10.9)	3.80 dd(5.0, 11.0) 3.72 dd(4.0, 11.0)	3.78 m 3.73 m
2′	6.74 d(2.0)	6.62 br s	7.13 s	6.85 br s	6.89 br s
6′	6.79 d(2.0)	6.98 br s	7.05 s	6.89 br s	6.89 br s
7′	4.34 d(7.2)	3.66 s	7.45 d(15.8)	4.51 d(6.0)	4.68 d(6.5)
8′	3.89 dq(7.2, 6.4)		6.64 dd(7.8, 15.8)	3.63 m	3.78 m
9′	1.10 d(6.4)	2.19 s	9.62 d(7.8)	3.47 dd(4.0, 11.5) 3.33 dd(6.5, 11.5)	3.54 dd(4.0, 12.0) 3.38 dd(5.5, 12.0)
1″					4.25 d(7.5)
2″					3.20 m
3″					3.17 m
4″					3.25 m
5″					3.28 m
6″					3.78 m 3.59 dd(6.0, 12.0)
OMe	3.86 s(5-OMe) 3.89 s(4-OMe) 3.90 s(5′-OMe)	3.88 s(3-OMe) 3.89 s(5′-OMe)	3.94 s(3′-OMe)	3.75 s(3, 5-OMe) 3.83 s(5′-OMe)	3.76 s(3-OMe) 3.82 s(5′-OMe)
OCH_2O			5.95 s		
OH	5.78 s(3-OH) 2.44 s, 2.56 s	5.63 s(4-OH)	5.95 s		

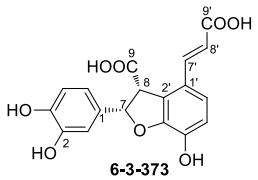
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Table 6-3-102: ^{1}H NMR spectroscopic data of lignans **6-3-371** and **6-3-372**.

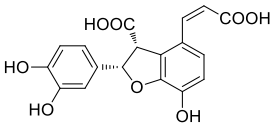
H	6-3-371	6-3-372	H	6-3-371	6-3-372
2	6.94 d(2)	7.00 d(1.5)	3″	3.35 t(8)	3.17 m(ov)
5	6.76 d(8)	7.04 d(8.3)	4″	3.31 t(8)	3.03 br d(9.0)
6	6.82 dd(2, 8)	6.86 dd(1.5, 8.3)	5″	3.27 m	3.25 m(ov)
7	5.52 d(6)	5.57 d(5.8)	6″	3.88 dd(3, 11)	3.42 dd(1.8, 11.5)
				3.68 dd(5, 12)	3.60 dd(5.6, 11.5)
8	3.49 m	3.55 br q(5.8)	1‴		4.87 d(7.2)
9	3.84 dd(3, 11)	4.08 dd(5.7, 9.5)	2‴		3.23 dd(7.2, 8.0)
	3.78 dd(4, 11)	3.60 br d(9.5)			
2′	6.98 br s	6.72 br s	3‴		3.10 br t(8.0)
6′	6.95 br s	6.71 br s	4‴		3.16 m
7′	6.61 d(16)	2.53 br t(7.5)	5‴		3.24 m(ov)
8′	6.22 dt(16, 6)	1.68 br quint(6.8)	6‴		3.60 m(ov)
					3.39 dd(6.2, 11.8)
9′	4.49 dd(6, 13)	3.36 br t(6.0)	OMe	3.88 s	3.74 s(3-OMe)
	4.30 dd(6, 13)			3.82 s	3.78 s(7-OMe)
1″	4.36 d(8)	4.26 d(7.8)			
2″	3.23 t(8)	3.23 m(ov)			

Table 6-3-103: Compounds, MFs, and test solvents of lignans **6-3-373**~**6-3-377**.

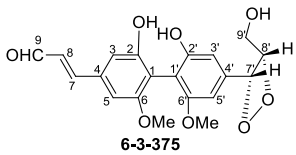
No.	Compounds	MFs	Test solvents	References
6-3-373	(–)-*trans*-blechnic acid	$C_{18}H_{14}O_8$	CD_3OD	[337]
6-3-374	(–)-*cis*-blechnic acid	$C_{18}H_{14}O_8$	CD_3OD	[337]
6-3-375	mansoxetane	$C_{20}H_{20}O_8$	–	[338]
6-3-376	2,6,2′,6′-tetramethoxy-4,4′-bis(2,3-epoxy-1-hydroxy-propyl)biphenyl	$C_{22}H_{26}O_8$	$CDCl_3$	[339]
6-3-377	piperkadsin C	$C_{20}H_{20}O_5$	$CDCl_3$	[340]



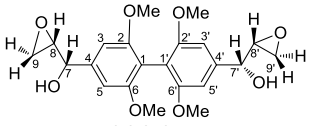
6-3-373



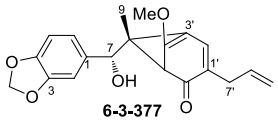
6-3-374



6-3-375



6-3-376



6-3-377

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Table 6-3-104: ^{1}H NMR spectroscopic data of lignans **6-3-373**~**6-3-377**.

H	6-3-373	6-3-374	6-3-375	6-3-376	6-3-377
2	6.96 d(1.6)	6.95 d(1.7)			6.92 d(1.5)
3			6.90 d(1.8)	6.57 s	
5	6.75 d(8.4)	6.74 d(8.3)	6.76 d(1.8)	6.57 s	6.76 d(7.5)
6	6.85 dd(1.6, 8.4)	6.82 dd(1.7, 8.3)			6.75 dd(1.5, 7.5)
7	5.95 d(9.4)	5.91 d(9.5)	7.35 d(15.6)	4.78 d(7.0)	3.64 s
8	4.59 d(9.4)	4.50 d(9.5)	6.60 dd(7.9, 15.6)	3.09 m	
9			9.66 d(7.6)	3.89 m, 4.26 m	0.96 s
2′					7.00 s
3′			6.70 d(1.8)	6.57 s	
5′	6.81 d(8.4)	6.72 d(8.3)	6.57 d(1.8)	6.57 s	3.36 s
6′	7.12 d(8.4)	7.25 d(8.3)			
7′	7.57 d(16.1)	6.74 d(12.7)	4.90 d(8.2)	4.78 d(7.0)	2.91 dd(1.5, 5.5)
8′	6.27 d(16.1)	5.88 d(12.7)	4.05 ddd(3.3, 3.3, 8.2)	3.09 m	5.82 m
9′			3.60 m, 3.90(ov)	3.89 m, 4.26 m	5.06 dd(1.5, 5.5) 5.08 dd(1.5, 12.0)
OMe			3.92 s(6-OMe) 3.90 s(6′-OMe)	3.90 s(2,2′,6,6′-OMe)	3.82 s(4-OMe)
OCH_2O					5.94 s
OH			5.56 br s(2,2′-OH) 2.30 s(9′-OH)	5.54 br s(7,7′-OH)	

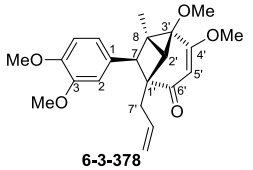
Table 6-3-105: Compounds, MFs, and test solvents of lignans **6-3-378**~**6-3-397**.

No.	Compounds	MFs	Test solvents	References
6-3-378	6-allyl-7-(3,4-dimethoxyphenyl)-2,3-dimethoxy-8-methyl-tricyclo[4.2.0.0^{2,8}]oct-3-en-5-one	$C_{22}H_{26}O_5$	$CDCl_3$	[341]
6-3-379	denudadione A	$C_{21}H_{24}O_5$	$CDCl_3$	[342]
6-3-380	denudadione B	$C_{20}H_{20}O_5$	$CDCl_3$	[342]
6-3-381	denudadione C	$C_{20}H_{20}O_5$	$CDCl_3$	[342]
6-3-382	(1*S*,5*S*,6*S*,7*S*)-5-allyl-6-methyl-3-methoxy-7(3,4-methyl-endioxyphenyl)-bicyclo[3.2.1]oct-3-en-2,8-dione	$C_{20}H_{20}O_5$	$CDCl_3$	[342]
6-3-383	(7*S*,8*R*,1′*S*,5′*S*,6′*R*)-$\Delta^{2',8'}$-5,6-dihydroxy-3-methoxy-3,4-methylenedioxy-4′-oxo-8,1′:7,5′-neolignan	$C_{20}H_{22}O_6$	$CDCl_3$	[343]

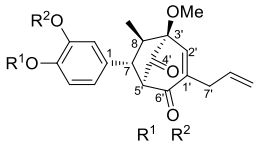
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Table 6-3-105 (continued)

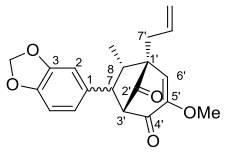
No.	Compounds	MFs	Test solvents	References
6-3-384	(7*S*,8*R*,1′*S*,5′*S*,6′*R*)-$\Delta^{2',8'}$-3,5,6-trihydroxy-3,4-methyl-enedioxy-4′-oxo-8,1′:7,5′-neolignan	$C_{19}H_{20}O_6$	$CDCl_3$	[343]
6-3-385	cinerin A	$C_{22}H_{24}O_7$	$CDCl_3$	[344]
6-3-386	cinerin B	$C_{21}H_{24}O_6$	$CDCl_3$	[344]
6-3-387	cinerin C	$C_{22}H_{26}O_7$	$CDCl_3$	[344]
6-3-388	cinerin D	$C_{22}H_{26}O_7$	$CDCl_3$	[344]
6-3-389	piperarborenine C	$C_{33}H_{34}N_2O_{10}$	$CDCl_3$	[345]
6-3-390	piperarborenine D	$C_{33}H_{36}N_2O_9$	$CDCl_3$	[345]
6-3-391	piperarborenine E	$C_{32}H_{32}N_2O_9$	$CDCl_3$	[345]
6-3-392	puberulin A	$C_{23}H_{28}O_6$	$CDCl_3$	[346]
6-3-393	puberulin B	$C_{22}H_{24}O_6$	$CDCl_3$	[346]
6-3-394	puberulin C	$C_{22}H_{26}O_6$	$CDCl_3$	[346]
6-3-395	*rel*-(7*S*,8*R*,l′*R*,2′*R*,3′*S*,4′*S*)-Δ^8-4′-acetoxy-2′-hydroxy-3′,5′-dimethoxy-3,4-methylenedioxy-1′,2′,3′,4′-tetra-hydro-7,3′,8,1′-neohgnan	$C_{23}H_{28}O_7$	$CDCl_3$	[347]
6-3-396	*rel*-(7*S*,8*R*,1′*R*,2′*R*,3′*S*,4′*S*)-Δ^8-4′-acetoxy-2′-hydroxy-3,3′,5′-trimethoxy-4,5-methylenedioxy-1′,2′,3′,4′-tetra-hydro-7,3′,8,1′-neolignan	$C_{24}H_{30}O_8$	$CDCl_3$	[347]
6-3-397	*rel*-(7*S*,8*R*,l′*S*,2′*R*,3′*S*,4′*R*)-Δ^8-4-acetoxy-2′-hydroxy-3′-methoxy-3,4-methylenedtoxy-1′,2′,3′,4′,5′,6-tetra-hydro-5′-oxo-7,3′,8,1′-neolrgnan	$C_{22}H_{26}O_7$	$CDCl_3$	[347]



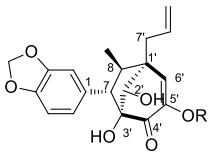
6-3-378



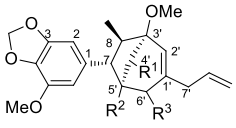
	R^1	R^2
6-3-379	Me	Me
6-3-380	CH_2	



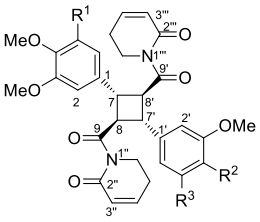
6-3-381 7α
6-3-382 7β



6-3-383 R = Me
6-3-384 R = H

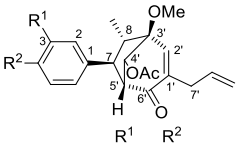


	R^1	R^2	R^3
6-3-385	=O	OMe	=O
6-3-386	OH	H	=O
6-3-387	OH	OMe	=O
6-3-388	=O	OMe	α-OH

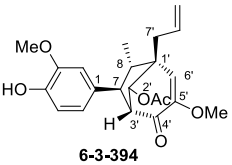


	R^1	R^2	R^3
6-3-389	OMe	OCH_2O	
6-3-390	OMe	OMe	H
6-3-391	H	OCH_2O	

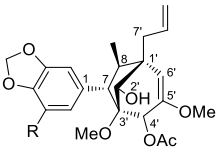
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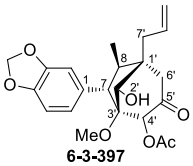
6-3-392 OMe OMe
6-3-393 OCH_2O



6-3-394



6-3-395 R = H
6-3-396 R = OMe



6-3-397

Table 6-3-106: ^{1}H NMR spectroscopic data of lignans **6-3-378**~**6-3-382**.

H	6-3-378	6-3-379	6-3-380	6-3-381	6-3-382
2	6.43 br s	6.57 d(2.0)	6.58 d(2.0)	6.52 d(2.0)	6.53 d(2.0)
5	6.67 d(8.5)	6.79 d(8.0)	6.73 d(8.0)	6.70 d(7.6)	6.72 d(8.4)
6	6.47 br d(8.5)	6.66 dd(8.0, 2.0)	6.57 dd(8.0, 2.0)	6.54 dd(7.6, 1.6)	6.53 dd(8.4, 2.0)
7	3.73 s	2.46 (ov)	2.45 d(8.0)	3.11 dd(6.0, 7.2)	2.50 (ov)
8		2.46 (ov)	2.41 dq(8.0, 6.5)	2.53 dq(6.0, 7.2)	2.10 quint(7.2)
9	1.63 s	1.07 d(6.0)	1.06 d(6.5)	1.14 d(7.2)	1.05 d(6.8)
2′	2.26 s	7.04 brs	7.03 br s		
3′				3.74 d(7.2)	3.54 s
5′	4.86 s	3.52 s	3.59 s		
6′				6.26 s	5.78 s
7′	2.90 m	3.20 mdd(16.4, 7.2)	3.12 mdd(16.5, 7.0)	2.61 dd(14.8, 7.2)	2.50 (ov)
	2.65 m	3.07 mdd(16.4, 6.8)	3.07 mdd(16.5, 7.0)	2.44 dd(14.8, 6.8)	
8′	6.05 m	5.86 ddt(16.0, 10.8, 6.8)	5.85 ddt(16.5, 10.5, 7.0)	5.95 ddt(16.8, 10.4, 7.0)	5.96 ddt(17.2, 10.0, 7.6)
9′	5.26 br d(17.1)	5.18 md(10.8)	5.18 md(10.5)	5.29 md(16.8)	5.19 md(17.2)
	5.23 br d(10.4)	5.17 md(16.0)	5.17 md(6.5)	5.27 md(10.4)	5.16 md(10.0)
OMe	3.80 s(3-OMe)	3.63 s	3.63 s	3.68 s	3.73 s
	3.79 s(4-OMe)	3.84 s			
	3.39 s(3′-OMe)	3.85 s			
	3.50 s(4′-OMe)				
OCH_2O			5.94 s	5.91 s	5.94 s

Table 6-3-107: ^{1}H NMR spectroscopic data of lignans **6-3-383**~**6-3-387**.

H	6-3-383	6-3-384	6-3-385	6-3-386	6-3-387
2	6.96 s	6.99 s	6.53 d(1.3)	6.48 br s	6.50 d(1.2)
5	6.70 s	6.703 s			
6	6.69 s	6.701 s	6.72 d(1.3)	6.68 br s	6.70 d(1.2)

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Table 6-3-107 (continued)

H	6-3-383	6-3-384	6-3-385	6-3-386	6-3-387
7	2.40 d(8.9)	2.43 d(9.0)	2.42~2.44 m	2.40 d(7.5)	2.43 d(8.5)
8	2.62 dq(8.9, 7.0)	2.64 dq(9.0, 7.1)	2.42~2.44 m	2.64~2.68 m	2.88 m
9	0.87 d(6.4)	0.89 d(6.8)	1.09 d(6.8)	0.99 d(6.8)	0.90 d(6.8)
2′	3.98 d(1.6)	3.99 d(1.8)	7.09 s	6.86 s	6.87 s
3′				3.46 s	
4′				4.21 s	4.23 s
5′				3.08 s	
6′	5.66 s	6.05 s			
7′	2.42 m, 2.60 m	2.45 m, 2.62 m	3.07~3.09 m	3.02~3.06 m	3.08 mdd(16.2, 9.4)
8′	5.86 m	5.85 m	5.82~5.88 m	5.81~5.85 m	5.83~5.87 m
9′	5.24 dd(17.0, 0.9)	5.22 dd(17.0, 1.1)	5.15~5.19 m	5.14~5.17 m	5.14~5.19 m
	5.15 dd(10.5, 1.1)	5.13 dd(10.5, 1.1)			
OMe	3.67 s(5′-OMe)		3.84 s(5-OMe)	3.86 s(5-OMe)	3.87 s(5-OMe)
			3.48 s(3′-OMe)	3.46 s(3′-OMe)	3.47 s(3′-OMe)
			3.34 s(5′-OMe)		3.34 s(5′-OMe)
OCH_2O	5.92 d(1.6)	5.93 d(1.4)	5.94 s	5.93 d(1.0)	5.93 s
	5.93 d(1.6)	5.94 d(1.4)			
OH	2.37 d(1.9)(2′-OH)	2.36 d(2.1)(2′-OH)		2.51 s(4-OH)	2.64 s(4-OH)

Table 6-3-108: ^{1}H NMR spectroscopic data of lignans **6-3-388**~**6-3-392**.

H	6-3-388	6-3-389	6-3-390	6-3-391	6-3-392
2	6.54 d(1.4)	6.24 s	6.20 s	6.41 d(1.6)	6.78 s
5				6.69 d(9.2)	6.80 d(9.0)
6	6.59 d(1.4)	6.24 s	6.20 s	6.72 dd(9.2, 1.6)	6.84 d(9.0)
7	2.42~2.50 m	4.17 dd(9.2, 5.7)	4.20 dd(9.4, 6.4)	4.16 dd(9.2, 6.2)	2.41 d(8.5)
8	2.42~2.50 m	4.73 m	4.80 dd(9.4, 6.4)	4.75 dd(9.2, 6.2)	2.73 dt(8.5, 7.0)
9	1.04 d(6.8)				0.98 d(7.0)
2′	5.68 s	6.12 d(1.4)	6.38 d(1.6)	6.11 d(1.2)	6.83 s
4′					5.29 s
5′			6.70 d(8.0)		2.98 s
6′	4.90 s	6.33 d(1.4)	6.74 dd(8.0, 1.6)	6.29 d(1.2)	
7′	3.05 d(7.2)	4.11 dd(9.2, 5.7)	4.13 dd(9.4, 6.4)	4.12 dd(9.2, 6.2)	3.01 d(6.5)
8′	5.85~5.95 m	4.73 m	4.75 dd(9.4, 6.4)	4.70 dd(9.2, 6.2)	5.82 ddd (6.5, 1.0, 13.5)
9′	5.00~5.20 m				5.10 dd(1.0, 13.5)
3″		5.95 dt(9.6, 2.0)[a]	5.94 dt(9.2, 1.8)[a]	5.94 dt(9.8, 1.6)[a]	
4″		6.87 dt(9.6, 4.0)[b]	6.85 dt(9.2, 4.4)[b]	6.87 dt(9.8, 4.2)	
5″		2.40 m	2.40 m	2.40 m	
6″		3.99 t(6.6)[c]	3.99 t(6.6)[c]	3.99 t(6.6)[b]	

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Table 6-3-108 (continued)

H	6-3-388	6-3-389	6-3-390	6-3-391	6-3-392
3‴		5.96 dt(9.6, 2.0)[a]	5.97 dt(9.2, 4.4)[a]	5.96 dt(9.8, 4.2)[a]	
4‴		6.88 dt(9.6, 4.0)[b]	6.88 dt(9.2, 4.4)[b]	6.87 dt(9.8, 4.2)	
5‴		2.40 m	2.40 m	2.40 m	
6‴		4.00 t(6.6)[c]	4.01 t(6.6)[c]	4.00 t(6.6)[c]	
OMe	3.81 s(5-OMe)	3.69 s(3′-OMe)	3.63 s(4-OMe)	3.67 s(3-OMe)	3.35 s(3′-OMe)
	3.55 s(3′-OMe)	3.71 s(3, 5-OMe)	3.66 s(3, 5-OMe)	3.68 s(5-OMe)	3.84 s(3-OMe)
	3.40 s(5′-OMe)	3.74 s(4-OMe)	3.73 s(3′-OMe)	3.79 s(4-OMe)	3.84 s(4-OMe)
			3.78 s(4′-OMe)		
OCH_2O	5.97 s	5.84 d(1.4)		5.84 s	
Oac					2.14 s

Note: Assignments bearing the same superscript may be exchanged in each column.

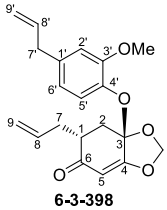
Table 6-3-109: ^{1}H NMR spectroscopic data of lignans **6-3-393**~**6-3-397**.

H	6-3-393	6-3-394	6-3-395	6-3-396	6-3-397
2	6.63 s	6.76 d(1.0)	6.84 d(1.5)	6.53 s	6.77 d(1.5)
5	6.89 d(12.0)	6.81 d(8.0)	6.70 d(8)		6.71 d(8)
6	6.89 d(12.0)	6.81 dd(8.0, 1.0)	6.77 dd(8, 1.5)	6.53 s	6.65 dd(8, 1.5)
7	2.41 d(8.5)	2.57 d(8.0)	3.24 dd(7, 2)	3.23 dd(7, 2)	3.26 dd(9, 2)
8	2.70 dt(8.5, 7.0)	2.45 dt(8.0, 6.5)	2.48 dq(7, 1)	2.45dq (7, 1)	2.15 br q(7.5)
9	1.00 d(7.0)	1.01 d(6.5)	1.12 d(7)	1.14 d(7)	1.08 d(7)
2′	6.73 s	5.17 s	3.88 d(1)	3.89 d(1)	4.16 d(1)
3′		3.04 s			
4′	5.31 s		6.03 dd(2, 1)	6.04 dd(2, 1)	5.55 dd(2, 1)
5′	2.97 s				
6′		5.66 s	4.88 d(1)	4.87 d(1)	2.52 dd(16, 1)
					2.37 d(16)
7′	3.04 d(6.5)	2.38 d(12.5)	2.59 ddt(14, 8, 1)	2.59 ddt(14, 8, 1)	2.76 ddt(13.5, 6.5, 1)
			2.26 ddt(14, 6.5, 1.5)	2.25 ddt(14, 6.5, 1.5)	2.06 dd(13.5, 8)
8′	5.85 ddd(6.5, 1.0, 13.5)	5.85 dd(12.5, 5.5)	5.87 m	5.87 m	5.89 m
9′	5.15 dd(1.0, 13.5)	5.10 d(5.5)	5.21 br d(17)	5.21 br d(17)	5.20 br d(14.5)
			5.13 br d(10)	5.13 br d(10)	5.19 br d(11.5)
OMe	3.37 s(3′-OMe)	3.68 s(5′-OMe)	3.34 s(3′-OMe)	3.35 s(3′-OMe)	3.31 s(3′-OMe)
		3.88 s(3-OMe)	3.51 s(5′-OMe)	5.87 s(3-OMe)	
				3.51 s(5′-OMe)	
OCH_2O	5.95 s		5.89 s	5.91 s	5.90 s
OAc	2.20 s	2.14 s	1.49 s	1.54 s	1.76 s
OH		5.55 s(4′-OH)			

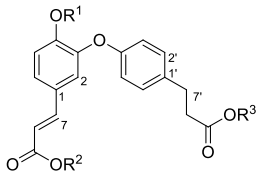
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Table 6-3-110: Compounds, MFs, and test solvents of lignans **6-3-398**~**6-3-402**.

No.	Compounds	MFs	Test solvents	References
6-3-398	didymochlaenone A	$C_{20}H_{22}O_5$	$CDCl_3$	[348]
6-3-399	spiraformin A	$C_{20}H_{20}O_6$	$CDCl_3$	[349]
6-3-400	spiraformin B	$C_{21}H_{22}O_6$	$CDCl_3$	[349]
6-3-401	spiraformin C	$C_{23}H_{26}O_6$	$CDCl_3$	[349]
6-3-402	spiraformin D	$C_{24}H_{26}O_{11}$	CD_3OD	[349]



6-3-398



	R^1	R^2	R^3
6-3-399	H	Me	Me
6-3-400	H	Me	Et
6-3-401	H	Me	*n*-Bu
6-3-402	Glc	H	H

Table 6-3-111: ^{1}H NMR spectroscopic data of lignans **6-3-398**~**6-3-402**.

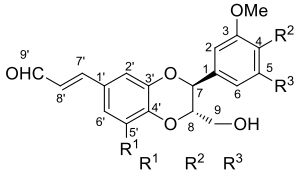
H	6-3-398	6-3-399	6-3-400	6-3-401	6-3-402
1	2.47 m				
2	3.05 br d(14.4) 2.17 dd(14.4, 8.0)	6.98 d(2.0)	6.98 d(2.0)	6.98 d(2.0)	7.16 d(2.0)
5	5.57 br s	7.03 d(8.0)	7.03 d(8.0)	7.03 d(8.0)	7.28 d(8.0)
6		7.20 dd(8.0, 2.0)	7.20 dd(8.0, 2.0)	7.20 dd(8.0, 2.0)	7.36 dd(8.0, 2.0)
7	2.60 m, 2.40 m	7.52 d(16.0)	7.52 d(16.0)	7.52 d(16.0)	7.55 d(16.0)
8	5.54 m	6.17 d(16.0)	6.17 d(16.0)	6.17 d(16.0)	6.30 d(16.0)
9	4.82 br d(10.1) 4.46 br d(17.0)				
2′	6.74 d(2.2)	7.21 d(8.4)	7.21 d(8.4)	7.21 d(8.4)	7.21 d(8.4)
3′		6.96 d(8.4)	6.96 d(8.4)	6.96 d(8.4)	6.87 d(8.4)
5′	7.30 d(8.1)	6.96 d(8.4)	6.96 d(8.4)	6.96 d(8.4)	6.87 d(8.4)
6′	6.70 dd(8.1, 2.2)	7.21 d(8.4)	7.21 d(8.4)	7.21d(8.4)	7.21 d(8.4)
7′	3.35 d(6.4)	2.96 t(8.0)	2.96 t(8.0)	2.96 t(8.0)	2.87 t(8.0)
8′	5.94 m	2.65 t(8.0)	2.65 t(8.0)	2.65 t(8.0)	2.44 t(8.0)
9′	5.09 br s, 5.07 br s				
1″			4.13 q(7.2)	4.09 t(6.8)	5.02 d(7.6)
2″			1.25 t(7.2)	1.61 m	3.55~3.86 m
3″				1.55 m	3.55~3.86 m
4″				0.92 t(7.4)	3.55~3.86 m
5″					3.55~3.86 m
6″					3.55~3.86 m
OMe	3.77 s(3′-OMe)	3.67 s(9-OMe) 3.75 s(9′-OMe)	3.75 s(9-OMe)	3.75 s(9-OMe)	
OCH_2O	5.56 br s, 5.49 br s				

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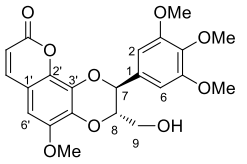
Table 6-3-112: Compounds, MFs, and test solvents of lignans **6-3-403**~**6-3-437**.

No.	Compounds	MFs	Test solvents	References
6-3-403	(7′*S*,8′*S*)-bilagrewin	$C_{21}H_{22}O_8$	$CDCl_3$	[350]
6-3-404	(7′*S*,8′*S*)-5-demethoxybilagrewin	$C_{20}H_{20}O_7$	$CDCl_3$	[350]
6-3-405	(7′*S*,8′*S*)-5-*O*-demethyl-4′-*O*-methylbilagrewin	$C_{21}H_{22}O_8$	$CDCl_3$	[350]
6-3-406	(7′*S*,8′*S*)-nocomtal	$C_{20}H_{20}O_7$	$CDCl_3$	[350]
6-3-407	(7′*S*,8′*S*)-4′-*O*-methylcleomiscosin D	$C_{22}H_{22}O_9$	$CDCl_3$	[350]
6-3-408	–	$C_{20}H_{22}O_8$	CD_3OD	[351]
6-3-409	7*S*,8*S*-nitidanin	$C_{21}H_{24}O_8$	CD_3OD	[351]
6-3-410	isoamericanoic acid A	$C_{18}H_{16}O_7$	CD_3OD	[352]
6-3-411	grewin	$C_{19}H_{16}O_8$	C_5D_5N	[353]
6-3-412	bilagrewin	$C_{21}H_{22}O_8$	C_5D_5N	[353]
6-3-413	nitidanin	$C_{21}H_{24}O_8$	C_5D_5N	[353]
6-3-414	–	$C_{18}H_{18}O_4$	$CDCl_3$	[354]
6-3-415	–	$C_{18}H_{18}O_4$	$CDCl_3$	[354]
6-3-416	–	$C_{18}H_{16}O_4$	$CDCl_3$	[354]
6-3-417	–	$C_{18}H_{16}O_4$	$CDCl_3$	[354]
6-3-418	(7*R*,8*R*)-5-*O*-demethylbilagrewin	$C_{20}H_{20}O_8$	C_5D_5N	[355]
6-3-419	(7*S*,8*R*)-4-hydroxy-3,5′-dimethoxy-$\Delta^{1,3,5,1',3',5',7'}$-7,*O*,3′:8,*O*,4′-neolignan	$C_{20}H_{22}O_5$	$CDCl_3$	[356]
6-3-420	verticillatoside A	$C_{26}H_{32}O_{12}$	DMSO-d_6	[357]
6-3-421	verticillatoside B	$C_{26}H_{32}O_{12}$	DMSO-d_6	[357]
6-3-422	isoamericanin A	$C_{18}H_{16}O_6$	CD_3OD	[358]
6-3-423	isoamericanol A	$C_{18}H_{18}O_6$	CD_3OD	[358]
6-3-424	eusiderin	$C_{22}H_{26}O_6$	$CDCl_3$	[359]
6-3-425	eusiderin B	$C_{20}H_{20}O_5$	$CDCl_3$	[359]
6-3-426	eusiderin F	$C_{22}H_{26}O_7$	CCl_4	[360]
6-3-427	eusiderin G	$C_{22}H_{24}O_7$	$CDCl_3$	[360]
6-3-428	eusiderin A	$C_{22}H_{26}O_6$	$CDCl_3$	[361]
6-3-429	eusiderin I	$C_{21}H_{22}O_6$	$CDCl_3$	[361]
6-3-430	eusiderin J	$C_{21}H_{22}O_6$	$CDCl_3$	[361]
6-3-431	eusiderin K	$C_{21}H_{24}O_6$	$CDCl_3$	[361]
6-3-432	eusiderin M	$C_{22}H_{26}O_7$	$CDCl_3$	[361]
6-3-433	eusiderin C	$C_{22}H_{26}O_6$	$CDCl_3$	[361]
6-3-434	(7*S*,8*S*)-3-methoxy-3′,7-epoxy-8,4′-oxyneoligna-4,9,9′-triol	$C_{19}H_{22}O_6$	CD_3COCD_3	[362]
6-3-435	(7*R*,8*S*)-3-methoxy-3′,7-epoxy-8,4′-oxyneoligna-4,9,9′-triol	$C_{19}H_{22}O_6$	CD_3COCD_3	[362]
6-3-436	3-methoxy-4-[(2*S*,3*R*)-3-methyl-7-[(*E*)-1-propenyl-2,3-dihydro-1,4-benzodioxin-2-yl]-1,2-benzenediol	$C_{19}H_{20}O_5$	$CDCl_3$	[363]
6-3-437	3-methoxy-4-[(2*S*,3*R*)-3-methyl-7-(1-propynyl)-2,3-dihydro-1,4-benzodioxin-2-yl]-1,2-benzenediol	$C_{19}H_{18}O_5$	$CDCl_3$	[363]

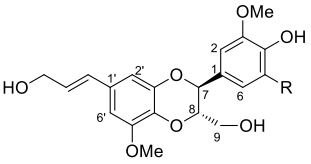
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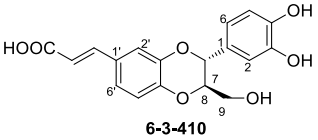
	R^1	R^2	R^3
6-3-403	OMe	OH	OMe
6-3-404	H	OH	OMe
6-3-405	OH	OMe	OMe
6-3-406	OMe	OH	H



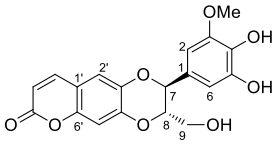
6-3-407



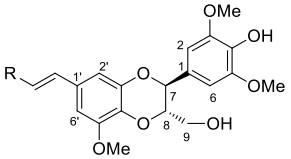
6-3-408 R = OH
6-3-409 R = OMe



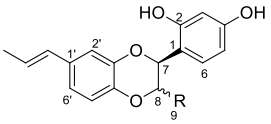
6-3-410



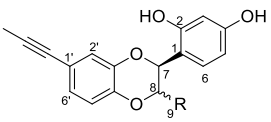
6-3-411



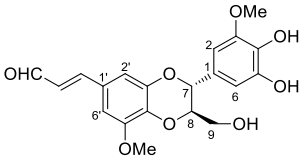
6-3-412 R = CHO
6-3-413 R = CH_2OH



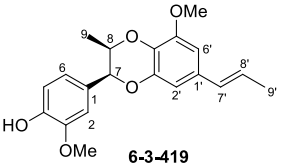
6-3-414 R = β-Me
6-3-415 R = α-Me



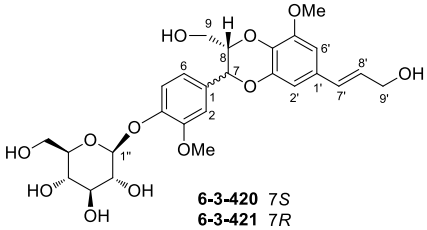
6-3-416 R = β-Me
6-3-417 R = α-Me



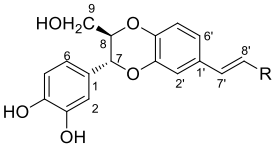
6-3-418



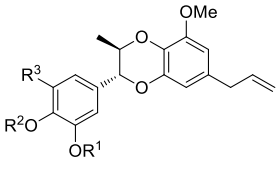
6-3-419



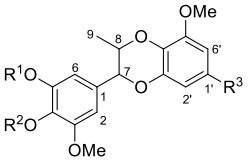
6-3-420 7*S*
6-3-421 7*R*



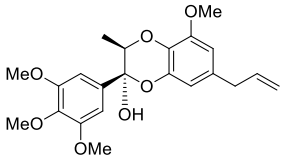
6-3-422 R = CHO
6-3-423 R = CH_2OH



	R^1	R^2	R^3
6-3-424	Me	Me	OMe
6-3-425	CH_2		H

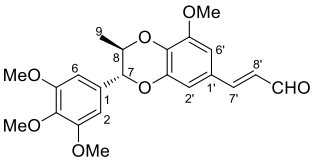


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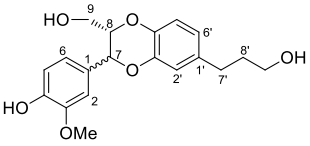
6-3-426

		R^1	R^2	R^3
6-3-428	*trans*	Me	Me	
6-3-429	*trans*	CH_2		
6-3-430	*cis*	CH_2		

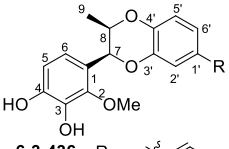


6-3-427

6-3-431	*trans*	Me	H	
6-3-432	*trans*	Me	Me	OH
6-3-433	*cis*	Me	Me	



6-3-434 *trans*
6-3-435 *cis*



6-3-436 R =
6-3-437 R =

Table 6-3-113: ^{1}H NMR spectroscopic data of lignans **6-3-403**~**6-3-407**.

H	6-3-403	6-3-404	6-3-405	6-3-406	6-3-407
2	6.67 s	6.67 s	6.67 s	6.97 d(1.6)	6.67 s
5				6.97 d(8.0)	
6	6.67 s	6.67 s	6.67 s	6.93 dd(8.0, 1.6)	6.67 s
7	4.97 d(8.0)	5.01 d(8.4)	4.98 d(8.4)	5.00 d(8.0)	5.05 d(8.0)
8	4.07 dt(8.0, 3.0)	4.06 ddd(8.4, 3.2, 2.8)	4.07 dt(8.4, 3.0)	4.08 dt(8.0, 3.0)	4.02 dt(8.0, 3.0)
9	3.58 m, 3.93 m	3.58 m, 3.93 m	3.58 m, 3.93 m	3.59 m, 3.93 m	3.59 m, 3.92 m
2′	6.90 d(2.0)	7.23 d(2.0)	6.90 d(2.0)	6.89 d(2.0)	
5′		7.03 d(8.0)			
6′	6.77 d(2.0)	7.15 dd(8.0, 2.0)	6.78 d(2.0)	6.77 d(2.0)	6.55 s
7′	7.36 d(16.0)	7.40 d(16.0)	7.38 d(15.6)	7.36 d(16.0)	7.94 d(9.6)
8′	6.60 dd(16.0, 7.6)	6.62 dd(16.0, 8.0)	6.62 dd(15.6, 7.6)	6.60 dd(16.0, 7.6)	6.22 d(9.6)
9′	9.66 d(7.6)	9.68 d(8.0)	9.68 d(7.6)	9.67 d(7.6)	
OMe	3.92 s(3, 5-OMe)	3.93 s(3, 5-OMe)	3.89 s(4-OMe)	3.94 s(3-OMe)	3.93 s(3, 4, 5-OMe)
	3.95 s(5′-OMe)		3.91 s(3, 5-OMe)	3.95 s(5′-OMe)	3.96 s(5′-OMe)
OH	2.43 br s(9-OH)	5.64 br s(4-OH)	5.62 br s(5′-OH)	2.03 br s(9-OH)	
	5.63 br s(4-OH)			5.73 br s(4-OH)	

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Table 6-3-114: ^{1}H NMR spectroscopic data of lignans **6-3-408**~**6-3-412**.

H	6-3-408	6-3-409	6-3-410	6-3-411	6-3-412
2	6.62 d(1.8)	6.78 s	6.85 d(2.0)	7.01 d(1.9)	7.19 d(1.9)
5			6.80 d(8.0)		
6	6.60 d(1.8)	6.78 s	6.76 dd(2.0, 8.0)	7.35 d(1.9)	7.19 d(1.9)
7	4.84 d(8.4)	4.93 d(8.4)	4.82 d(8.0)	5.50 d(8.0)	5.52 d(8.0)
8	4.03 ddd(8.4, 4.8, 3.0)	4.08 ddd(8.4, 4.8, 3.0)	4.04 m	4.46 m	4.43 m
9	3.76 dd(12.6, 3.0)	3.77 dd(12.6, 3.0)	3.48 dd(4.4, 12.4)	4.21 br d(12.3)	4.28 br d(12.6)
	3.56 dd(12.6, 4.8)	3.55 dd(12.6, 4.8)	3.69 dd(2.8, 12.4)	3.98 br d(12.3)	3.88 m
2′	6.67 d(1.8)	6.69 d(1.8)	7.15 d(2.0)	7.18 s	7.21 d(1.0)
5′			6.97 d(8.4)	7.08 s	
6′	6.73 d(1.8)	6.74 d(1.8)	7.12 dd(2.0, 8.4)		7.04 d(1.8)
7′	6.52 br d(16.2)	6.53 br d(15.6)	7.56 d(16.0)	7.64 d(9.6)	7.53 d(15.8)
8′	6.27 dt(16.2)	6.28 dt(15.6, 5.4)	6.30 d(16.0)	6.36 d(9.5)	6.96 dd(15.7, 7.8)
9′	4.24 dd(5.4, 1.8)	4.24 dd(5.4, 1.8)			9.84 d(7.7)
OMe	3.89 s(3-OMe)	3.93 s(5′-OMe)		3.79 s	3.78 s
	3.92 s(5′-OMe)	3.90 s(3, 5-OMe)			3.83 s

Table 6-3-115: ^{1}H NMR spectroscopic data of lignans **6-3-413**~**6-3-417**.

H	6-3-413	6-3-414	6-3-415	6-3-416	6-3-417
2	7.16 d(1.9)				
3		6.35 d(2.4)	6.39 br s	6.34 br s	6.38 br s
5		6.40 dd(8.3, 2.4)	6.40 d(7.9)	6.39 d(8.3)	6.40 d(8.4)
6	7.16 d(1.9)	7.02 d(8.3)	6.98 d(7.9)	7.03 d(8.3)	6.99 d(8.4)
7	5.49 d(7.9)	5.37 d(2.4)	4.80 d(8.0)	5.36 d(2.2)	4.81d(8.0)
8	4.36 m	4.56 qd(6.5, 2.4)	4.33 dq(8.0, 6.4)	4.58 qd(6.6, 2.2)	4.32 qd(8.0, 6.4)
9	4.26 br d(12.3), 4.06 br d(12.3)	1.20 d(6.5)	1.19 d(6.6)	1.18 d(6.6)	1.12 d(6.4)
2′	7.09 d(1.9)	6.94 d(2.0)	6.93 d(1.7)	6.99 d(1.7)	6.97 br s
5′		6.81 d(8.4)	6.82 d(8.3)	6.80 d(8.3)	6.80 d(8.3)
6′	6.92 d(1.9)	6.88 dd(8.4, 2.0)	6.88 dd(8.3, 1.7)	6.91 dd(8.3, 1.7)	6.94 d(8.3)
7′	6.93 d(15.4)	6.28 d(14.0)	6.27 d(15.3)		
8′	6.65 dt(15.8, 4.9)	6.10 qd(14.0, 6.5)	6.06 dq(15.3, 6.6)		
9′	4.61 m	1.83 d(6.5)	1.83 d(6.6)	2.00 s	2.00 s
OMe	3.87 s(6H), 3.95 s				

Table 6-3-116: ^{1}H NMR spectroscopic data of lignans **6-3-418**~**6-3-422**.

H	6-3-418	6-3-419	6-3-420	6-3-421	6-3-422
2	7.04 d(1.8)	6.68~6.79 m	7.03 d(1.5)	7.03 d(1.5)	6.87 d(2.5)
5		6.68~6.79 m	6.98 d(8.0)	6.99 d(8.0)	6.81 d(8.5)
6	7.39 d(1.8)	6.68~6.79 m	6.65 dd(1.5, 8.0)	6.65 dd(1.5, 8.0)	6.78 dd(8.5, 2.5)

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Table 6-3-116 (continued)

H	6-3-418	6-3-419	6-3-420	6-3-421	6-3-422
7	5.47 d(7.9)	4.83 d(3.2)	4.75 d(7.2)	4.80 d(2.4)	4.85 d(8)
8	4.43 ddd(7.9, 3.7, 2.8)	4.35 dq(6.3, 3.2)	4.29 m	4.30 m	4.08 ddd(8, 4.5, 3)
9	4.26 dd(12.7, 2.8) 3.99 dd(12.7, 3.7)	1.16 d(6.3)	3.80 br d(12.0)	3.78 br d(12.0)	3.50 dd(12.5, 4.5) 3.71 dd(12.5, 3)
2′	7.20 d(1.8)	6.68~6.79 m	7.02 d(1.6)	7.02 d(1.6)	7.25 d(2.5)
5′					7.03 d(2.5)
6′	7.01 d(1.8)	6.68~6.79 m	6.83 d(1.6)	6.82 d(1.6)	7.23 dd(8.5, 2.5)
7′	7.52 d(15.8)	6.39 d(15.7)	6.44 d(15.7)	6.44 d(15.7)	7.57 d(16)
8′	6.94 dd(15.8, 4.0)	6.10 dq(5.0, 15.7)	6.23 dt(15.7, 5.7)	6.23 dt(15.7, 5.7)	6.64 dd(16, 8)
9′	9.82 d(4.0)	1.87 d(5.0)	4.07 br d(5.7)	4.09 br d(5.7)	9.58 d(8)
1″			4.85 d(7.8)	4.85 d(7.8)	
OMe	3.79 s(3-OMe)	3.87 s(3, 5′-OMe)	3.77 s	3.77 s	
	3.87 s(5′-OMe)		3.71 s	3.71 s	
OH		5.62 br s(4-OH)			

Table 6-3-117: ^{1}H NMR spectroscopic data of lignans **6-3-423**~**6-3-427**.

H	6-3-423	6-3-424	6-3-425	6-3-426	6-3-427
2	6.85 d(2.5)	6.62 s	6.90 s	6.42 s	6.59 s
3			6.90 s		
5	6.80 d(8.5)				
6	6.76 dd(8.5, 2.5)	6.62 s	6.90 s	6.42 s	6.59 s
7	4.80 d(8)	4.58 d(8)	4.58 d(8)		4.58 d(8)
8	3.98 ddd(8, 5.5, 3)	3.9~4.0 m	3.9~4.0 m	4.1~4.6 m	4.18 dq(8, 6.5)
9	3.47 dd(12.5, 5.5) 3.66 dd(12.5, 3)	1.30 d(6)	1.30 d(6)	1.10 d(6)	1.32 d(6.5)
2′	6.95 d(2.5)	6.40 d(2)	6.50 d(2)	6.32 d(2)	6.89 d(2)
5′	6.88 d(8.5)				
6′	6.92 dd(8.5, 2.5)	6.52 d(2)	6.51 d(2)	6.15 d(2)	6.77 d(2)
7′	6.48 br d(16)	3.32 d(7)	3.30 d(7)	3.25 dd(6, 1.5)	7.36 d(16)
8′	6.20 dt(16, 6)	5.6~6.3 m	5.6~6.3 m	5.4~6.1 m	6.60 dd(8, 16)
9′	4.18 dd(6, 1.5)	4.9~5.3 m	4.9~5.3 m	4.75~5.3 m	9.62 d(8)
1″					
OMe		3.90 s(4, 5, 5′-OMe)	3.90 s(5′-OMe)	3.80 s(5′-OMe)	3.94 s(5′-OMe)
				3.75 s(3, 5-OMe)	3.86 s(3, 5-OMe)
				3.70 s(4-OMe)	3.85 s(4-OMe)
OCH_2O			6.00 s		
OH				4.96 d(*ca*. 3)(7-OH)	

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Table 6-3-118: ^{1}H NMR spectroscopic data of lignans **6-3-428**~**6-3-432**.

H	6-3-428	6-3-429	6-3-430	6-3-431	6-3-432
2	6.60 s	6.50 s	6.56 s	6.59 s	6.58 s
6	6.60 s	6.50 s	6.56 s	6.59 s	6.58 s
7	4.40 d(8)	4.40 d(8)	4.53 d(8)	4.56 d(8)	4.57 d(8)
8	3.8~4.2 m	3.8~4.1 m	3.85~4.15 m	4.1~4.3 m	4.12 dq(8, 6.5)
9	1.25 d(6)	1.20 d(7)	1.25 d(6)	1.28 d(7)	1.28 d(6.5)
2′	6.40 d(2)	6.35 d(2)	6.48 d(2)	7.13 br s	6.60 d(2)
6′	6.30 d(2)	6.25 d(2)	6.38 d(2)	7.13 br s	6.68 d(2)
7′	3.25 d(6)	3.25 d(6)	3.30 d(6)	9.8 s	6.54 br d(16)
8′	5.7~6.2 m	5.8~6.2 m	5.62~6.2 m		6.15 dt(16, 6.5)
9′	4.9~5.2 m	4.9~5.3 m	4.9~5.2 m		4.70 dd(6.5, 1.5)
OMe	3.75 s	3.80 s	3.90 s	3.86~3.88	3.80~3.89
	3.80 s	3.90 s	3.90 s	3.86~3.88	3.80~3.89
	3.85 s		3.90 s	3.86~3.88	3.80~3.89
	3.85 s				
OCH_2O		5.95 s			

Table 6-3-119: ^{1}H NMR spectroscopic data of lignans **6-3-433**~**6-3-437**.

H	6-3-433	6-3-434	6-3-435	6-3-436	6-3-437
2	6.50 s	7.09 d(1.8)	7.23 d(1.8)		
5		6.86 d(8.1)	6.84 d(8.1)	6.71 d(8.5)	6.72 d(7.9)
6	6.50 s	6.93 dd(8.1, 1.8)	6.88 dd(8.1, 1.8)	6.95 d(8.5)	6.94 d(7.9)
7	4.95 d(2)	4.92 d(8.0)	5.24 d(2.8)	5.35 d(2.5)	5.35 d(2.4)
8	4.3~4.7 m	4.04 ddd(8.0, 2.6, 2.4)	4.46 ddd(7.8, 2.8, 2.6)	4.56 qd(7.4, 2.5)	4.61 qd(6.6, 2.4)
9	1.10 d(6)	3.47 br d(12), 3.69 br d(12)	3.43 m	1.07 d(7.4)	1.08 d(6.6)
2′	6.35 d(2)	6.72 d(1.9)	6.77 d(1.9)	6.91 s	6.98 d(1.4)
5′		6.79 d(8.1)	6.79 d(8.1)	6.81 d(8.3)	6.81 d(8.3)
6′	6.25 d(2)	6.69 dd(8.1, 1.9)	6.71 dd(8.1, 1.9)	6.84 d(8.3)	6.93 dd(8.3, 1.4)
7′	3.25 d(6)	2.58 t(7.4)	2.60 t(7.4)	6.23 d(15.8)	
8′	5.8~6.2 m	1.77 m	1.78 m	6.06 qd(15.8, 6.5)	
9′	4.9~5.2 m	3.55 t(6.5)	3.55 t(6.5)	1.83 d(6.5)	2.02 s
OMe	3.75 s, 3.80 s	3.85 s	3.78 s	3.85 s	3.85 s
	3.85 s, 3.85 s				

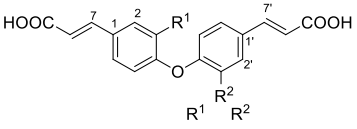
Table 6-3-120: Compounds, MFs, and test solvents of lignans **6-3-438**~**6-3-446**.

No.	Compounds	MFs	Test solvents	References
6-3-438	1-feruloyloxy-2-methoxy cinnamic acid	$C_{20}H_{18}O_7$	CD_3OD	[364]
6-3-439	1-feruloyloxy cinnamic acid	$C_{19}H_{16}O_6$	CD_3OD	[364]
6-3-440	(1-*p*-hydroxycinnamoyl) cinnamic acid	$C_{18}H_{14}O_5$	CD_3OD	[364]
6-3-441	apteniol A	$C_{18}H_{18}O_5$	CD_3OD	[365]
6-3-442	apteniol B	$C_{19}H_{20}O_6$	CD_3OD	[365]

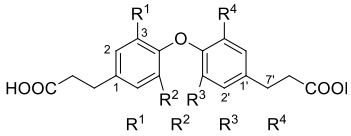
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Table 6-3-120 (continued)

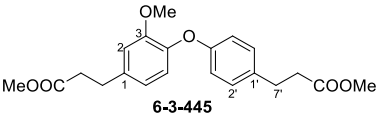
No.	Compounds	MFs	Test solvents	References
6-3-443	apteniol D	$C_{21}H_{24}O_8$	$CDCl_3$	[365]
6-3-444	apteniol E	$C_{22}H_{26}O_9$	$CDCl_3$	[365]
6-3-445	apteniol C	$C_{21}H_{24}O_6$	$CDCl_3$	[365]
6-3-446	4,4′-diallyl-2,3′-dihydroxybiphenyl ether	$C_{18}H_{18}O_3$	$CDCl_3$	[366]



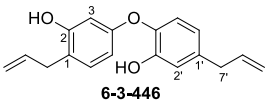
	R^1	R^2
6-3-438	OMe	OMe
6-3-439	H	OMe
6-3-440	H	H



	R^1	R^2	R^3	R^4
6-3-441	H	H	H	H
6-3-442	OMe	H	H	H
6-3-443	OMe	OMe	OMe	H
6-3-444	OMe	OMe	OMe	OMe



6-3-445



6-3-446

Table 6-3-121: ^{1}H NMR spectroscopic data of lignans **6-3-438**~**6-3-442**.

H	6-3-438	6-3-439	6-3-440	6-3-441	6-3-442
2	7.20 s	7.46 d(8.5)	7.48 d(8.6)	6.92 d(8.5)	6.72 d(1.5)
3		6.81 d(8.5)	6.82 d(8.6)	6.63 d(8.5)	
5	6.82 d(7.9)	6.81 d(8.5)	6.82 d(8.6)	6.63 d(8.5)	6.82 d(8.2)
6	7.10 d(7.9)	7.46 d(8.5)	7.48 d(8.6)	6.92 d(8.5)	6.70 dd(8.2, 1.5)
7	7.57 d(15.9)	7.56 d(15.9)	7.57 d(15.9)	2.84 t(8.1)	2.89 t(8.0)
8	6.62 d(15.9)	6.60 d(15.9)	6.59 d(15.9)	2.66 t(8.1)	2.66 t(8.0)
2′	7.20 s	7.19 d(1.8)	7.48 d(8.6)	6.92 d(8.5)	7.05 d(8.5)
3′			6.82 d(8.6)	6.63 d(8.5)	6.74 d(8.5)
5′	6.82 d(7.9)	6.82 d(8.2)	6.82 d(8.6)	6.63 d(8.5)	6.74 d(8.5)
6′	7.10 d(7.9)	7.09 dd(8.2, 1.8)	7.48 d(8.6)	6.92 d(8.5)	7.05 d(8.5)
7′	7.57 d(15.9)	7.55 d(15.9)	7.57 d(15.9)	2.84 t(8.1)	2.89 t(8.0)
8′	6.62 d(15.9)	6.57 d(15.9)	6.59 d(15.9)	2.66 t(8.1)	2.66 t(8.0)
OMe	3.91 s	3.90 s			3.86 s

Table 6-3-122: ^{1}H NMR spectroscopic data of lignans **6-3-443**~**6-3-446**.

H	6-3-443	6-3-444	6-3-445	6-3-446
2	6.44 s	6.42 s	6.70 d(1.5)	
3				6.35 d(2)
5			6.83 d(8.0)	6.95 dd(9, 2)

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Table 6-3-122 (continued)

H	6-3-443	6-3-444	6-3-445	6-3-446
6	6.44 s	6.42 s	6.68 dd(8.0, 1.5)	7.17 dd(9, 2)
7	2.90 t(7.5)	2.88 t(8.0)	2.88 t(7.5)	3.23 d(5) or 3.40 d(5)
8	2.67 t(7.5)	2.61 t(8.0)	2.59 t(7.5)	5.95 m
9				5.10 m
2′	6.72 s	6.42 s	7.05 d(9.0)	6.65 d(2)
3′			6.75 d(9.0)	
5′	6.82 d(8.5)		6.75 d(9.0)	6.95 dd(9, 2)
6′	6.70 d(8.5)	6.42 s	7.05 d(9.0)	7.17 dd(9, 2)
7′	2.90 t(7.5)	2.88 t(8.0)	2.88 t(7.5)	3.23 d(5) or 3.40 d(5)
8′	2.67 t(7.5)	2.61 t(8.0)	2.61 t(7.5)	5.95 m
9′				5.10 m
OMe	3.87 s(3-OMe)	3.88 s(3-OMe)	3.87 s(3-OMe)	
	3.87 s(5-OMe)	3.88 s(5-OMe)	3.67 s(9-OMe)	
	3.87 s(3′-OMe)	3.88 s(3′-OMe)	3.67 s(9′-OMe)	
		3.88 s(5′-OMe)		
OH				5.70 br s, 5.75 br s

Table 6-3-123: Compounds, MFs, and test solvents of lignans **6-3-447**~**6-3-491**.

No.	Compounds	MFs	Test solvents	References
6-3-447	(7*S*,8*S*)-*threo*-7,9,9′-trihydroxy-3,3′-dimethoxy-8-*O*-4′-neo-lignan-4-*O*-*β*-D-glucopyranoside	$C_{26}H_{36}O_{12}$	DMSO-d_6	[367]
6-3-448	(7*R*,8*R*)-*threo*-7,9,9′-trihydroxy-3,3′-dimethoxy-8-*O*-4′-neo-lignan-4-*O*-*β*-D-glucopyranoside	$C_{26}H_{36}O_{12}$	DMSO-d_6	[367]
6-3-449	(7*R*,8*S*)-*erythro*-7,9,9′-trihydroxy-3,3′-dimethoxy-8-*O*-4′-neolignan-4-*O*-*β*-D-glucopyranoside	$C_{26}H_{36}O_{12}$	DMSO-d_6	[367]
6-3-450	(7*S*,8*R*)-*erythro*-7,9,9′-trihydroxy-3,3′-dimethoxy-8-*O*-4′-neolignan-4-*O*-*β*-D-glucopyranoside	$C_{26}H_{36}O_{12}$	DMSO-d_6	[367]
6-3-451	burseneolignan	$C_{22}H_{30}O_9$	CD_3OD	[368]
6-3-452	1-(4′-hydroxy-3′-methoxyphenyl)-2-[4″-(3-hydroxypropyl)-2″, 6″-dimethoxyphenoxy] propane-1,3-diol	$C_{21}H_{28}O_8$	CD_3OD	[368]
6-3-453	(7*S*,8*R*)-1-(3,4-dimethoxyphenyl)-2-*O*-(2-methoxy-4-omega-hydroxypropylphenyl)propane-1,3-diol	$C_{21}H_{28}O_7$	$CDCl_3$	[369]
6-3-454	(7*S*,8*S*)-1-(4-hydroxy-3-methoxyphenyl)-2-*O*-(6-hydroxy-2-methoxy-4-omegahydroxypropylphenyl)propane-1,3-diol	$C_{20}H_{26}O_8$	$CDCl_3$	[369]
6-3-455	polysyphorin	$C_{23}H_{30}O_7$	$CDCl_3$	[370]
6-3-456	rhaphidecursinol A	$C_{23}H_{30}O_7$	$CDCl_3$	[370]
6-3-457	rhaphidecursinol B	$C_{23}H_{30}O_7$	$CDCl_3$	[370]
6-3-458	chushizisin A	$C_{19}H_{22}O_6$	CD_3OD	[371]
6-3-459	chushizisin B	$C_{19}H_{22}O_6$	CD_3OD	[371]
6-3-460	chushizisin C	$C_{19}H_{24}O_6$	CD_3OD	[371]

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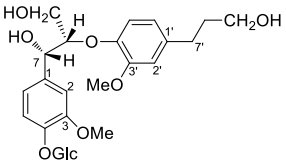
Table 6-3-123 (continued)

No.	Compounds	MFs	Test solvents	References
6-3-461	chushizisin D	$C_{19}H_{24}O_6$	CD_3OD	[371]
6-3-462	(7*R*,8*S*)-4,7,9-trihydroxy-3,5,3′,5′-tetramethoxy-8-*O*-4′-neo-lignan-8′-ene	$C_{22}H_{28}O_8$	$CDCl_3$	[372]
6-3-463	(7*S*,8*R*)-4-*O*-(glycer-2-yl)-7,9,9′-trihydroxy-3,3′,5′-trimethoxy-8-*O*-4′-neolignan	$C_{24}H_{34}O_{10}$	CD_3OD	[372]
6-3-464	(7*R*,8*R*)-4-*O*-(glycer-2-yl)-7,9,9′-trihydroxy-3,5,3′-trimethoxy-8-*O*-4′-neolignan	$C_{24}H_{34}O_{10}$	CD_3OD	[372]
6-3-465	(7S,8R)-4-*O*-(glycer-2-yl)-7,9,9′-trihydroxy-3,5,3′-trimethoxy-8-*O*-4′-neolignan	$C_{24}H_{34}O_{10}$	CD_3OD	[372]
6-3-466	(7*R*,8*R*)-4-*O*-(glycer-2-yl)-7,9,9′-trihydroxy-3,3′-dimethoxy-8-*O*-4′-neolignan	$C_{23}H_{32}O_9$	CD_3OD	[372]
6-3-467	(7*R*,8*S*)-4-*O*-(glycer-2-yl)-7,9,9′-trihydroxy-3,3′-dimethoxy-8-*O*-4′-neolignan	$C_{23}H_{32}O_9$	CD_3OD	[372]
6-3-468	machilin D	$C_{20}H_{24}O_5$	$CDCl_3$	[373]
6-3-469	4-methoxymachilin D	$C_{21}H_{26}O_5$	$CDCl_3$	[373]
6-3-470	nymphaeoside	$C_{27}H_{38}O_{12}$	CD_3OD	[374]
6-3-471	(7*R*,8*S*)-1-(3,4-dimethoxyphenyl)-2-[4-(3-hydroxy-1-propenyl)-2-methoxyphenoxy]-propane-1,3-diol	$C_{21}H_{26}O_7$	$CDCl_3$	[375]
6-3-472	glehlinoside C	$C_{26}H_{32}O_{13}$	DMSO-d_6	[157]
6-3-473	(–)-(7*S*,8*R*,7′*E*)-4,7,9,3′,9′-pentahydroxy-3-methoxy-8-4′-oxyneolign-7′-ene-3′-*O*-*β*-D-glucopyranoside	$C_{25}H_{32}O_{12}$	DMSO-d_6	[376]
6-3-474	(–)-(7*S*,8*R*,7′*E*)-4,7,9,3′,9′-pentahydroxy-3,5′-dimethoxy-8-4′-oxyneolignan-7′-ene-3′-*O*-*β*-D-glucopyranoside	$C_{26}H_{34}O_{13}$	DMSO-d_6	[376]
6-3-475	(–)-(7*R*,8*S*)-4,7,9,3′,9′-pentahydroxy-3-methoxy-8-4′-oxy-neolignan-3′-*O*-*β*-D-glucopyranoside	$C_{25}H_{34}O_{12}$	DMSO-d_6	[376]
6-3-476	(–)-(7*R*,8*S*)-4,7,9,3′,9′-pentahydroxy-3-methoxy-8-4′-oxy-neolignan-9′-*O*-*β*-D-glucopyranoside	$C_{25}H_{34}O_{12}$	DMSO-d_6	[376]
6-3-477	(+)-(7*S*,8*S*)-4,7,9,9′-Tetrahydroxy-3,3′-dimethoxy-8-4′-oxy-neolignan-9′-*O*-D-glucopyranoside	$C_{26}H_{36}O_{12}$	DMSO-d_6	[376]
6-3-478	1-(4-hydroxy-3-methoxyphenyl)-1,2-bis 4-[(*E*)-3-acetoxy-propen-1-yl]-2-methoxyphenoxy propan-3-ol acetate	$C_{36}H_{40}O_{12}$	$CDCl_3$	[377]
6-3-479	1-(4-hydroxy-3-methoxyphenyl)-2-4-[(*E*)-3-acetoxypropen-1-yl]-2-methoxyphenoxy propan-1,3-diol 3-acetate	$C_{24}H_{28}O_9$	C_6D_6	[377]
6-3-480	1-(4-hydroxy-3-methoxyphenyl)-2-{4-[(*E*)-3-acetoxypropen-1-yl]-2-methoxyphenoxy}propan-1,3-diol 3-acetate	$C_{24}H_{28}O_9$	C_6D_6	[377]
6-3-481	*threo*-1-(4-hydroxyphenyl)-2-[4-(*E*)-propenylphenoxy]-propan-1-ol	$C_{18}H_{20}O_3$	$CDCl_3$	[378]
6-3-482	odoratisol B	$C_{20}H_{24}O_5$	$CDCl_3$	[165]
6-3-483	4-hydroxy-*α*-{4-[(*E*)-1-propenyl]phenoxy}propiophenone	$C_{18}H_{18}O_3$	$CDCl_3$	[379]

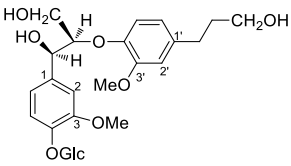
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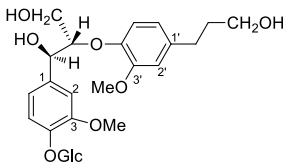
No.	Compounds	MFs	Test solvents	References
6-3-484	*erythro*-l-(4-hydroxy-3-methoxyphenyl)-2-{4-[2-formyl-(*E*)-vinyl]-2-methoxyphenyl}-propane-1,3-diol	$C_{20}H_{22}O_7$	CD_3COCD_3	[380]
6-3-485	*threo*-l-(4-hydroxy-3-methoxyphenyl)-2-{4-[2-formyl-(*E*)-vinyl]-2-methoxyphenyl}-propane-1,3-diol	$C_{20}H_{22}O_7$	CD_3COCD_3	[380]
6-3-486	machilin E	$C_{22}H_{24}O_7$	$CDCl_3$	[381]
6-3-487	virolongin B	$C_{23}H_{30}O_6$	$CDCl_3$	[361]
6-3-488	virolongin E	$C_{23}H_{30}O_7$	$CDCl_3$	[361]
6-3-489	virolongin F	$C_{23}H_{28}O_7$	$CDCl_3$	[361]
6-3-490	*rel*-(8*R*)-$\Delta^{8'}$-3,4-methylenedloxy-3′,5′-dimethoxy-8,*O*,4′-neolignan	$C_{21}H_{24}O_5$	$CDCl_3$	[382]
6-3-491	*rel*-(7*R*,8*R*)-$\Delta^{8'}$-3,4-methylenedioxy-3′,5,5′-trimethoxy-7-hydroxy-8,*O*,4′-neolignan	$C_{22}H_{26}O_7$	CCl_4	[382]



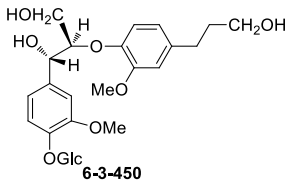
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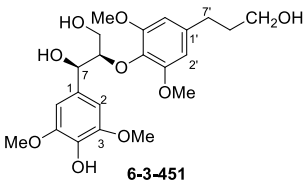
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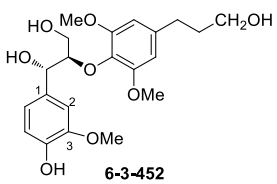
6-3-449



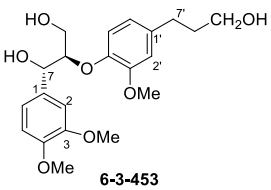
6-3-450



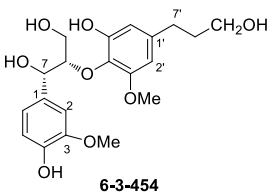
6-3-451



6-3-452

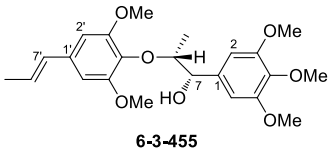


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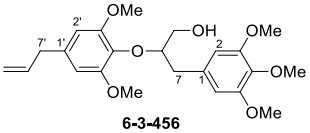


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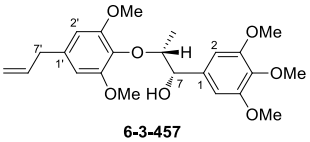
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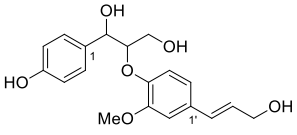
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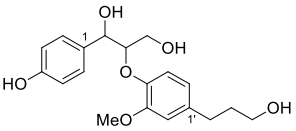
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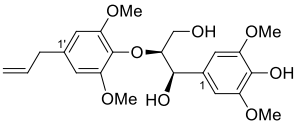
6-3-457



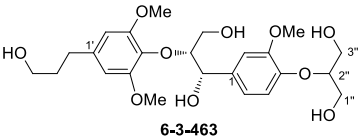
6-3-458 *threo*
6-3-459 *erythro*



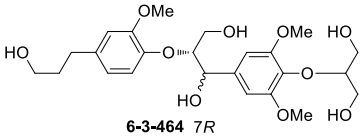
6-3-460 *threo*
6-3-461 *erythro*



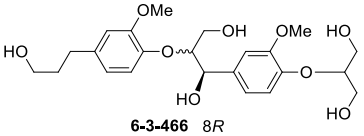
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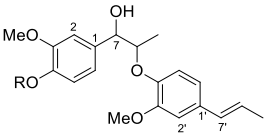
6-3-463



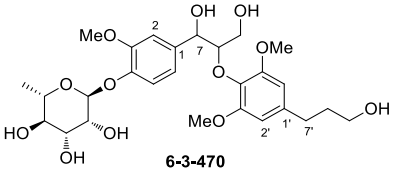
6-3-464 7*R*
6-3-465 7*S*



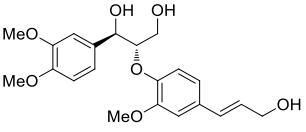
6-3-466 8*R*
6-3-467 8*S*



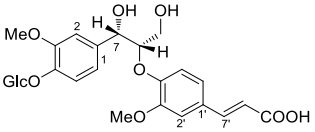
6-3-468 R = H
6-3-469 R = Me



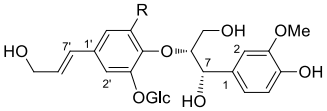
6-3-470



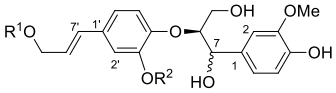
6-3-471



6-3-472

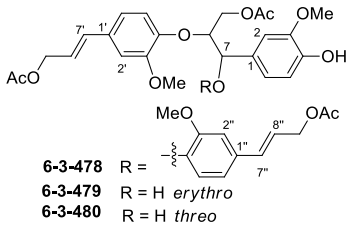


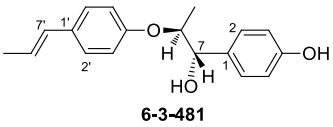
6-3-473 R = H
6-3-474 R = OMe

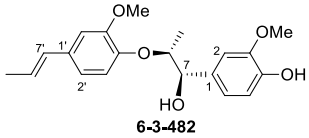


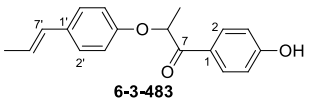
6-3-475 7*R* H Glc
6-3-476 7*R* Glc H
6-3-477 7*S* Glc Me

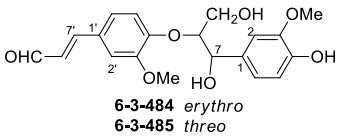
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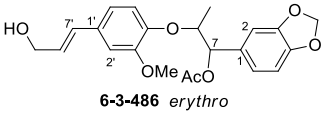


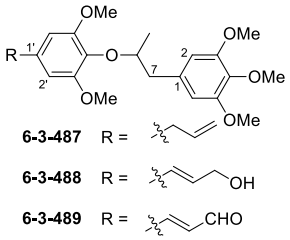












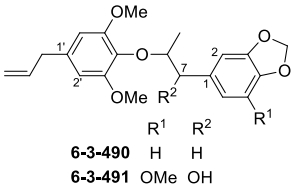


Table 6-3-124: ^{1}H NMR spectroscopic data of lignans **6-3-447**~**6-3-451**.

H	6-3-447	6-3-448	6-3-449	6-3-450	6-3-451
2	7.04 d(1.5)	7.03 d(1.5)	7.04 d(1.5)	7.05 d(1.5)	6.74 s
5	6.99 d(8.5)	6.99 d(8.5)	7.00 d(8.5)	7.00 d(8.5)	
6	6.85 dd(8.5, 1.5)	6.85 dd(8.5, 1.5)	6.87 br d(8.5)	6.86 dd(8.5, 1.5)	6.74 s
7	4.75 d(4.5)	4.75 d(4.5)	4.75 d(5.0)	4.75 d(5.0)	5.00 d(7.0)
8	4.19 m	4.19 m	4.22 m	4.24 m	4.03 td(3.7, 7.0)
9	3.21 m, 3.58 m	3.21 m, 3.57 m	3.21 m, 3.60 m	3.21 m, 3.61 m	3.78 m
2′	6.78 d(1.5)	6.78 d(1.5)	6.73 d(1.5)	6.74 d(1.5)	6.56 s
5′	6.92 d(8.5)	6.91 d(8.5)	6.87 d(8.5)	6.89 d(8.5)	
6′	6.64 dd(8.5, 1.5)	6.64 dd(8.5, 1.5)	6.62 dd(8.5, 1.5)	6.62 dd(8.5, 1.5)	6.56 s
7′	2.51 t(8.0, 7.5)	2.51 t(8.0, 7.5)	2.50 t(8.0, 7.5)	2.51 t(8.0, 7.5)	2.65 t(7.4)
8′	1.67 m	1.67 m	1.67 m	1.67 m	1.84 m
9′	3.39 m	3.39 m	3.39 m	3.39 m	3.58 t(6.4)
1″	4.86 d(7.0)	4.85 d(7.0)	4.84 d(7.0)	4.85 d(7.0)	
2″	3.23	3.23	3.23	3.23	

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Table 6-3-124 (continued)

H	6-3-447	6-3-448	6-3-449	6-3-450	6-3-451
3″	3.24	3.24	3.24	3.24	
4″	3.14	3.14	3.14	3.14	
5″	3.26	3.26	3.26	3.26	
6″	3.43	3.43	3.43	3.43	
	3.64 br d(11.5)	3.64 br d(11.5)	3.62 br d(11.5)	3.64 br d(11.5)	
3-OMe	3.72 s	3.72 s	3.69 s	3.69 s	3.86 s
3′-OMe	3.74 s	3.74 s	3.72 s	3.72 s	3.84 s
5-OMe					3.86 s
5′-OMe					3.84 s

Table 6-3-125: ^{1}H NMR spectroscopic data of lignans **6-3-452**~**6-3-456**.

H	6-3-452	6-3-453	6-3-454	6-3-455	16-3-456
2	6.97 br s	6.96 d(1.6)	6.94 s	6.56 s	6.51 s
5	6.73 d(8.1)	6.83 d(8.0)	6.88 d(8.1)		
6	6.77 br d(8.1)	6.89 dd(1.6, 8.0)	6.91 dd(1.2, 8.3)	6.56 s	6.51 s
7	4.90 d(4.8)	4.96 d(4.4)	5.54 d(7.3)	4.57 d(8.17)	3.21 dd(13.57, 5.39) 2.97 dd(13.64, 8.39)
8	4.16 m	4.11 dd(5.6, 8.4)	3.60 dd(5.9, 12.0)	3.94 m	4.19 m
9	3.52 dd(3.4, 12.0)	3.64 t(6.4)	3.94 m	1.20 d(6.28)	3.56 br d(11.39)
	3.88 dd(5.6, 12.0)	3.89 m			3.44 m
2′	6.53 s	6.74 d(1.6)	6.67 s	6.57 s	6.41 s
5′		6.83 d(8.0)			
6′	6.53 s	6.71 dd(1.6, 8.0)	6.67 s	6.57 s	6.41 s
7′	2.63 t(7.4)	2.64 t(7.6)	2.67 t(7.5)	6.32 dq(15.67, 1.57)	3.32 d(6.69)
8′	1.82 m	1.85 m	1.88 m	6.15 dq(15.62, 6.51)	5.93 ddt(16.91, 10.12, 6.80)
9′	3.56 t(6.4)	3.64 t(6.4)	3.69 t(6.3)	1.87 dd(6.62, 1.56)	5.09 dq(17.04, 1.61) 5.08 dq(10.03, 1.24)
OMe	3.82 s(3-OMe)	3.84 s(4-OMe)	3.86 s(3-OMe)	3.83 s(3, 5-OMe)	3.83 s(3, 5-OMe)
	3.80 s(3′, 5′-OMe)	3.85 s(3, 3′-OMe)	3.88 s(3′-OMe)	3.79 s(4-OMe)	3.80 s(4-OMe)
				3.87 s(3′, 5′-OMe)	3.81 s(3′, 5′-OMe)

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Table 6-3-126: ^{1}H NMR spectroscopic data of lignans **6-3-457**~**6-3-461**.

H	6-3-457	6-3-458	6-3-459	6-3-460	6-3-461
2	6.56 s	7.24 d(8.3)	7.24 d(8.3)	7.24 d(8.3)	7.22 d(8.3)
3		6.74 d(8.3)	6.74 d(8.3)	6.74 d(8.3)	6.72 d(8.3)
5		6.74 d(8.3)	6.74 d(8.3)	6.74 d(8.3)	6.72 d(8.3)
6	6.56 s	7.24 d(8.3)	7.24 d(8.3)	7.24 d(8.3)	7.22 d(8.3)
7	4.57 d(8.35)	4.87 d(6.6)	4.88 d(5.4)	4.85 d(6.9)	4.87 d(5.3)
8	3.92 m	4.25 m	4.25 m	4.15 m	4.21 m
9	1.20 d(6.27)	3.69 dd(11.5, 3.7)	3.84 m	3.67 dd(12.0, 3.7)	3.83 dd(11.7, 5.7)
		3.42 dd(11.5, 5.0)	3.78 m	3.40 dd(12.0, 5.0)	3.72 dd(11.7, 3.4)
2′	6.43 s	7.05 s	7.05 s	6.85 d(1.4)	6.80 d(1.8)
5′		7.01 d(8.1)	7.01 d(8.1)	6.98 d(8.1)	6.80 d(8.1)
6′	6.43 s	6.74 d(8.1)	6.74 d(8.1)	6.72 d(8.1)	6.66 d(8.1)
7′	3.33 br d(6.7)	6.53 d(16.0)	6.53 d(16.0)	2.62 t(7.1)	2.60 t(8.5)
8′	5.95 ddt(16.8, 10.1, 6.8)	6.26 dt(16.0, 5.8)	6.26 dt(16.0, 5.8)	1.80 m	1.79 m
9′	5.11 dq(17.0, 1.7) 5.09 dq(10.1, 1.3)	4.20 d(5.8)	4.20 d(5.8)	3.55 t(6.5)	3.54 t(6.5)
OMe	3.83 s(3, 5-OMe) 3.80 s(4-OMe) 3.85 s(3′, 5′-OMe)	3.87 s	3.87 s	3.85 s	3.79 s

Table 6-3-127: ^{1}H NMR spectroscopic data of lignans **6-3-462**~**6-3-466**.

H	6-3-462	6-3-463	6-3-464	6-3-465	6-3-466
2	6.60 br s	7.02 br s	6.69 br s	6.74 br s	7.02 br s
5		6.80 d(8.0)			6.96 d(8.0)
6	6.60 br s	6.84 d(8.0)	6.69 br s	6.74 br s	6.87 d(8.0)
7	5.01 d(3.0)	4.89 d(5.0)	4.70 d(6.5)	4.87 d(4.0)	4.79 d(6.0)
8	4.12 m	4.14 m	4.26 m	4.24 m	4.15 m
9	3.44 d(7.0)	3.83 dd(12.0, 5.0)	3.82 dd(11.5, 5.0)	3.74 m	3.80 dd(12.0, 6.5)
2′	6.50 br s	6.48 br s	6.70 br s	6.76 br s	6.72 br s
5′			6.71 d(8.0)	6.82 d(8.0)	6.72 d(8.0)
6′	6.50 br s	6.48 br s	6.57 d(8.0)	6.61 d(8.0)	6.58 d(8.0)
7′	3.38 d(6.5)	2.58 t(8.0)	2.53 t(7.5)	2.55 t(7.5)	2.53 t(7.5)
8′	5.99 m	1.76 m	1.73 m	1.74 m	1.73 m
9′	5.16 m	3.49 t(6.0)	3.48 t(6.5)	3.48 m	3.49 t(6.5)
1″		3.67 m	3.66 d(4.5)	3.67 m	3.67 d(5.0)
2″		4.16 m	3.90 t(4.5)	3.91 m	4.20 m
3″		3.67 m	3.66 d(4.5)	3.67 m	3.67 d(5.0)
OMe	3.90 s(3, 5, 3′, 5′-OMe)	3.76 s(3-OMe)	3.75 s(3, 5-OMe)	3.76 s(3, 5, 3′-OMe)	3.74 s(3-OMe)
		3.74 s(3′, 5′-OMe)	3.71 s(3′-OMe)		3.72 s(3′-OMe)

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Table 6-3-128: ^{1}H NMR spectroscopic data of lignans **6-3-467**~**6-3-471**.

H	6-3-467	6-3-468	6-3-469	6-3-470	6-3-471
2	7.05 br s	6.82~6.97	6.82~6.97	7.11 br s	6.97(ov)
5	6.98 d(8.0)	6.82~6.97	6.82~6.97	7.08 d(8.0)	6.84 d(8.4)
6	6.90 d(8.0)	6.82~6.97	6.82~6.97	6.93 d(8.0)	6.901 dd(2.0, 8.4)
7	4.86 d(5.5)	4.59 d(8.3)	4.61 d(8.3)	4.99 d(5.2)	4.99 d(4.8)
8	4.15 m	4.06 m	4.07 m	4.22 m	4.17 m
9	4.20 dd(11.5, 5.0)	1.14 d(6.1)	1.14 d(6.1)	3.57 m	3.68 br d(11.6) 3.93 dd(5.6, 12.0)
2′	6.78 br s	6.82~6.97 m	6.82~6.97 m	6.57 br s	6.97 (ov)
5′	6.80 d(8.0)	6.82~6.97 m	6.82~6.97 m		6.904 d(8.0)
6′	6.83 d(8.0)	6.82~6.97 m	6.82~6.97 m	6.57 br s	6.92 dd(2.0, 8.0)
7′	2.56 t(7.5)	6.34 dd(1.5, 16.3)	6.34 dd(1.5, 15.7)	2.65 t(8.0)	6.57 d(15.6)
8′	1.74 m	6.12 m	6.12 m	1.82 m	6.29 dt(6.0, 15.6)
9′	3.49 t(6.0)	1.86 dd(1.5, 6.6)	1.85 dd(1.5, 6.7)	3.57 m	4.33 d(5.6)
1″	3.69 m			5.38 br s	
2″	4.18 m			4.12 br s	
3″	3.69 m			3.95 m	
4″				3.48 t(9.5)	
5″				3.91 m	
6‴				1.26 d(5.9)	
OMe	3.78 s(3-OMe) 3.76 s(3′-OMe)	3.88 s 3.90 s	3.85 s 3.86 s 3.90 s	3.83 s(3′, 5′-OMe) 3.85 s(3-OMe)	3.875 s(4-OMe) 3.882 s(3-OMe) 3.907 s(3′-OMe)
OH		5.59 s			

Table 6-3-129: ^{1}H NMR spectroscopic data of lignans **6-3-472**~**6-3-476**.

H	6-3-472	6-3-473	6-3-474	6-3-475	6-3-476
2	7.07 d(2.0)	6.97 br s	6.88 br s	6.97 br s	6.95 d(1.5)
5	7.00 d(8.3)	6.68 d(8.0)	6.64 d(8.0)	6.68 d(8.0)	6.69 d(8.0)
6	6.90 dd(8.3, 2.0)	6.80 br d(8.0)	6.67 br d(8.0)	6.78 br d(8.0)	6.75 dd(8.0, 1.5)
7	4.76 d(5.1)	4.69 d(5.5)	4.72 d(4.5)	4.69 d(5.5)	4.69 d(4.5)
8	4.45 m	4.27 ddd(6.0, 5.5, 3.0)	4.24 ddd(6.0, 4.5, 3.0)	4.18 ddd(5.5, 5.0, 3.5)	3.93 ddd(6.5, 4.5, 3.5)
9	3.62 d(4.4)	3.63 dd(12.0, 6.0) 3.51 dd(12.0, 3.0)	3.70 dd(11.5, 6.0) 3.38 dd(11.5, 3.0)	3.62 dd(11.0, 5.0) 3.48 dd(11.0, 3.5)	3.58 dd(11.5, 6.5) 3.48 dd(11.5, 3.5)
2′	7.19 d(2.0)	7.19 d(1.0)	6.90 d(1.5)	6.94 d(2.0)	6.60 d(1.5)

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Table 6-3-129 (continued)

H	6-3-472	6-3-473	6-3-474	6-3-475	6-3-476
5′	7.03 d(8.3)	6.89 d(8.0)		6.82 d(8.0)	6.65 d(8.0)
6′	7.12 dd(8.3, 2.0)	6.93 dd(8.0, 1.0)	6.77 d(1.5)	6.70 dd(8.0, 2.0)	6.39 dd(8.0, 1.5)
7′	7.47 d(15.8)	6.41 d(16.0)	6.43 d(16.0)	2.47 t(7.0)	2.46 t(7.0)
8′	6.35 d(15.8)	6.21 dt(16.0, 5.0)	6.31 dt(16.0, 5.0)	1.66 quint(7.0)	1.73 quint(7.0)
9′		4.06 d(5.0)	4.08 d(5.0)	3.37 t(7.0)	3.74 dt(10.0, 7.0) 3.38 dt(10.0, 7.0)
1″	4.83 d(7.0)	4.79 d(7.0)	4.80 d(7.0)	4.75 d(7.5)	4.09 d(8.0)
2″	3.28 m	3.27 m	3.28 m	3.26 m	2.94 dd(8.5, 8.0)
3″	3.32 m	3.29 m	3.26 m	3.30 m	3.12 dd(8.5, 8.5)
4″	3.19 t(9.0)	3.15 dd(9.0, 8.5)	3.12 m	3.14 m	3.03 dd(8.5, 8.5)
5″	3.32 m	3.26 m	3.28 m	3.25 m	3.04 m
6″	3.67 dd(12.0, 2.0)	3.68 br d(11.5)	3.69 br d(11.5)	3.66 br d(12.0)	3.64 br d(12.0)
	3.47 dd(12.0, 5.6)	3.46 dd(11.5, 5.5)	3.48 dd(11.5, 5.5)	3.46 dd(12.0, 5.5)	3.43 dd(12.0, 5.0)
OMe	3.80 s(3-OMe) 3.80 s(3′-OMe)	3.72 s(3-OMe)	3.72 s(3-OMe) 3.74 s(5′-OMe)	3.72 s(3-OMe)	3.71 s(3-OMe)

Table 6-3-130: ^{1}H NMR spectroscopic data of lignans **6-3-477**~**6-3-481**.

H	6-3-477	6-3-478	6-3-479	6-3-480	6-3-481
2	6.96 d(1.5)	7.02 d(1.8)	7.10 d(1.8)	6.94 d(1.8)	7.31 dd(2.1, 6.6)
3					6.90 dd(2.1, 6.6)
5	6.67 d(8.0)	6.83 d(8.4)	6.98 d(7.8)	6.97 d(8.1)	6.90 dd(2.1, 6.6)
6	6.75 dd(8.0, 1.5)	6.94 dd(8.1, 1.8)	6.77 dd(8.1, 1.8)	6.82 dd(8.1, 1.8)	7.31 dd(2.1, 6.6)
7	4.68 d(4.5)	5.35 d(6.6)	4.98 d(3.6)	4.95 d(7.2)	4.65 d(7.8)
8	4.16 ddd(5.5, 4.5, 4.0)	4.72 m	4.62 m	4.30 m	4.37 dq(7.8, 6.0)
9	3.55 dd(11.0, 4.0)	4.64 dd(11.7, 5.7)	4.67 dd(11.1, 7.2)	4.10 dd(11.7, 5.1)	1.11 d(6.0)
	3.22 dd(11.0, 5.5)	4.54 dd(11.7, 3.0)	4.39 dd(11.1, 2.7)	4.37 dd(11.4, 3.3)	
2′	6.81 d(1.5)	6.87 d(1.8)	6.70 d(2.1)	6.69 d(1.8)	7.27 dd(2.1, 6.6)
3′					6.83 dd(2.1, 6.6)
5′	6.90 d(8.5)	6.67 d(8.1)	6.96 d(8.1)	7.10 d(8.1)	6.83 dd(2.1, 6.6)
6′	6.66 dd(8.5, 1.5)	6.77 dd(8.1, 1.8)	6.79 dd(8.1, 2.1)	6.78 dd(8.1, 1.8)	7.27 dd(2.1, 6.6)
7′	2.56 t(7.5)	6.53 br d(16.2)	6.42 d(15.6)	6.41 d(15.9)	6.36 dd(1.5, 15.6)
8′	1.78 m	6.13 dd(15.9, 6.6)	6.09 dt(15.6, 6.6)	6.09 dt(15.9, 6.6)	6.10 m

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Table 6-3-130 (continued)

H	6-3-477	6-3-478	6-3-479	6-3-480	6-3-481
9′	3.79 dt(10.0, 6.0) 3.39 dt(10.0, 7.0)	4.66~4.70 m	4.63 dd(6.3, 0.9)	4.62 dd(6.6, 0.9)	1.88 dd(1.5, 6.6)
1″	4.09 d(8.0)				
2″	2.95 dd(8.0, 8.0)	6.92 d(2.1)			
3″	3.14 dd(8.0, 8.0)				
4″	3.02 dd(8.0, 8.5)				
5″	3.07 m	6.68 d(8.4)			
6″	3.63 dd(12.0, 2.0) 3.41 dd(12.0, 6.0)	6.73 dd(8.4, 2.1)			
7″		6.54 br d(15.6)			
8″		6.14 dd(15.9, 6.6)			
9″		4.66~4.70 m			
3-OMe	3.68 s	3.78 s	3.27 s	3.19 s	
3′-OMe	3.70 s	3.75 s	3.27 s	3.29 s	
9′-OAc		2.09 s	1.73 s	1.73 s	
9-OAc		2.08 s	1.61 s	1.61 s	
OH			5.68 br s	5.72 br s	

Table 6-3-131: ^{1}H NMR spectroscopic data of lignans **6-3-482**~**6-3-486**.

H	6-3-482	6-3-483	6-3-484	6-3-485	6-3-486
2	6.84 d(2.0)	8.02 d(8.7)	6.7~7.4	6.7~7.3	6.82~6.98 m
3		6.78 d(8.7)			
5	6.78 d(8.5)	6.78 d(8.7)	6.7~7.4	6.7~7.3	6.82~6.98 m
6		8.02 d(8.7)	6.7~7.4	6.7~7.3	6.82~6.98 m
7	4.75 d(3.2)		4.92 d(6)	4.90 d(6)	5.83 d(4.1)
8	4.27 dq(3.2, 6.4)	5.40 q(7.0)	4.54 m	4.34 m	4.54 m
9	1.09 d(6.4)	1.69 d(6.7)	3.5~4.0	3.5~4.0	1.29 d(6.6)
2′	6.91 d(2.0)	7.18 d(8.7)	6.7~7.4	6.7~7.3	6.82~6.98 m
3′		6.86 d(9.0)			
5′	6.88 d(8.3)	6.86 d(9.0)	6.7~7.4	6.7~7.3	6.82~6.98 m
6′	6.84 dd(8.3, 2.0)	7.18 d(8.7)	6.7~7.4	6.7~7.3	6.82~6.98 m
7′	6.28 d(15.6)	6.28 dq(15.6, 1.7)	7.54 d(16)	7.48 d(16)	6.54 m
8′	6.08 dq(15.6, 6.6)	6.05 dq(15.6, 6.7)	6.64 dd(8, 16)	6.61 dd(8, 16)	6.25 dt(15.8, 6.0)
9′	1.80 d(6.6)	1.82 dd(6.7, 1.4)	9.61 d(8)	9.57 d(8)	4.30 m
OMe	3.819 s(3-OMe) 3.822 s(3′-OMe)		3.80 s 3.87 s	3.80 s 3.92 s	3.83 s
OCH_2O					5.90 s
OAc					2.09 s

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Table 6-3-132: ^{1}H NMR spectroscopic data of lignans **6-3-487**~**6-3-491**.

H	6-3-487	6-3-488	6-3-489	6-3-490	6-3-491
2	6.40 s	6.50 s	6.50 s	6.67 br s	6.50 br s
5				6.67 br s	
6	6.40 s	6.50 s	6.50 s	6.67 br s	6.50 br s
7	2.70 dd(14, 8)	2.70 dd(14, 8)	2.78 dd(13.5, 7.5)	3.05~2.50 m	4.30 d(8)
	3.10 dd(14, 6)	3.10 dd(14, 6)	3.08 dd(13.5, 6)		
8	4.2~4.6 m	4.2~4.5 m	4.54 dq(7.5, 6)	4.20~3.90 m	4.10~3.90 m
9	1.20 d(6)	1.25 d(6)	1.25 d(6)	1.10 d(7)	1.10 d(7)
2′	6.50 s	6.62 s	6.78 s	6.38 s	6.30 s
6′	6.50 s	6.62 s	6.78 s	6.38 s	6.30 s
7′	3.30 d(7.0)	6.40 d(7)	7.40 d(15.5)	3.20 d(7)	3.20 d(7)
8′	5.8~6.3 m	5.8~6.3 m	6.64 dd(15.5, 8)	6.20~5.80 m	6.20~5.70 m
9′	4.95~5.3 m	4.25 d(6)	9.68 d(8)	5.20~4.80 m	5.40~4.80 m
OMe	3.80 s, 3.80 s	3.85 s, 3.85 s	3.82~3.85	3.70 s(3′, 5′-OMe)	3.80 s(5-OMe)
	3.85 s, 3.85 s	3.85 s, 3.85 s			3.80 s(3′, 5′-OMe)
	3.85 s	3.85 s			
OCH_2O				5.88 s	5.88 s

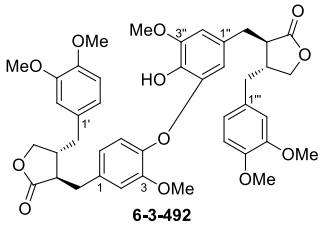
Table 6-3-133: Compounds, MFs, and test solvents of lignans **6-3-492**~**6-3-526**.

No.	Compounds	MFs	Test solvents	References
6-3-492	conicaol A	$C_{42}H_{46}O_{12}$	$CDCl_3$	[383]
6-3-493	rhyncoside E	$C_{52}H_{62}O_{20}$	DMSO-d_6	[384]
6-3-494	rhyncoside F	$C_{52}H_{62}O_{20}$	DMSO-d_6	[384]
6-3-495	5″-methoxyhedyotisol A	$C_{43}H_{52}O_{17}$	CD_3OD	[385]
6-3-496	hedyotisol A	$C_{42}H_{50}O_{16}$	CD_3OD	[385]
6-3-497	4″-*O*-(8-guaiacylglycerol)buddlenol A	$C_{41}H_{46}O_{15}$	CD_3OD	[385]
6-3-498	5″-methoxy-4″-*O*-(8-guaiacylglycerol)buddlenol A	$C_{42}H_{48}O_{16}$	CD_3OD	[385]
6-3-499	buddlenol A	$C_{31}H_{34}O_{11}$	CD_3OD	[385]
6-3-500	3-benzofuranmethanol-2,3-dihydro-2-(4-hydroxy-3-meth-oxyphenyl)-4-methoxy-6-[tetrahydro-2-(3-hydroxy-4-methoxy-phenyl)-3-methanol]-2-furanmethyl	$C_{30}H_{34}O_9$	CD_3OD	[386]
6-3-501	isolappaol C	$C_{30}H_{34}O_{10}$	CD_3COCD_3	[387]
6-3-502	bis-5,5-nortrachelogenin	$C_{40}H_{42}O_{14}$	CD_3OD	[388]
6-3-503	bis-5,5‴-nortrachelogenin	$C_{40}H_{42}O_{14}$	CD_3OD	[388]
6-3-504	herpepropenal	$C_{30}H_{30}O_{10}$	CD_3OD	[389]
6-3-505	bonaspectin E	$C_{35}H_{46}O_{11}$	$CDCl_3$	[390]
6-3-506	bonaspectin G	$C_{37}H_{48}O_{12}$	$CDCl_3$	[390]
6-3-507	bonaspectin F	$C_{35}H_{46}O_{11}$	$CDCl_3$	[390]
6-3-508	bonaspectin H	$C_{37}H_{48}O_{12}$	$CDCl_3$	[390]
6-3-509	bonaspectin A	$C_{35}H_{46}O_{10}$	$CDCl_3$	[391]

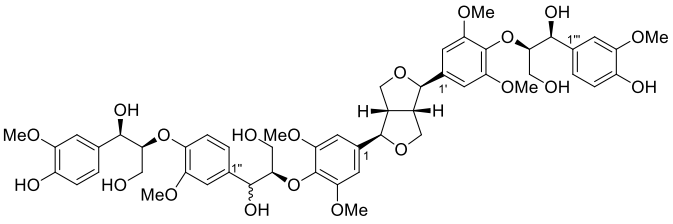
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Table 6-3-133 (continued)

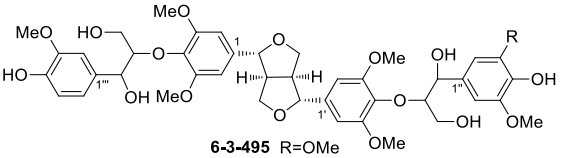
No.	Compounds	MFs	Test solvents	References
6-3-510	bonaspectin B	$C_{35}H_{46}O_{10}$	$CDCl_3$	[391]
6-3-511	bonaspectin C 4″-β-glucoside	$C_{40}H_{54}O_{15}$	$CDCl_3$	[391]
6-3-512	bonaspectin D 4″-β-glucoside	$C_{40}H_{54}O_{16}$	$CDCl_3$	[391]
6-3-513	globoidnan A	$C_{26}H_{20}O_{10}$	DMSO-d_6	[392]
6-3-514	tulsinol B	$C_{30}H_{32}O_6$	$CDCl_3$	[393]
6-3-515	tulsinol C	$C_{30}H_{32}O_6$	$CDCl_3$	[393]
6-3-516	tulsinol D	$C_{31}H_{36}O_7$	$CDCl_3$	[393]
6-3-517	tulsinol E	$C_{40}H_{44}O_8$	$CDCl_3$	[393]
6-3-518	tulsinol F	$C_{30}H_{32}O_6$	$CDCl_3$	[393]
6-3-519	*erythro*-argenteane	$C_{40}H_{46}O_8$	$CDCl_3$	[394]
6-3-520	saucerneol D	$C_{31}H_{36}O_8$	$CDCl_3$	[395]
6-3-521	saucerneol E	$C_{30}H_{34}O_8$	$CDCl_3$	[395]
6-3-522	princepin	$C_{27}H_{26}O_9$	CD_3OD	[358]
6-3-523	isoprincepin	$C_{27}H_{26}O_9$	CD_3OD	[358]
6-3-524	garrettilignan A	$C_{54}H_{52}O_{10}$	$CDCl_3$	[396]
6-3-525	garrettilignan B	$C_{54}H_{52}O_{11}$	$CDCl_3$	[396]
6-3-526	cavaol H	$C_{31}H_{32}O_{11}$	CD_3OD	[397]



6-3-492

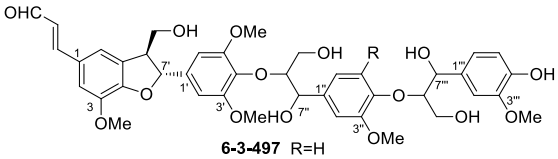


6-3-493 H-7″/H-8″ = H-7‴/8‴ = H-7⁗/H-8⁗ = *erythro*
6-3-494 H-7″/H-8″ = *threo*, H-7‴/8‴ = H-7⁗/H-8⁗ = *erythro*

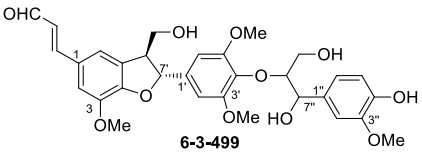


6-3-495 R=OMe
6-3-496 R=H

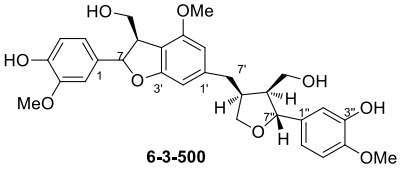
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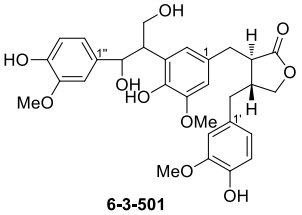
6-3-497 R=H
6-3-498 R=OMe



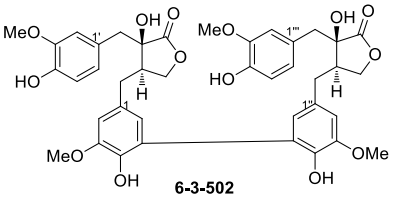
6-3-499



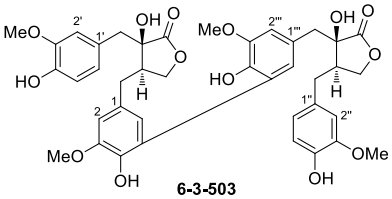
6-3-500



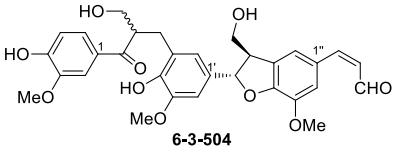
6-3-501



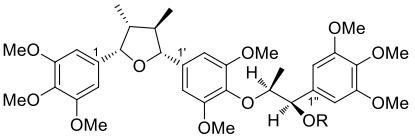
6-3-502



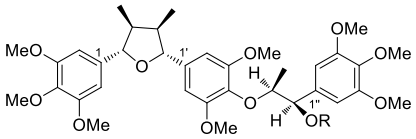
6-3-503



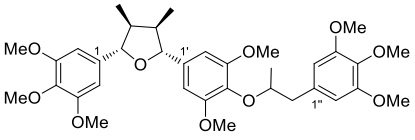
6-3-504



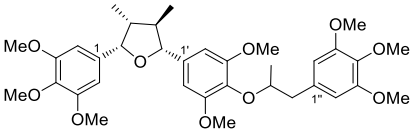
6-3-505 R = H
6-3-506 R = Ac



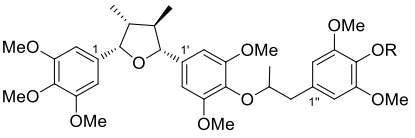
6-3-507 R = H
6-3-508 R = Ac



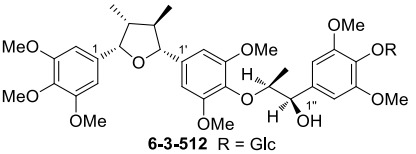
6-3-509



6-3-510

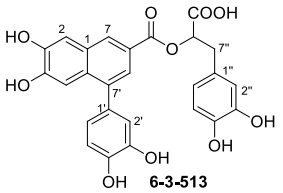


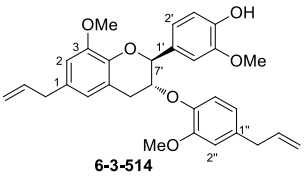
6-3-511 R = Glc

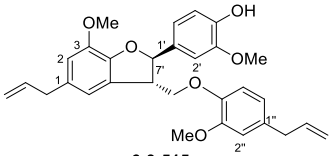


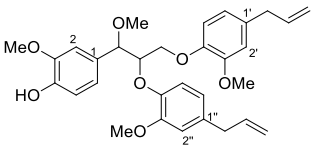
6-3-512 R = Glc

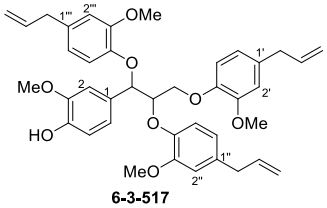
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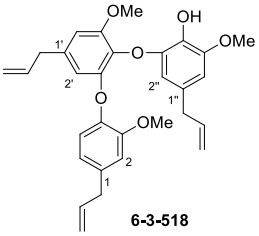

6-3-513

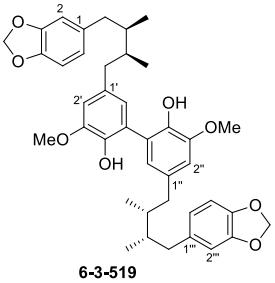

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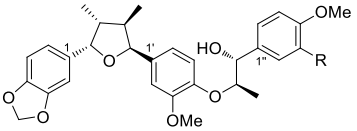

6-3-515

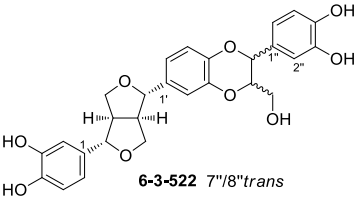

6-3-516

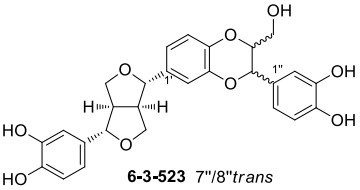

6-3-517

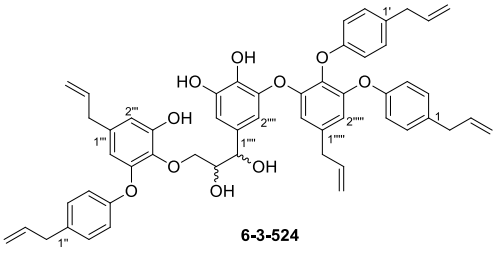

6-3-518


6-3-519

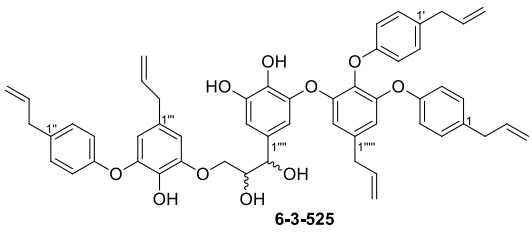

6-3-520 R = OMe
6-3-521 R = OH


6-3-522 7''/8''*trans*


6-3-523 7''/8''*trans*


6-3-524

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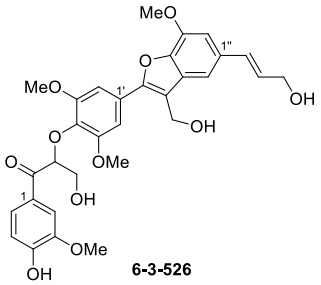


Table 6-3-134: ^{1}H NMR spectroscopic data of lignans **6-3-492**~**6-3-496**.

H	6-3-492	6-3-493	6-3-494	6-3-495	6-3-496
2	6.76 d(1.9)	6.65 s	6.65 s	6.67 s	6.68 s
5	6.81 d(8.1)				
6	6.61 dd(1.9, 8.1)	6.65 s	6.65 s	6.67 s	6.68 s
7	2.93 dd(6.5, 13.0) 2.97 dd(5.6, 13.0)	4.67 br s	4.67 br s	4.74	4.74 br s
8	2.58 m	3.07 m	3.07 m	3.11 br s	3.11 br s
9		3.83 br d(9.0) 4.20 dd(7.0, 9.0)	3.82 br d(9.0) 4.21 dd(6.5, 9.0)	4.27 m, 3.91 m	4.28 m, 3.92 m
2′	6.49 d(1.8)	6.65 s	6.65 s	6.67 s	6.68 s
5′	6.73 d(8.0)				
6′	6.50 dd(1.8, 8.0)	6.65 s	6.65 s	6.67 s	6.68 s
7′	2.50 m, 2.58 m	4.67 s	4.67 br s	4.74	4.74 br s
8′	2.50 m	3.07 m	3.07 m	3.11 br s	3.11 br s
9′	4.18 dd(7.2, 9.1) 3.86 (ov)	3.83 br d(9.0) 4.20 dd(7.0, 9.0)	3.82 br d(9.0) 4.21 dd(6.5, 9.0)	3.91 m, 4.27 m	3.92 m, 4.28 m
2″	6.46 d(1.8)	6.92 d(1.5)	6.93 d(2.0)	6.62 s	6.95 s
5″		6.69 d(8.0)	6.70 d(8.0)		6.72 d(7.8)
6″	6.38 d(1.8)	6.71 dd(1.5, 8.0)	6.71 dd(2.0, 8.0)	6.62 s	6.75 d(7.8)
7″	2.80 dd(5.1, 13.0) 2.85 dd(6.5, 13.0)	4.80 m	4.80 m	4.85 br s	4.86 m
8″	2.59 m, 2.50 m	4.10 m	4.11 m	4.28 m	4.26 m
9″		3.40 m	3.41 m	3.90 m, 3.59 m	3.91 m, 3.60 d(11.9)
2‴	6.47 d(1.9)	6.98 d(1.7)	7.00 d(2.0)	6.94 s	6.95 s
5‴	6.75 d(8.2)	6.69 d(7.6)	6.70 d(8.0)	6.73 m	6.72 d(7.8)
6‴	6.54 dd(1.9, 8.2)	6.71 dd(1.7, 7.6)	6.72 dd(2.0, 8.0)	6.74 m	6.75 d(7.8)
7‴	2.50 m, 2.58 m	4.83 m	4.88 m	4.84 br s	4.86 m
8‴	2.48 m	4.10 m	4.00 m	4.28 m	4.26 m
9‴	4.08 dd(7.0, 9.1) 3.84(ov)	3.74 m	3.15 m, 3.60 m	3.90 m, 3.59 m	3.91 m, 3.60 d(11.9)

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Table 6-3-134 (continued)

H	6-3-492	6-3-493	6-3-494	6-3-495	6-3-496
2‴″		6.99 d(1.5)	7.00 d(1.8)		
5‴″		6.96 d(8.0)	6.90 d(8.0)		
6‴″		6.81 dd(1.5, 8.0)	6.89 dd(1.8, 8.0)		
7‴″		4.72 m	4.72 m		
8‴″		4.28 m	4.23 m		
9‴″		3.57 m, 3.60 m	3.19 m, 3.60 m		
OMe	3.80 s(3-OMe)	3.76 s(3, 3′, 5, 5′-OMe)	3.76 s(3, 3′, 5, 5′-OMe)	3.82 s(3, 3′, 5, 5′-OMe)	3.85 s(3, 3′, 5, 5′-OMe)
	3.80 s(3′-OMe)	3.74 s(3″-OMe)	3.74 s(3″-OMe)	3.82 s(3″-OMe)	3.83 s(3″-OMe)
	3.85 s(4′-OMe)	3.75 s(3‴″-OMe)	3.75 s(3‴″-OMe)	3.82 s(5″-OMe)	3.83 s(3‴″-OMe)
	3.85 s(3″-OMe)	3.74 s(3⁗‴″-OMe)	3.74 s(3⁗‴″-OMe)	3.80 s(3‴″-OMe)	
	3.82 s(3‴″-OMe)				
	3.85 s(4″-OMe)				

Table 6-3-135: ^{1}H NMR spectroscopic data of lignans **6-3-497**~**6-3-501**.

H	6-3-497	6-3-498	6-3-499	6-3-500	6-3-501
2	7.23 s	7.23 s	7.20 s	6.97 d(1.5)	6.65 d(1.8)
5				6.79 d(8.0)	
6	7.26 s	7.26 s	7.24 s	6.84 dd(8.0, 1.5)	6.53 d(1.8)
7	7.61 d(15.7)	7.60 d(15.7)	7.88 d(15.6)	5.52 d	2.74 dd(14.2, 6.5)
					2.76 dd(14.2, 5.5)
8	6.67 m	6.66 m	6.67 m	3.51 m	2.53 m
9	9.58 d(7.8)	9.57 d(7.8)	9.50 d(7.8)	3.80 dd, 3.84 dd	
2′	6.68 s	6.68 s	6.68 s	6.77 d(1.5)	6.69 d(1.8)
5′					6.72 d(9.6)
6′	6.68 s	6.68 s	6.68 s	6.79 d(1.5)	6.55 dd(9.6, 1.8)
7′	5.64 br s	5.64 m	5.63 m	2.58 m, 2.97 m	2.48 dd(15.0, 9.6)
					2.59 dd(15.0, 7.8)
8′	3.50 m	3.54 m	3.52 m	2.80 m	2.42 m
9′	3.88 m, 3.81 m	3.87 m, 3.80 m	3.87 m, 3.81 m	4.03 dd, 0.79 dd	3.84 dd(9.0, 6.0)
					3.99 dd(9.0, 7.5)
2″	7.00 s	6.70 m	6.94 s	6.93 d(1.5)	6.82 d(1.8)
5″	6.71 d(8.0)		6.70 d(8.0)	6.78d(8.0)	6.67d(9.6)
6″	6.83 d(8.0)	6.70 m	6.82 d(8.0)		6.75dd(9.6, 1.8)
7″	4.88 m	4.94 m	4.88 m	4.78d	5.53 d(5.6)
8″	4.25 m	4.18 br s	4.25 m	2.42 m	3.44 dd(6.8, 5.6)
9″	3.86 m, 3.45 m	3.86 m, 3.60 m	3.86 m, 3.45 m	3.67 dd, 0.84 dd	3.72 dd(10.5, 6.8)
					4.02 dd(10.5, 6.8)
2‴	7.00 s	6.95 s			
5‴	6.71 d(8.0)	6.72 m			
6‴	6.83 d(8.0)	6.73 m			
7‴	4.88 m	4.93 m			

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Table 6-3-135 (continued)

H	6-3-497	6-3-498	6-3-499	6-3-500	6-3-501
8‴	4.25 m	4.28 m			
9‴	3.86 m, 3.45 m	3.86 m, 3.54 m			
OMe	3.92 s(3-OMe) 3.78 s(3′,5′-OMe) 3.80 s(3″-OMe) 3.79 s(3‴-OMe)	3.92 s(3-OMe) 3.78 s(3′,5′-OMe) 3.80 s(3″-OMe) 3.80 s(5″-OMe) 3.79 s(3‴-OMe)	3.90 s(3-OMe) 3.78 s(3′,5′-OMe) 3.80 s(3″-OMe)		3.68 s(3″-OMe) 3.74 s(3-OMe) 3.79 s(3′-OMe)

Table 6-3-136: ^{1}H NMR spectroscopic data of lignans **6-3-502**~**6-3-506**.

H	6-3-502	6-3-503	6-3-504	6-3-505	6-3-506
2	6.69 d(3.1)	6.69 d(1.8)	7.62 br s	6.58 s	6.56 s
5			6.74 d(7.7)		
6	6.67 d(3.1)	6.66 d(1.8)	7.57 br d(7.6)	6.58 s	6.56 s
7	2.53 m, 2.82 dd(12.5, 7.9)	2.55 m, 2.82 m		5.13 d(8.5)	5.11 d(8.6)
8	2.46 m	2.58 m	5.27 m	2.29 m	2.27 m
9	4.04 m	4.05 m	3.65 m, 4.22 m	0.72 d(6.9)	0.70 d(7.0)
2′	6.70 d(1.8)	6.68 d(1.8)	6.69 br s	6.80 s	6.73 s
5′	6.66 d(8.0)	6.65 d(7.9)			
6′	6.55 dd(8.0, 1.8)	6.55 dd(7.9, 1.8)	6.84 br s	6.80 s	6.73 s
7′	2.87 d(13.0), 3.10 d(13.0)	2.86 d(13.7), 3.10 d(13.7)	5.50 d(6.5)	4.44 d(9.1)	4.42 d(9.0)
8′			3.45 m	1.84 m	1.82 m
9′			3.75 m, 3.77 m	1.15 d(6.4)	1.11 d(6.6)
2″	6.69 d(3.1)	6.62 d(1.8)	7.22 br s	6.53 s	6.53 s
5″		6.64 d(7.9)			
6″	6.67 d(3.1)	6.56 dd(7.9, 1.8)	7.20 br s	6.53 s	6.53 s
7″	2.53 m, 2.82 dd(12.5, 7.9)	2.52 m, 2.85 m	7.60 d(5.1)	4.77 d(2.6)	5.85 d(3.3)
8″	2.46 m	2.48 m	6.64 m	4.36 dq(2.6, 6.5)	4.42 m
9″	4.04 m	4.07 m	9.57 d(7.5)	1.14 d(6.5)	1.31 d(6.4)
2‴	6.70 d(1.8)	6.72 d(1.8)			
5‴	6.66 d(8.0)				
6‴	6.55 dd(8.0, 1.8)	6.70 d(1.8)			
7‴	2.87 d(13.0), 3.10 d(13.0)	2.90 d(13.4), 3.17 d(13.4)			
OMe	3.86 s(3,3″-OMe)	3.62 s(3-OMe)	3.83 s(3-OMe)	3.82~3.91 s (24H)	3.78~3.86 s (24H)
	3.69 s(3′,3‴-OMe)	3.68 s(3′-OMe) 3.86 s(3″-OMe) 3.83 s(3‴-OMe)	3.88 s(3′-OMe) 3.89 s(5″-OMe)		
OCH_2O					2.20 s

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Table 6-3-137: ^{1}H NMR spectroscopic data of lignans **6-3-507**~**6-3-511**.

H	6-3-507	6-3-508	6-3-509	6-3-510	6-3-511
2	6.68 s	6.67 s	6.67 s	6.56 s	6.56 s
6	6.68 s	6.67 s	6.67 s	6.56 s	6.56 s
7	4.53 d(6.3)	4.52 d(6.1)	4.52 m	5.12 d(8.5)	5.11 d(8.5)
8	2.39 m	2.36 m	2.36 m	2.27 ddq(6.5, 8.5, 7.0)	2.26 m
9	1.09 d(6.5)	1.07 d(6.4)	1.07 d(6.4)	0.70 d(7.0)	0.70 d(6.9)
2′	6.72 s	6.65 s	6.66 s	6.74 s	6.73 s
6′	6.72 s	6.65 s	6.66 s	6.74 s	6.73 s
7′	4.53 d(6.3)	4.51 d(6.2)	4.52 m	4.43 d(9.3)	4.42 d(8.9)
8′	2.39 m	2.36 m	2.36 m	1.82 ddq(6.5, 9.3, 6.5)	1.81 m
9′	1.09 d(6.5)	1.08 d(6.4)	1.08 d(6.4)	1.12 d(6.5)	1.12 d(6.4)
2″	6.54 s	6.52 s	6.47 s	6.48 s	6.54 s
6″	6.54 s	6.52 s	6.47 s	6.48 s	6.54 s
7″	4.79 d(2.6)	5.84 d(3.4)	2.75 m	2.75 dd(7.8, 13.2)	2.79 dd(7.0, 13.6)
			3.12 m	3.12 dd(5.4, 13.2)	3.10 dd(5.3, 13.6)
8″	4.34 dq(2.6, 6.5)	4.46 m	4.39 m	4.41 m	4.42 m
9″	1.14 d(6.5)	1.30 d(6.4)	1.23 d(6.2)	1.24 d(6.4)	1.26 d(6.2)
1‴					4.53 d(7.6)
2‴					3.68 t(8.5)
3‴					3.59 m
4‴					3.64 m
5‴					3.38 m
6‴					3.75~3.95 m
OMe	3.82~3.91 (24H)	3.78~3.86 (24H)	3.79~3.86 (24H)	3.80~3.85 (24H)	3.78~3.87 (21H)
OCH_2O		2.19 s			

Table 6-3-138: ^{1}H NMR spectroscopic data of lignans **6-3-512**~**6-3-516**.

H	6-3-512	6-3-513	6-3-514	6-3-515	6-3-516
2	6.58 s	7.32 s	6.59 d(2.0)	6.65 br s	7.05 d(1.7)
5		7.22 s			6.85 d(8.1)
6	6.58 s		6.49 d(2.0)	6.76 br s	6.91 dd(8.1, 1.7)
7	5.13 d(8.6)	8.18 br s	3.30 br d(5.1)	3.33 br d(5.4)	4.62 d(4.9)
8	2.29 ddq(6.5, 8.6, 7.0)		5.89~5.96 (ov)	5.95 (ov)	4.53 dt(5.1, 4.9)
9	0.72 d(7.0)		5.03~5.10 (ov)	5.07 (ov)	3.91 dd(10.3, 4.9)
					4.26 dd(10.3, 5.1)
2′	6.79 s	6.81 d(1.8)	6.89 d(1.7)	6.98 d(2.2)	6.67 d(1.7)

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Table 6-3-138 (continued)

H	6-3-512	6-3-513	6-3-514	6-3-515	6-3-516
5′		6.87 d(8.5)	6.83 d(8.1)	6.86 d(8.8)	6.71 d(8.1)
6′	6.79 s	6.65 dd(8.5, 1.5)	6.91 dd(8.1, 1.7)	6.97 dd(8.8, 2.2)	6.61d d(8.1, 1.7)
7′	4.43 d(9.1)		5.23 d(6.4)	5.66 br d(6.6)	3.30 br d(3.9)
8′	1.84 ddq(6.5, 9.1, 6.4)	7.47 br s	4.65 q(6.4)	3.93 m	5.92 ddt(16.9, 10.3, 1.8)
9′	1.15 d(6.4)		3.04 d(5.4)	4.16 t(8.6) 4.27 dd(9.5, 5.9)	5.05 (ov)
2″	6.59 s	6.71 br s	6.66 d(1.7)	6.71 d(2.0)	6.65 d(2.0)
5″		6.60 d(8.5)	6.63 d(8.1)	6.80 d(8.3)	6.87 d(8.1)
6″	6.59 s	6.57 br d(8.5)	6.58 dd(8.1, 1.7)	6.68 dd(8.3, 2.0)	6.63 dd(8.1, 2.0)
7″	4.79 d(2.5)	3.08 dd(14.5, 3.3) 2.91 dd(14.5, 9.5)	3.29 br d(6.1)	3.32 br d(6.1)	3.30 br d(4.9)
8″	4.35 dq(2.5, 6.4)	5.11 dd(9.5, 3.3)	5.89~5.96 (ov)	5.95 (ov)	5.93 ddt(16.9, 10.3, 6.6)
9″	1.15 d(6.4)		5.03~5.15 (ov)	5.05~5.11 (ov)	5.05 (ov)
1‴	4.55 d(7.6)				
2‴	3.69 t(8.5)				
3‴	3.59 t(8.5)				
4‴	3.67 t(8.5)				
5‴	3.38 m				
6‴	3.77~3.95 m				
OMe	3.80~3.90 (21H)		3.89 s(3-OMe) 3.77 s(3′-OMe) 3.75 s(3″-OMe)	3.89 s(3-OMe) 3.84 s(3′-OMe) 3.82 s(3″-OMe)	3.79 s(3-OMe) 3.80 s(3′-OMe) 3.76 s(3″-OMe) 3.30 s(7-OMe)

Table 6-3-139: ^{1}H NMR spectroscopic data of lignans **6-3-517**~**6-3-521**.

H	6-3-517	6-3-518	6-3-519	6-3-520	6-3-521
2	7.17 d(1.7)	6.75 d(1.7)	6.66 br s	6.81 d(1.7)	6.82 d(1.5)
5	6.82 d(8.1)	6.80 d(8.1)	6.70 d(7.9)	6.79 d(8.0)	6.80 d(8.0)
6	7.01 dd(8.1, 1.7)	6.67 dd(8.1, 1.7)	6.60 dd(7.9, 1.6)	6.76 br d(8.0)	6.76 br d(8.0)
7	5.54 d(4.6)	3.35 d(6.6)	2.27 dd(13.7, 9.3) 2.73 dd(13.7, 4.9)	5.42 d(6.5)	5.42 d(6.4)
8	4.79 q(4.9)	5.84~5.98 (ov)	1.77 m	2.26 ddq(12.8, 6.5, 6.5)	2.27 ddq(12.8, 6.4, 6.4)
9	3.96 dd(10.3, 5.4) 4.46 dd(10.3, 4.4)	4.98~5.10 (ov)	0.87 d(6.8)	0.71 d(6.5)	0.71 d(6.4)
2′	6.64 (ov)	6.51 br s	6.66 br s	6.90 d(1.6)	6.91 d(1.6)

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Table 6-3-139 (continued)

H	6-3-517	6-3-518	6-3-519	6-3-520	6-3-521
5′	6.75 d(7.8)			6.99 d(8.0)	6.99 d(7.9)
6′	6.64 (ov)	6.30 d(1.7)	6.72 d(1.8)	6.82 dd(8.0, 1.6)	6.81 dd(7.9, 1.6)
7′	3.29 br d(6.1)	3.26 d(6.6)	2.31 dd(13.6, 9.3) 2.76 dd(13.6, 4.8)	5.43 d(6.5)	5.43 d(6.4)
8′	5.90 (ov)	5.84~5.98 (ov)	1.77 m	2.28 ddq(12.8, 6.5, 6.5)	2.29 ddq(12.8, 6.4, 6.4)
9′	5.00~5.08 (ov)	4.98~5.10 (ov)	0.84 d(6.7)	0.70 d(6.5)	0.72 d(6.4)
2″	6.64 (ov)	6.40 d(1.5)	6.66 br s	6.95 d(1.7)	6.94 d(1.5)
5″	7.00 d(7.8)			6.84 d(8.2)	6.88 d(8.6)
6″	6.64 (ov)	6.51 br s	6.72 d(1.8)	6.93 dd(8.2, 1.7)	6.89 dd(8.6, 1.5)
7″	3.30 br d(5.1)	3.20 (ov)	2.31 dd(13.6, 9.3) 2.76 dd(13.6, 4.8)	4.65 d(8.3)	4.63 d(8.3)
8″	5.90 (ov)	5.84~5.98 (ov)	1.77 m	4.13 dq(8.3, 6.2)	4.12 dq(8.3, 6.2)
9″	5.00~5.08 (ov)	4.98~5.10 (ov)	0.84 d(6.7)	1.17 d(6.2)	1.17 d(6.2)
2‴	6.64 (ov)		6.66 br s		
5‴	6.74 d(8.1)		6.70 d(7.9)		
6‴	6.52 dd(8.1, 1.7)		6.60 dd(7.9, 1.6)		
7‴	3.25 br d(6.6)		2.27 dd(13.7, 9.3) 2.73 dd(13.7, 4.9)		
8‴	5.90 (ov)		1.77 m		
9‴	5.00~5.08 (ov)		0.87 d(6.8)		
OMe	3.78 s(3-OMe) 3.76 s(3′-OMe) 3.74 s(3″-OMe) 3.73 s(3‴-OMe)	3.74 s(3-OMe) 3.82 s(3′-OMe) 3.84 s(3″-OMe)	3.91 s	3.93 s(3′-OMe) 3.89 s(3″-OMe) 3.88 s(4″-OMe)	3.93 s(3′-OMe) 3.90 s(4″-OMe)
OCH_2O			5.98 br d(1.4)	5.95 s	5.96 s

Table 6-3-140: ^{1}H NMR spectroscopic data of lignans **6-3-522**~**6-3-526**.

H	6-3-522	6-3-523	6-3-524	6-3-525	6-3-526
2	6.81 d(2.5)	6.80 d(2.5)	7.13 d(8.4)	7.08 m	7.64 br s
3			6.98 d(8.4)	6.85 m	
5	6.75 d(8.5)	6.73 d(8.5)	6.98 d(8.4)	6.85 m	6.87 d(8.0)
6	6.69 dd(8.5, 2.5)	6.67 dd(8.5, 2.5)	7.13 d(8.4)	7.08 m	7.66 dd(7.5, 2.0)
7	4.64 m	4.62 m	3.36 m, 3.36 m	3.33 m, 3.33 m	
8	3.10 m	3.09 m	5.95 m	5.93 m	5.43 t(5.5)
9	3.82 m, 4.20 m	3.81 m, 4.20 m	5.06 m, 5.06 m	5.05 m, 5.05 m	3.97 m
2′	6.99 m	6.91 d(2.5)	7.09 d(8.4)	7.05 d(8.4)	7.23 s
3′			6.85 d(8.4)	6.84 m	
5′	6.87 m	6.93 d(8.5)	6.85 d(8.4)	6.84 m	
6′	6.83 m	6.86 dd(8.5, 2.5)	7.09 d(8.4)	7.05 d(8.4)	7.23 s
7′	4.71 m	4.69 m	3.34 m, 3.34 m	3.32 m, 3.32 m	

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Table 6-3-140 (continued)

H	6-3-522	6-3-523	6-3-524	6-3-525	6-3-526
8′	3.10 m	3.09 m	5.93 m	5.93 m	
9′	3.82 m, 4.23 m	3.81 m, 4.22 m	5.06 m, 5.06 m	5.05 m, 5.05 m	4.85 br s
2″	6.85 m	6.85 d(2.5)	7.07 d(8.4)	7.05 m	7.02 d(1.0)
3″			6.75 d(8.4)	6.87 m	
5″	6.80 d(8.5)	6.81 d(8.5)	6.75 d(8.4)	6.87 m	
6″	6.75 dd(8.5, 2.5)	6.75 dd(8.5, 2.5)	7.07 d(8.4)	7.05 m	7.33 br s
7″	4.80 d(8)	4.80 d(8)	3.32 m, 3.32 m	3.30 m, 3.30 m	6.70 d(16.0)
8″	3.99 ddd(8, 5, 3)	3.98 ddd(8, 5, 3)	5.93 m	5.93 m	6.36 m
9″	3.48 dd(12.5, 5)	3.47 dd(12.5, 5)	5.06 m, 5.06 m	5.06 m, 5.06 m	4.25 br d(5.0)
	3.68 dd(12.5, 3)	3.66 dd(12.5, 3)			
2‴			6.55 s	6.35 s	
6‴			6.22 s	6.43 s	
7‴			3.18 m, 3.18 m	3.15 m, 3.15 m	
8‴			5.84 m	5.82 m	
9‴			5.00 m, 5.04 m	4.99 m, 4.99 m	
2⁗			6.66 s	6.79 s	
6⁗			6.42 s	6.51 s	
7⁗			4.76 m	4.90 m	
8⁗			4.06 m	4.19 m	
9⁗			3.93 m, 3.93 m	4.08 m, 3.95 m	
2′′′′′			6.39 s	6.39 s	
6′′′′′			6.54 s	6.57 s	
7′′′′′			3.19 m, 3.19 m	3.19 m, 3.19 m	
8′′′′′			5.84 m	5.84 m	
9′′′′′			5.00 m, 5.04 m	4.98 m, 4.98 m	
3-OMe					3.91 s
3′, 5′-OMe					3.82 s
3″-OMe					4.03 s

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7 Stilbenes

7.1 Simple 1,2-diphenylethenes

Table 7-1-1: Compounds, MFs, and test solvents of simple 1,2-diphenylethenes **7-1-1**~**7-1-60**.

No.	Compounds	MFs	Test solvents	References
7-1-1	phoyunbene A	$C_{17}H_{18}O_5$	CD_3OD	[1]
7-1-2	phoyunbene B	$C_{17}H_{18}O_5$	CD_3OD	[1]
7-1-3	phoyunbene C	$C_{16}H_{16}O_4$	CD_3OD	[1]
7-1-4	phoyunbene D	$C_{17}H_{18}O_4$	CD_3OD	[1]
7-1-5	3,4′,5-triacetoxystilbene	$C_{20}H_{18}O_6$	CD_3COCD_3	[2]
7-1-6	combretastatin A-6	$C_{18}H_{20}O_5$	$CDCl_3$	[3]
7-1-7	halophilol A	$C_{17}H_{18}O_5$	$CDCl_3$	[4]
7-1-8	*E*-3,4-dihydroxy-3′-methoxystilbene	$C_{15}H_{14}O_3$	CD_3OD	[5]
7-1-9	*trans*-4-[2-(3,5-dimethoxyphenyl) ethenyl]-1,2-benzenediol	$C_{16}H_{16}O_4$	DMSO-d_6	[6]
7-1-10	*pterostilbene*	$C_{16}H_{16}O_3$	DMSO-d_6	[7]
7-1-11	*E*-3,3′-dimethoxy-4,4′-dihydroxystilbene	$C_{16}H_{16}O_4$	$CDCl_3$	[8]
7-1-12	5-[(1*E*)-2-(4-hydroxyphenyl)ethenyl]-4,7-dimethoxy-3-methyl-2*H*-1-benzopyran-2-one	$C_{20}H_{18}O_5$	C_5D_5N	[9]
7-1-13	1-{2-hydroxy-6-[(1*E*)-2-(4-hydroxyphenyl)ethenyl]-4-meth-oxyphenyl}-2-methyl-1-propanone	$C_{19}H_{20}O_4$	$CDCl_3$	[9]
7-1-14	1-{2,4-dihydroxy-6-[(1*E*)-2-(4-hydroxyphenyl)ethenyl]-phen-yl}-2-methyl-1-propanone	$C_{18}H_{18}O_4$	CD_3COCD_3	[9]
7-1-15	gnetupendin A	$C_{22}H_{20}O_5$	CD_3COCD_3	[10]
7-1-16	gnetupendin B	$C_{22}H_{20}O_6$	CD_3COCD_3	[10]
7-1-17	chiricanine A	$C_{19}H_{20}O_2$	$CDCl_3$	[11]
7-1-18	chiricanine C	$C_{25}H_{30}O_2$	$CDCl_3$	[11]
7-1-19	artoindonesianin N	$C_{20}H_{22}O_3$	CD_3COCD_3	[12]
7-1-20	3′,5′-dimethoxy-4-hydroxy-4′-(3,3-dimethylallyl)stilbene	$C_{21}H_{24}O_3$	$CDCl_3$	[13]
7-1-21	*trans*-4-(3-methyl-*E*-but-1-enyl)-3,5,2′,4′-tetrahydroxystilbene	$C_{19}H_{20}O_4$	DMSO-d_6	[14]
7-1-22	4-hydroxy-5′-methoxy-6″,6″-dimethylpyran[2″,3″:3′,4′]stilbene	$C_{20}H_{20}O_3$	$CDCl_3$	[15]
7-1-23	3,5′-dimethoxy-4-hydroxy-6″,6″-dimethylpyran[2″,3″:3′,4′]-stilbene	$C_{21}H_{22}O_4$	$CDCl_3$	[15]
7-1-24	3,4,5-trimethoxy-6″,6″-dimethylpyran[2″,3″:3′,4′]stilbene	$C_{22}H_{24}O_4$	$CDCl_3$	[15]
7-1-25	chiricanine B	$C_{19}H_{20}O_3$	$CDCl_3$	[11]
7-1-26	chiricanine D	$C_{24}H_{28}O_3$	$CDCl_3$	[11]
7-1-27	mappain	$C_{29}H_{36}O_4$	$CDCl_3$	[16]
7-1-28	4-[(2″*E*)-7″-hydroxy-3″,7″-dimethyloct-2″-enyl]-2′,3,4′,5-tetrahydroxy-*trans*-stilbene	$C_{24}H_{30}O_5$	CD_3COCD_3	[17]
7-1-29	pawhuskin A	$C_{29}H_{36}O_4$	CD_3COCD_3	[18]

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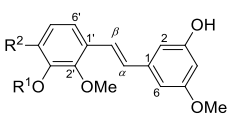
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Table 7-1-1 (continued)

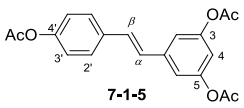
No.	Compounds	MFs	Test solvents	References
7-1-30	pawhuskin C	$C_{24}H_{28}O_4$	CD_3COCD_3	[18]
7-1-31	pawhuskin B	$C_{24}H_{26}O_4$	CD_3COCD_3	[18]
7-1-32	schweinfurthin E	$C_{30}H_{38}O_6$	CD_3OD	[19]
7-1-33	schweinfurthin F	$C_{30}H_{38}O_5$	CD_3OD	[19]
7-1-34	schweinfurthin G	$C_{29}H_{36}O_5$	CD_3OD	[19]
7-1-35	schweinfurthin H	$C_{30}H_{38}O_7$	CD_3OD	[19]
7-1-36	schweinfurthin A	$C_{34}H_{44}O_6$	CD_3OD	[20]
7-1-37	schweinfurthin B	$C_{35}H_{46}O_6$	CD_3OD	[20]
7-1-38	rumexoid	$C_{19}H_{20}O_7$	CD_3OD	[21]
7-1-39	5-*O*-methyl-(*E*)-resveratrol 3-*O*-*β*-D-glucopyranoside	$C_{21}H_{24}O_8$	CD_3OD	[22]
7-1-40	5-*O*-methyl-(*E*)-resveratrol 3-*O*-*β*-D-apiofuranosyl-(1→6)-*β*-D-glucopyranoside	$C_{26}H_{32}O_{12}$	CD_3OD	[22]
7-1-41	*trans*-4′,5-dihydroxy-3-methoxystilbene-5-*O*-{*α*-L-rhamno-pyranosyl-(1→2)-[*α*-L-rhamnopyranosyl-(1→6)]-*β*-D-gluco-pyranoside	$C_{33}H_{44}O_{16}$	CD_3OD	[23]
7-1-42	*trans*-4′,5-dihydroxy-3-methoxystilbene-5-*O*-[*α*-L-rhamno-pyranosyl-(1→6)]-*β*-D-glucopyranoside	$C_{27}H_{34}O_{12}$	CD_3OD	[23]
7-1-43	(*E*)-resveratrol 3-(6″-galloyl)-*O*-*β*-D-glucopyranoside	$C_{27}H_{26}O_{12}$	CD_3OD	[24]
7-1-44	(*E*)-resveratrol 3-(4″-acetyl)-*O*-*β*-D-xylopyranoside	$C_{21}H_{22}O_8$	CD_3OD	[24]
7-1-45	oxyresveratrol 2-*O*-*β*-D-glucopyranoside	$C_{20}H_{22}O_9$	CD_3OD	[25]
7-1-46	resveratrol-12-*C*-*β*-glucopyranoside	$C_{20}H_{22}O_8$	CD_3COCD_3	[26]
7-1-47	10-*C*-*β*-glucopyranosylresveratrol①	$C_{20}H_{22}O_8$	CD_3COCD_3	[27]
7-1-48	5-[(1*E*)-2-(4*β*-D-glucopyranosyloxyphenyl) ethenyl]-4,7-dimethoxy-3-methyl-2*H*-1-benzopyran-2-one	$C_{26}H_{28}O_{10}$	C_5D_5N	[9]
7-1-49	*E*-resveratrol-3-*O*-*β*-D-xylopyranoside	$C_{19}H_{20}O_7$	CD_3COCD_3	[28]
7-1-50	resveratrol 3-*O*-*β*-D-glucopyranoside	$C_{20}H_{22}O_8$	DMSO-d_6	[29]
7-1-51	2,3,5,4′-tetrahydroxystilbene-2-*O*-(6″-*O*-*α*-D-glucopyranosyl)-*β*-D-glucopyranoside	$C_{26}H_{32}O_{14}$	DMSO-d_6	[30]
7-1-52	*trans*-3,5,4′-trihydroxystilbene 2-*C*-glucoside①	$C_{20}H_{22}O_9$	CD_3OD	[31]
7-1-53	(*E*)-3,4′-dimethoxy-5-rutinosyl-stilbene	$C_{28}H_{36}O_{12}$	CD_3OD	[32]
7-1-54	rhaponticin	$C_{21}H_{24}O_9$	DMSO-d_6	[32]
7-1-55	piceid	$C_{20}H_{22}O_8$	CD_3OD-$CDCl_3$	[32]
7-1-56	3,5-dimethoxy-4′-*O*-(*β*-rhamnopyranosyl-(1→6)-*β*-glucopyr-anoside)stilbene	$C_{28}H_{36}O_{12}$	DMSO-d_6	[7]
7-1-57	piceid 2′-*O*-4-hydroxyl benzoate	$C_{27}H_{26}O_{10}$	CD_3COCD_3	[33]
7-1-58	piceid 2′-*O*-*E*-ferulate	$C_{30}H_{30}O_{11}$	CD_3COCD_3	[33]
7-1-59	piceid 2′-*O*-*E*-coumarate	$C_{29}H_{28}O_{10}$	CD_3COCD_3	[33]
7-1-60	pieceid-2″-*O*-gallate	$C_{27}H_{26}O_{12}$	CD_3OD	[34]

① Compound **7-1-47** is identical to **7-1-52**, but the used solvents are different.

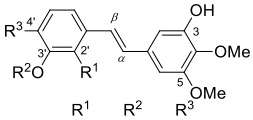
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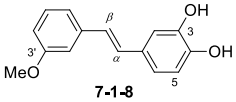
	R^1	R^2
7-1-1	H	OMe
7-1-2	Me	OH
7-1-3	H	H
7-1-4	Me	H



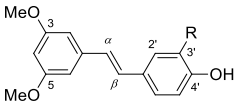
7-1-5



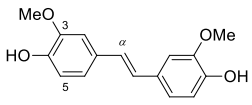
	R^1	R^2	R^3
7-1-6	H	Me	OMe
7-1-7	OMe	H	H



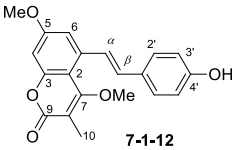
7-1-8



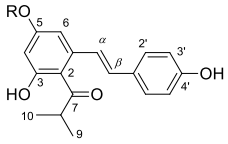
7-1-9 R = OH
7-1-10 R = H



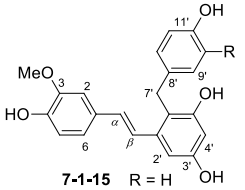
7-1-11



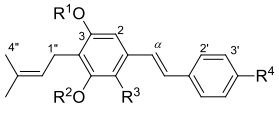
7-1-12



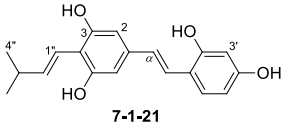
7-1-13 R = Me
7-1-14 R = H



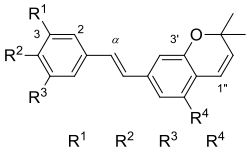
7-1-15 R = H
7-1-16 R = OH



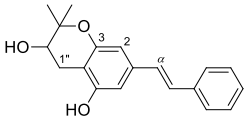
	R^1	R^2	R^3	R^4
7-1-17	H	H	H	H
7-1-18	H	Me	Prenyl	H
7-1-19	Me	H	H	OH
7-1-20	Me	Me	H	OH



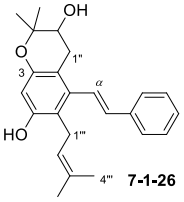
7-1-21



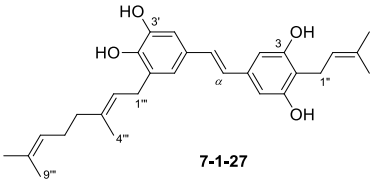
	R^1	R^2	R^3	R^4
7-1-22	H	OH	H	OMe
7-1-23	OMe	OH	H	OMe
7-1-24	OMe	OMe	OMe	H



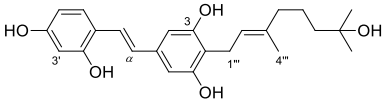
7-1-25



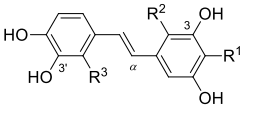
7-1-26



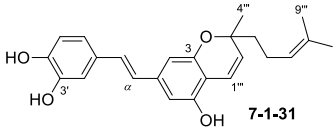
7-1-27



7-1-28

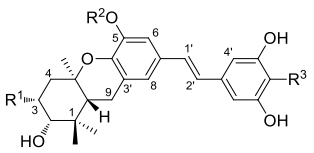


	R^1	R^2	R^3
7-1-29	H	Ger	Preny
7-1-30	Ger	H	H

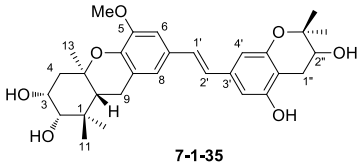


7-1-31

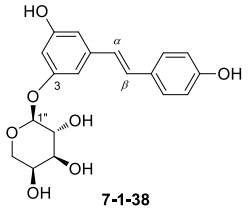
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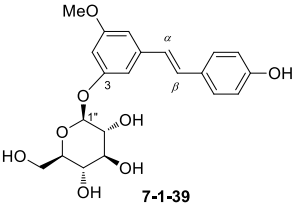
	R^1	R^2	R^3
7-1-32	OH	Me	Prenyl
7-1-33	H	Me	Prenyl
7-1-34	H	H	Prenyl
7-1-36	OH	H	Ger
7-1-37	OH	Me	Ger



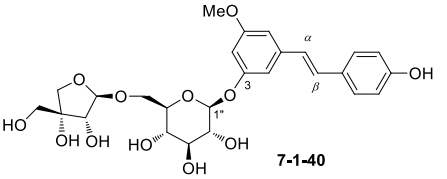
7-1-35



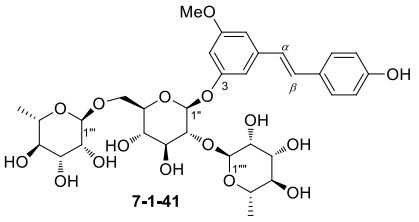
7-1-38



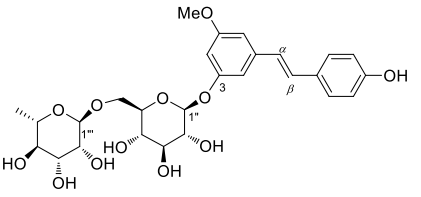
7-1-39



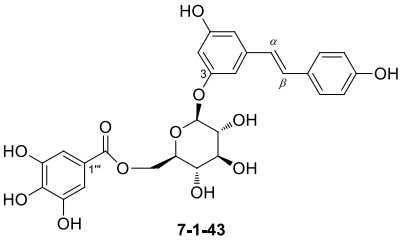
7-1-40



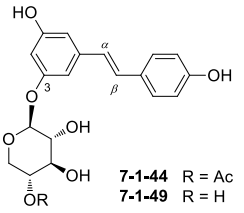
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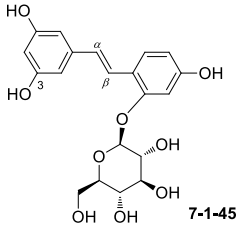
7-1-42



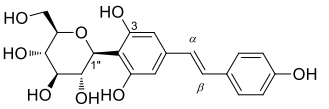
7-1-43



7-1-44 R = Ac
7-1-49 R = H

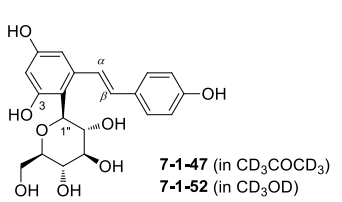


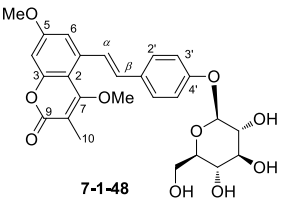
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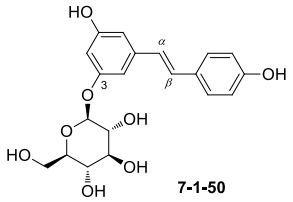


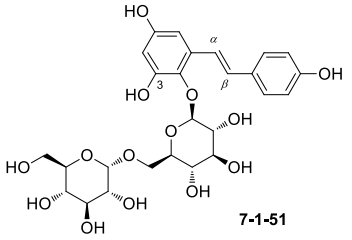
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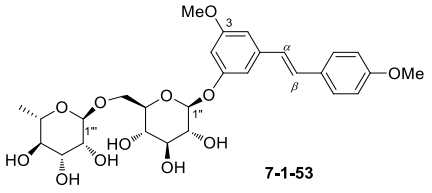
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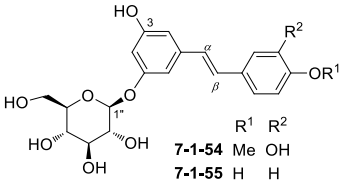


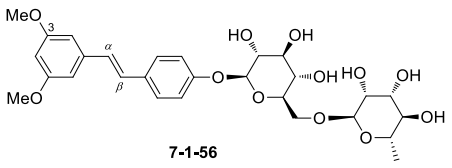












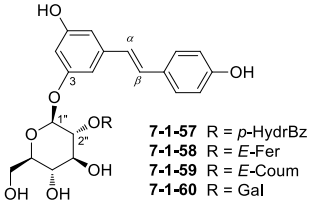


Table 7-1-2: ^{1}H NMR spectroscopic data of simple 1,2-diphenylethenes **7-1-1**~**7-1-5**.

H	7-1-1	7-1-2	7-1-3	7-1-4	7-1-5
2	6.58 t(1.8)	6.57 t(1.8)	6.60 t(1.8)	6.60 t(1.8)	7.25 d(2.0)
4	6.26 t(1.8)	6.26 t(1.8)	6.29 t(1.8)	6.29 t(1.8)	6.86 t(2.0)
6	6.54 t(1.8)	6.53 t(1.8)	6.57 t(1.8)	6.57 t(1.8)	7.25 d(2.0)
α	6.93 d(16.4)	6.88 d(16.7)	7.02 d(16.4)	7.04 d(16.5)	7.22 d(16.4)
β	7.23 d(16.4)	7.22 d(16.7)	7.31 d(16.4)	7.35 d(16.5)	7.32 d(16.4)
2′					7.65 d(8.5)
3′					7.14 d(8.5)
4′			6.76 dd(7.9, 1.5)	6.91 dd(8.2, 1.5)	
5′	6.72 d(8.7)	6.62 d(8.7)	6.92 t(7.9)	7.05 t(8.2)	7.14 d(8.5)
6′	7.07 d(8.7)	7.21 d(8.7)	7.10 dd(7.9, 1.5)	7.23 dd(8.2, 1.5)	7.65 d(8.5)
5-OMe	3.76 s	3.76 s	3.76 s	3.77 s	

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Table 7-1-2 (continued)

H	7-1-1	7-1-2	7-1-3	7-1-4	7-1-5
2′-OMe	3.81 s	3.85 s	3.78 s	3.81 s	
3′-OMe		3.84 s		3.85 s	
4′-OMe	3.84 s				
OAc					2.26 s, 2.27 s

Table 7-1-3: ^{1}H NMR spectroscopic data of simple 1,2-diphenylethenes **7-1-6**~**7-1-10**.

H	7-1-6	7-1-7	7-1-8	7-1-9	7-1-10
2	6.78 d(1.9)	6.86 d(1.8)	7.00 d(2.0)	6.70 t(2.2)	6.77 d(2.1)
4				6.35 t(2.2)	6.46 d(2.1)
5			6.73 d(8.0)		
6	6.61 d(1.9)	6.64 d(1.8)	6.86 dd(8.0, 2.0)	6.70 t(2.2)	6.77 d(2.1)
α	6.94 d(16.2)	7.03 d(16.4)	6.87 d(16.0)	7.07 d(16.5)	6.82 d(16.0)
β	6.85 d(16.2)	7.19 d(16.4)	6.99 d(16.0)	6.83 d(16.5)	7.15 d(16.0)
2′	7.05 d(1.9)		7.02 d(2.0)	6.98 d(1.7)	7.46 d(8.8)
3′					6.75 d(8.8)
4′		6.89 dd(7.9, 1.8)	6.76 dd(8.0, 2.0)		
5′	6.86 d(8.1)	7.02 t(7.9)	7.21 t(8.0)	6.72 d(9.8)	6.75 d(8.8)
6′	7.04 dd(8.1, 1.9)	7.12 dd(7.9, 1.8)	7.05 d(8.0)	6.82 br d(9.8)	7.46 d(8.8)
3-OMe				3.75 s	3.76 s
4-OMe	3.91 s	3.92 s			
5-OMe	3.92 s	3.93 s		3.75 s	3.76 s
2′-OMe		3.83 s			
3′-OMe	3.95 s		3.80 s		
4′-OMe	3.92 s				
OH	5.78 s			8.94 s, 9.12 s	

Table 7-1-4: ^{1}H NMR spectroscopic data of simple 1,2-diphenylethenes **7-1-11**~**7-1-14**.

H	7-1-11	7-1-12	7-1-13	7-1-14
2	7.02 d(2.0)			
4		6.90 d(2.3)	6.39 d(2.5)	6.33 d(2.2)
5	6.90 d(8.0)			
6	7.00 dd(8.0, 2.0)	7.16 d(2.3)	6.55 d(2.5)	6.65 d(2.2)
8			3.58 sept(6.7)	3.50 sept(6.8)
9			1.15 d(6.7)	1.11 d(6.8)
10		2.17 s	1.15 d(6.7)	1.11 d(6.8)
α	6.89 s	8.01 d(16.1)	7.13 d(15.9)	7.13 d(16.0)
β		7.11 d(16.1)	6.77 d(15.9)	6.89 d(16.0)
2′,6′		7.69 d(8.5)	7.35 d(8.5)	7.41 d(8.5)
3′,5′		7.27 d(8.5)	6.88 d(8.5)	6.86 d(8.5)

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Table 7-1-4 (continued)

H	7-1-11	7-1-12	7-1-13	7-1-14
3-OMe	3.95 s			
5-OMe		3.79 s	3.83 s	
7-OMe		3.62 s		
OH	5.61 s	11.94 s(4′-OH)	12.29 s(3-OH)	

Table 7-1-5: ^{1}H NMR spectroscopic data of simple 1,2-diphenylethenes **7-1-15** and **7-1-16**.

H	7-1-15	7-1-16	H	7-1-15	7-1-16
2	7.07 br s	7.07 d(2.1)	7′	4.02 s	3.98 s
5	6.78 d(8.4)	6.86 d(8.1)	9′	7.08 d(8.7)	6.64 d(1.8)
6	6.93 dd(1.8, 8.4)	6.91 dd(2.1, 8.1)	10′	6.68 d(8.7)	
α	6.85 d(16.2)	6.85 d(16.2)	12′	6.68 d(8.7)	6.67 d(7.5)
β	7.24 d(16.2)	7.23 d(16.2)	13′	7.08 d(8.7)	6.69 dd(1.8, 5)
2′	6.68 d(2.1)	6.68 d(2.1)	3-OMe	3.87 s	3.87 s
4′	6.41 d(2.1)	6.41 d(2.1)			

Note: Signals of hydroxyls of **7-1-15** were resonated at *δ* 8.28 s, 8.08 s, 8.02 s, and 7.72 s; Signals of hydroxyls of **7-1-16** were resonated at *δ* 8.02 br s, 8.20 br s, 7.66 br s, and 7.58 br s.

Table 7-1-6: ^{1}H NMR spectroscopic data of simple 1,2-diphenylethenes **7-1-17**~**7-1-21**.

H	7-1-17	7-1-18	7-1-19	7-1-20	7-1-21
2	6.57 s		6.38 d(2.3)	6.67 s	6.44 s
6	6.57 s	6.96 s	6.71 d(2.3)	6.67 s	6.44 s
α	6.90 d(16.2)	7.28 d(15.9)	6.89 d(16.1)	6.90 d(16.3)	6.70 d(16.4)
β	6.98 d(16.2)	6.93 d(16.4)	7.20 d(16.1)	7.00 d(16.3)	7.13 d(16.4)
2′	7.46 d(7.3)	7.48 d(7.4)	7.40 dd(8.4, 2.0)	7.40 d(8.6)	
3′	7.32 d(7.3)	7.35 d(7.4)	6.84 dd(8.4, 2.0)	6.80 d(8.6)	6.31 d(2.3)
4′	7.24 t(7.3)	7.27 t(7.4)			
5′	7.32 d(7.3)	7.35 d(7.4)	6.84 dd(8.4, 2.0)	6.80 d(8.6)	6.24 dd(2.3, 8.5)
6′	7.46 d(7.3)	7.48 d(7.4)	7.40 dd(8.4, 2.0)	7.40 d(8.6)	7.35 d(8.5)
1″	3.42 d(7.0)	3.46 br d(6.3)	3.40 d(7.0)	3.34 d(7.0)	6.51 d(16.2)
2″	5.27 t(7.0)	5.27 m	5.07 t(7.0)	5.18 td(7.0, 1.3)	6.58 dd(16.2, 6.3)
3″					2.38 m
4″	1.82 s	1.85 s	1.63 s	1.77 s	1.03 d(6.7)
5″	1.76 s	1.77 s	1.78 s	1.66 s	1.03 d(6.7)
1‴		3.46 br d(6.3)			
2‴		5.16 t(6.7)			
4‴		1.83 s			
5‴		1.70 s			
OMe		3.72 s(4-OMe)	3.77 s	3.86 s(6H)	
5-OMe					
OH			8.45 s, 8.08 s		

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Table 7-1-7: ^{1}H NMR spectroscopic data of simple 1,2-diphenylethenes **7-1-22**~**7-1-26**.

H	7-1-22	7-1-23	7-1-24	7-1-25	7-1-26
2	7.39 d(8.7)	7.02 d(2.1)	6.70 s	6.65 s	
3	6.81 d(8.7)				
4					6.36 s
5	6.81 d(8.7)	6.90 d(8.6)			
6	7.39 d(8.7)	7.01 dd(7.2, 2.1)	6.70 s	6.52 s	
α	6.84 d(16.4)	6.83 d(15.9)	6.86 d(16.4)	6.95 d(16.5)	7.04 d(15.6)
β	7.00 d(16.4)	7.00 d(16.4)	6.94 d(16.4)	7.00 d(16.5)	6.56 d(16.6)
2′	6.52 d(1.0)	6.52 br s	7.14 d(2.1)	7.46 d(7.4)	7.50 d(7.8)
3′				7.34 d(7.4)	7.40 d(7.8)
4′				7.24 t(7.4)	7.32 t(7.5)
5′			6.76 d(8.2)	7.34 d(7.4)	7.40 d(7.8)
6′	6.63 d(2.1)	6.64 br s	7.26 dd(8.2, 2.1)	7.46 d(7.4)	7.50 d(7.8)
3-OMe		3.94 s	3.91 s		
4-OMe			3.86 s		
5-OMe			3.91 s		
5′-OMe	3.86 s	3.87 s			
1″	6.65 d(9.7)	6.65 d(10.3)	6.34 d(9.8)	2.93 dd(17.0, 5.0)	2.96 dd(16.7, 5.1)
				2.72 dd(17.0, 5.0)	2.72 dd(16.6, 5.6)
2″	5.56 d(9.7)	5.56 d(9.7)	5.64 d(9.8)	3.85 t(5.0)	3.78 t(5.2)
4″	1.43 s	1.43 s	1.44 s	1.39 s	1.34 s
5″	1.43 s	1.43 s	1.44 s	1.33 s	1.37 s
1‴					3.44 d(6.3)
2‴					5.25 t(6.0)
4‴					1.76 s
5‴					1.76 s
OH		5.68 s(4-OH)			

Table 7-1-8: ^{1}H NMR spectroscopic data of simple 1,2-diphenylethenes **7-1-27**~**7-1-31**.

H	7-1-27	7-1-28	7-1-29	7-1-30	7-1-31
2	6.53 s	6.56 s		6.57 s	6.51 br s
4			6.36 d(2.4)		
6	6.53 s	6.56 s	6.65 d(2.4)	6.57 s	6.55 d(1.3)
α	6.74 d(16.1)	6.81 d(16.6)	7.07 d(15.9)	6.76 d(16.0)	6.79 d(16.5)
β	6.85 d(16.1)	7.25 d(16.6)	7.13 d(15.9)	6.84 d(16.7)	6.97 d(16.3)
2′	6.94 d(1.8)			7.03 d(2.0)	7.07 d(2.0)
3′		6.41 d(2.4)			
5′		6.36 dd(2.4,8.3)	6.73 d(8.2)	6.79 d(7.9)	6.80 d(8.2)
6′	6.78 d(1.8)	7.37 d(8.3)	7.01 d(8.4)	6.85 dd(8.2, 2.0)	6.91 dd(8.2, 2.0)
1″	3.42 d(7.1)		3.53 d(6.8)		
2″	5.28 m		5.17 m		
4″	1.83 s		1.81 br s		
5″	1.76 s		1.66 br s		
1‴	3.38 d(7.1)	3.35 d(7.1)	3.43 d(6.8)	3.36 d(7.1)	6.71 d(10.1)
2‴	5.34 m	5.30 tq(1.2, 7.3)	5.17 m	5.32 m	5.59 d(9.9)

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Table 7-1-8 (continued)

H	7-1-27	7-1-28	7-1-29	7-1-30	7-1-31
4‴	1.80 s	1.76 br d(0.7)	1.78 br s	1.77 s	1.36 s
5‴	2.10 m	1.93 t(7.0)	1.96 m	1.95 m	1.69 m
6‴	2.10 m	1.42~1.53 m	2.05 m	2.05 m	2.13 m
7‴	5.07 m	1.35~1.40 m	5.06 m	5.09 m	5.12 m
9‴	1.60 s	1.12 s	1.52 s	1.56 s	1.57 s
10‴	1.70 s	1.12 s	1.58 s	1.61 s	1.64 s

Note: Signals of hydroxyls of **7-1-27** were resonated at δ 5.48 s, 5.38 s, and 5.13 s(2H); Signals of hydroxyls of **7-1-29** were resonated at δ 8.40 s, 8.07 s, 7.93 s, and 7.06 s; Signals of hydroxyls of **7-1-30** were resonated at δ 8.09 s(2H), 8.04 s, and 7.09 s; Signals of hydroxyls of **7-1-31** were resonated at δ 8.41 s, 8.00 s, and 7.87 s.

Table 7-1-9: ^{1}H NMR spectroscopic data of simple 1,2-diphenylethenes **7-1-32**~**7-1-35**.

H	7-1-32	7-1-33	7-1-34	7-1-35
2	3.30(ov)	3.30(ov)	3.30(ov)	3.30 m
3	4.14 q(3.5)	2.03 m	2.06 m	4.14 q(3.5)
4	2.34 dd(14.0, 3.0)	1.79 m	1.80 m	2.34 dd(14, 3)
	1.93 dd(13.5, 3.5)	1.65 m	1.68 m	1.92 dd(14.5)
6	6.91 d(1.5)	6.91 d(1.5)	6.79 d(1.5)	6.93 d(1.5)
8	6.84 d(1.5)	6.83 d(1.5)	6.72 d(1.5)	6.85 d(1)
9	2.76 m	2.72 m	2.71 m	2.76 m
9a	1.74 dd(12.5, 6.0)	1.75 m	1.75 m	1.74 dd(12, 5.5)
11	1.09 s	0.87 s	0.88 s	1.09 s
12	1.10 s	1.09 s	1.10 s	1.10 s
13	1.40 s	1.21 s	1.23 s	1.40 s
1′	6.87 d(16)	6.86 d(16.5)	6.80 d(17)	6.90 d(16)
2′	6.77 d(16.5)	6.77 d(16.5)	6.70 d(16)	6.80 d(16)
4′	6.46 s	6.46 s	6.44 s	6.52 d(1.5)
8′	6.46 s	6.46 s	6.44 s	6.44 d(1)
1″	3.30(ov)	3.30(ov)	3.30(ov)	2.90 dd(17, 5.5)
				2.53 dd(17, 7.5)
2″	5.23 tq(7, 1.5)	5.23 tq(7, 1.5)	5.23 tq(7, 1.5)	3.73 dd(7.5, 5.5)
4″	1.76 s	1.76 s	1.76 s	1.33 s
5″	1.65 s	1.65 s	1.65 s	1.23 s
5-OMe	3.84 s	3.83 s		3.84 s

Table 7-1-10: ^{1}H NMR spectroscopic data of simple 1,2-diphenylethenes **7-1-36** and **7-1-37**.

H	7-1-36	7-1-37	H	7-1-36	7-1-37
2	3.35 m	3.30 (ov)	2′	6.71 d(16)	6.77 d(16)
3	4.13 d(2.4)	4.14 d(3.4)	4′	6.46 s	6.47 s
4	2.35 d(13.0)	2.34 dd(13.9, 3.3)	8′	6.46 s	6.47 s

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Table 7-1-10 (continued)

H	7-1-36	7-1-37	H	7-1-36	7-1-37
6	6.80 d(2)	6.91 d(2.0)	1″	3.35 m	3.30(ov)
8	6.69 d(2)	6.83 d(2.0)	2″	5.25 tq(7.1, 1.2)	5.25 tq(7.2, 1.2)
9	2.71 m	2.75 m	4″	1.07 s①	1.08 s①
9a	3.35 m	1.74 m	5″	1.95 t(7.3)	1.94 m
11	1.76 s①	1.76 s①	6″	2.04 t(7.3)	2.05 t(7.3)
12	1.08 s	1.10 s	7″	5.07 t quint(7.1, 1.4)	5.07 t quint(7.2, 1.4)
13	1.40 s	1.40 s	9″	1.56 s	1.56 s
1′	6.82 d(16)	6.87 d(16)	10″	1.62 s	1.62 s
			5-OMe		3.83 s

① Typographic error maybe exist in the literature.

Table 7-1-11: ^{1}H NMR spectroscopic data of simple 1,2-diphenylethenes **7-1-38**~**7-1-42**.

H	7-1-38	7-1-39	7-1-40	7-1-41	7-1-42
2	6.74 dd(1.4, 2.1)	6.93 br s	6.86 br s	6.62 br s	6.65 br s
4	6.45 dd(2.1)	6.60 br s	6.61 br s	6.42 br s	6.41 br s
6	6.64 dd(1.4, 2.1)	6.75 br s	6.78 br s	6.69 br s	6.72 br s
α	6.86 d(16.0)	6.91 d(16.2)	6.93 d(16.3)	6.85 d(16.0)	6.85 d(16.2)
β	7.02 d(16.0)	7.09 d(16.2)	7.08 d(16.3)	7.04 d(16.0)	6.99 d(16.2)
2′, 6′	7.38 d(8.5)	7.40 d(8.5)	7.41 d(8.6)	7.44 d(8.5)	7.44 d(8.5)
3′, 5′	6.79 d(8.5)	6.79 d(8.5)	6.80 d(8.6)	6.89 d(8.5)	6.88 d(8.5)
5-OMe		3.81 s	3.84 s	3.79 s	3.79 s
1″	4.85 d(7.0)	4.94 d(7.2)	4.91 d(7.5)	4.94 d(7.4)	4.86 d(7.0)
2″	3.82 dd(7.0, 9.0)	3.40 m	3.48 m	3.63	3.46
3″	3.65 dd(3.5, 9.0)	3.50 m	3.48 m	3.56	3.41
4″	3.90 ddd (3.5, 2.5, 1.5)	3.50 m	3.40 m	3.43	3.70
5″	3.96 dd(12.5, 2.5) 3.74 dd(12.5, 1.5)	3.50 m	3.64 m	3.53	3.55
6″		3.96 dd(1.8, 12.1)	4.06 m	3.97	3.64
		3.73 dd(6.1, 12.1)	3.64 m	4.01	4.02
1‴			4.99 d(2.4)	4.71 s	4.72 s
2‴			3.91 d(2.4)	3.86	3.85
3‴				3.68	3.47
4‴			3.99 d(9.7) 3.77 d(9.7)	3.34	3.39
5‴			3.56 s	3.65	3.65
6‴				1.17 d(6.1)	1.18 d(6.1)
1⁗				5.28 s	
2⁗				3.94	
3⁗				3.62	
4⁗				3.43	
5⁗				4.08	
6‴				1.32 d(6.1)	

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Table 7-1-12: ^{1}H NMR spectroscopic data of simple 1,2-diphenylethenes **7-1-43**~**7-1-47**.

H	7-1-43	7-1-44	7-1-45	7-1-46	7-1-47
2	6.76 t(1.6)	6.75 br s	6.42 d(2.0)	6.55 s	
4	6.52 t(1.6)	6.46 br s	6.12 t(2.0)		6.22 d(2.4)
6	6.69 t(1.6)	6.68 br s	6.42 d(2.0)	6.55 s	6.56 d(2.4)
α	6.78 d(16.0)	6.88 d(16.3)	6.84 d(16.4)	6.86 d(16.3)	6.76 d(16.3)
β	7.00 d(16.0)	7.04 d(16.3)	7.23 d(16.4)	7.03 d(16.3)	7.48 br d(16.3)
2′	7.30 d(8.8)	7.40 d(8.5)		7.42 d(8.5)	7.36 d(8.5)
3′	6.80 d(8.8)	6.81 d(8.5)	6.56 d(2.4)	6.83 d(8.5)	6.79 d(8.5)
5′	6.80 d(8.8)	6.81 d(8.5)	6.54 dd(2.4, 9.3)	6.83 d(8.5)	6.79 d(8.5)
6′	7.30 d(8.8)	7.40 d(8.5)	7.37 d(9.3)	7.42 d(8.5)	7.36 d(8.5)
1″	4.97 d(7.2)	4.94 d(7.4)	4.83 d(7.3)	4.94 d(9.3)	4.92 d(9.6)
2″	3.56 m	3.56 dd(7.4, 9.0)	–	3.68 dd(9.3, 9.0)	3.71 t(9.6)
3″	3.58 m	3.72 d(9.0)	–	3.57 dd(8.6, 9.0)	3.58 t(9.6)
4″	3.55 m	4.83 m	–	3.65 ddd(8.6, 9.3, 1.0)	3.67 t(9.6)
5″	3.79 m	4.08 dd(5.4, 11.4)	–	3.48 dt(9.3, 3.5)	3.44 dd(9.6, 3.5)
		3.47 dd(9.9, 11.4)			
6″	4.67 dd(2.0, 12.0)		3.87 dd(1.7, 12.3)	3.87 m	3.81 m
	4.47 dd(5.6, 12.0)		3.68 dd(4.9, 12.3)		
2‴, 6‴	7.15 s				
Oac		2.12 s			

Table 7-1-13: ^{1}H NMR spectroscopic data of simple 1,2-diphenylethenes **7-1-48**~**7-1-50**.

H	7-1-48	7-1-49	7-1-50
2		6.75 br s	6.70 dd(1.8, 1.8)
4	6.94 d(2.5)	6.48 t(2.1)	6.32 dd(1.8, 1.8)
6	7.14 d(2.5)	6.71 t(1.7)	6.55 dd(1.8, 1.8)
10	2.18 s		
α	8.00 d(16.1)	6.93 d(16.4)	6.85 d(17.2)
β	7.05 d(16.1)	7.07 d(16.4)	7.05 d(17.2)
2′, 6′	7.65 d(8.7)	7.42 d(8.6)	7.39 d(8.6)
3′, 5′	7.47 d(8.7)	6.84 d(8.6)	6.72 d(8.6)
5-OMe	3.78 s		
7-OMe	3.59 s		
1″	5.74 d(7.1)	4.97 d(6.9)	4.80 d(7.0)
2″	4.38~4.44 m	3.50 m	3.12~3.6 m
3″	4.38~4.44 m	3.53 m	3.12~3.6 m
4″	4.38~4.44 m	3.65 m	3.12~3.6 m
5″	4.20 m	3.94 dd(5.0, 11.2)	3.12~3.6 m
		3.43 dd(9.7, 11.2)	
6″	4.61 dd(1.9, 12.0)	–	3.12~3.6 m
	4.45 dd(5.1, 12.0)		3.72 dd(12.0, 1.8)

Note: Signals of hydroxyls of **7-1-50** were resonated at *δ* 9.58 br s, 9.43 br s, 5.29 d, 5.11 d, 5.03 d, and 4.62 t.

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Table 7-1-14: ^{1}H NMR spectroscopic data of simple 1,2-diphenylethenes **7-1-51**~**7-1-54**.

H	7-1-51	7-1-52	7-1-53	7-1-54
2			6.75 t(1.6)	6.55 br s
4	6.18 d(2.7)	6.24 d(2.0)	6.58 t(2.6)	6.34 br s
6	6.55 d(2.7)	6.55 d(2.0)	6.82 t(1.6)	6.75 br s
α	7.63 d(16.5)	6.76 m	6.87 d(16.0)①	6.8~7.5 m
β	6.87 d(16.5)	6.76 m	7.04 d(16.0)①	6.8~7.5 m
2′	7.39 m	7.36 m	7.42(8.7)	6.8~7.5 m
3′	6.75 m	6.76 m	6.88(8.7)	
5′	6.75 m	6.76 m	6.88(8.7)	6.8~7.5 m
6′	7.39 m	7.36 m	7.42(8.7)	6.8~7.5 m
1″	4.41 d(7.8)	*ca*. 4.8(ov)	4.9 d(7.5)	4.85 d(6)
2″	–	3.87 t(9)	3.29~3.41 m	3.25~3.35 m
3″	–	3.52 t(9)	3.29~3.41 m	3.25~3.35 m
4″	–	3.46 t(9)	3.29~3.41 m	3.25~3.35 m
5″	–	3.39 ddd(9, 4.5, 2.5)	3.29~3.41 m	3.25~3.35 m
6″	–	3.77 dd(12, 4.5) 3.88 dd(12, 2.5)	3.29~3.41 m	3.25~3.35 m
1‴	4.71 d(3.6)		4.7 d(1.6)	
2‴	–		3.29~3.41 m	
3‴	–		3.29~3.41 m	
4‴	–		3.29~3.41 m	
5‴	–		3.29~3.41 m	
6‴	–		1.2 d(7.4)	
3-OMe			3.76 s①	
4′-OMe			3.79 s①	3.76 s

① Assignments bearing the same superscript may be exchanged.
Note: Signals of hydroxyls of **7-1-54** were resonated at 9.35 s, 8.9 s, and 5~5.3 br s(4H).

Table 7-1-15: ^{1}H NMR spectroscopic data of simple 1,2-diphenylethenes **7-1-55**~**7-1-58**.

H	7-1-55	7-1-56	7-1-57	7-1-58
2	6.44 dd(2, 1.8)	6.77 d(2.2)	6.71 br s	6.75 br s
4	6.27 dd(2, 1.8)	6.47 d(2.2)	6.35 t(2.0)	6.41 t(2.0)
6	6.5 dd(2, 1.8)	6.77 d(2.2)	6.64 br s	6.67 br s
α	6.64 d(18)①	7.14 d(16.0)	6.89 d(16.3)	6.87 d(16.3)
β	6.54 d(18)①	6.95 d(16.0)	7.01 d(16.3)	7.04 d(16.3)
2′, 6′	7.13①	7.50 d(8.8)	7.39 d(8.6)	7.35 d(8.6)
3′, 5′	6.58①	6.91 d(8.8)	6.89 d(8.6)	6.81 d(8.6)
1″	4.7 d(5)	4.84 d(7.3)	5.25 d(7.9)	5.16 d(7.9)
2″	3.17~3.6 m	3.00~3.85 m	5.20 m	5.12 m
3″	3.17~3.6 m	3.00~3.85 m	3.87 m	3.79 m
4″	3.17~3.6 m	3.00~3.85 m	3.59 m	3.59 m
5″	3.17~3.6 m	3.00~3.85 m	3.64 m	3.62 m
6″	3.17~3.6 m	3.00~3.85 m	3.77 m, 3.96 m	3.79 m, 3.97 m
1‴		4.43 d(6.2)		
2‴		3.00~3.85 m	7.93 d(8.8)	7.33 d(1.8)
3‴		3.00~3.85 m	6.90 d(8.8)	

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Table 7-1-15 (continued)

H	7-1-55	7-1-56	7-1-57	7-1-58
4‴		3.00~3.85 m		
5‴		3.00~3.85 m	6.90 d(8.8)	6.85 d(8.2)
6‴		1.18 d(6.2)	7.93 d(8.8)	7.14 dd(8.2, 1.8)
7‴				7.66 d(15.9)
8‴				6.43 d(15.9)
3-OMe		3.76 s		
3‴-OMe				3.90 s

① Assignments bearing the same superscript may be exchanged.

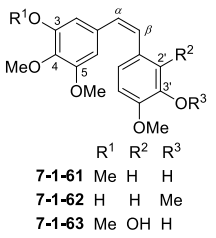
Table 7-1-16: ^{1}H NMR spectroscopic data of simple 1,2-diphenylethenes **7-1-59** and **7-1-60**.

H	7-1-59	7-1-60	H	7-1-59	7-1-60
2	6.75 br s	6.70 br s	4″	3.59 m	3.45 m
4	6.41 br s	6.36 br s	5″	3.62 m	3.45 m
6	6.67 br s	6.63 br s	6″	3.76 m, 3.96 m	3.66 m, 4.00 d(11.4)
α	6.86 d(16.5)	6.81 d(16.3)	2‴	7.55 d(8.6)	7.18 br s
β	7.04 d(16.5)	6.94 d(16.5)	3‴	6.88 d(8.6)	
2′, 6′	7.36 d(8.4)	7.35 d(8.6)	5‴	6.88 d(8.6)	
3′, 5′	6.81 d(8.4)	6.79 d(8.6)	6‴	7.55 d(8.6)	7.18 br s
1″	5.16 d(8.0)	5.12 d(7.9)	7‴	7.67 d(15.9)	
2″	5.11 m	5.14 m	8‴	6.38 d(15.9)	
3″	3.79 m	3.66 m			

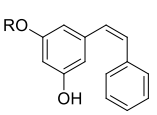
Table 7-1-17: Compounds, MFs, and test solvents of simple 1,2-diphenylethenes **7-1-61**~**7-1-76**.

No.	Compounds	MFs	Test solvents	References
7-1-61	combretastatin A-4	$C_{18}H_{20}O_5$	$CDCl_3$	[3]
7-1-62	combretastatin A-5	$C_{18}H_{20}O_5$	$CDCl_3$	[3]
7-1-63	combretastatin A-1	$C_{18}H_{20}O_6$	$CDCl_3$	[35]
7-1-64	(*Z*)-3-methoxy-5-hydroxystilbene	$C_{15}H_{14}O_2$	$CDCl_3$	[36]
7-1-65	(*Z*)-3,5-dihydroxystilbene	$C_{14}H_{12}O_2$	$CDCl_3$	[36]
7-1-66	–	$C_{26}H_{32}O_{14}$	D_2O	[37]
7-1-67	–	$C_{20}H_{22}O_8$	CD_3OD	[31]
7-1-68	*cis*-resveratrol-3,4′-*O*-*β*-diglucoside	$C_{20}H_{32}O_{13}$	CD_3OD	[38]
7-1-69	mulberroside D	$C_{26}H_{32}O_{14}$	CD_3OD	[39]
7-1-70	(*Z*)-resveratrol 3,5-*O*-*β*-diglucoside	$C_{26}H_{32}O_{13}$	CD_3OD	[40]
7-1-71	(*Z*)-resveratrol 3,5, 4′-*O*-*β*-triglucoside	$C_{32}H_{42}O_{18}$	CD_3OD	[40]
7-1-72	–	$C_{20}H_{21}O_{11}S^-$	D_2O	[41]
7-1-73	–	$C_{20}H_{21}O_{11}S^-$	D_2O	[41]
7-1-74	–	$C_{20}H_{21}O_{11}S^-$	D_2O	[41]
7-1-75	–	$C_{20}H_{21}O_{11}S^-$	D_2O	[41]
7-1-76	–	$C_{20}H_{21}O_{11}S^-$	D_2O	[41]

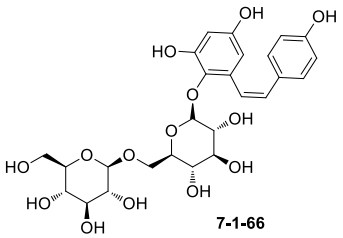
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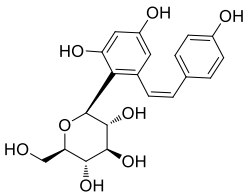
	R^1	R^2	R^3
7-1-61	Me	H	H
7-1-62	H	H	Me
7-1-63	Me	OH	H



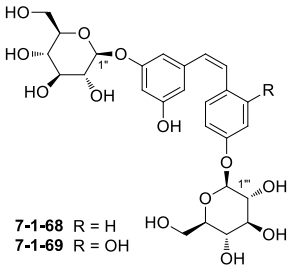
7-1-64 R = Me
7-1-65 R = H



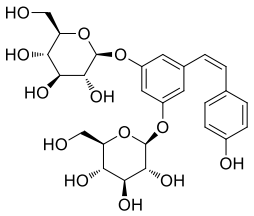
7-1-66



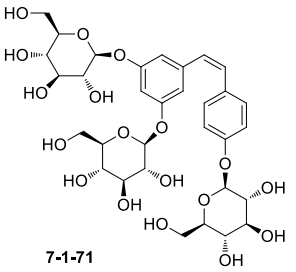
7-1-67



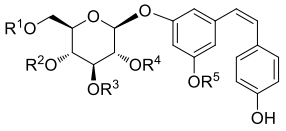
7-1-68 R = H
7-1-69 R = OH



7-1-70



7-1-71



	R^1	R^2	R^3	R^4	R^5
7-1-72	SO_3^-	H	H	H	H
7-1-73	H	SO_3^-	H	H	H
7-1-74	H	H	SO_3^-	H	H
7-1-75	H	H	H	SO_3^-	H
7-1-76	H	H	H	H	SO_3^-

Table 7-1-18: ^{1}H NMR spectroscopic data of simple 1,2-diphenylethenes **7-1-61**~**7-1-65**.

H	7-1-61	7-1-62	7-1-63	7-1-64	7-1-65
2	6.53 s	6.57 d(2.3)	6.46 s	6.31 d(1.6)	6.29 d(2.1)
4				6.27 t(2.3)	6.21 t(2.1)
6	6.53 s	6.42 d(2.3)	6.46 s	6.36 d(1.6)	6.29 d(2.1)
α	6.47 d(12.2)	6.48 d(12.2)	6.45 d(12.2)	6.49 d(12.2)	6.45 d(12.2)
β	6.41 d(12.2)	6.42 d(12.2)	6.52 d(12.2)	6.59 d(12.2)	6.57 d(12.2)
2′	6.93 d(2.0)	6.84 d(2.0)		7.15~7.35 m	7.15~7.30 m
3′				7.15~7.35 m	7.15~7.30 m
4′				7.15~7.35 m	7.15~7.30 m
5′	6.73 d(8.4)	6.75 d(8.0)	6.31 d(8.6)	7.15~7.35 m	7.15~7.30 m
6′	6.80 dd(8.4, 2.0)	6.85 dd(8.0, 2.0)	6.69 d(8.6)	7.15~7.35 m	7.15~7.30 m
3-OMe	3.70 s		3.60 s	3.63 s	
4-OMe	3.87 s	3.86 s	3.76 s		
5-OMe	3.70 s	3.87 s	3.60 s		
3′-OMe		3.68 s			
4′-OMe	3.84 s	3.67 s	3.77 s		
OH	5.51	5.69	5.44 br s		

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Table 7-1-19: ^{1}H NMR spectroscopic data of simple 1,2-diphenylethenes **7-1-66**~**7-1-69**.

H	7-1-66	7-1-67	7-1-68	7-1-69
2			6.46 br s	6.52 d(2)
4	6.46 d(2.3)	6.22 d(2.5)	6.39 br s	6.34 d(2)
6	6.25 d(2.3)	6.14 d(2.5)	6.37 br s	6.38 d(2)
α	6.60 d(12.0)	6.44 d(12)	6.45 d(11.9)	6.40 d(12)
β	6.66 d(12.0)	6.60 d(12)	6.50 d(11.9)	6.55 d(12)
2′	7.16 d(8.5)	7.04 m	7.17 d(8.5)	
3′	6.79 d(8.5)	6.56 m	6.96 d(8.5)	6.59 d(2)
5′	6.79 d(8.5)	6.56 m	6.96 d(8.5)	6.45 dd(8, 2)
6′	7.16 d(8.5)	7.04 m	7.17 d(8.5)	7.01 d(8)
Glu				
1″	4.78 d(7.4)	4.64 d(9.5)	4.61 d(7.2)	4.56 d(7)
2″	3.66 m	3.92 dd(9.5, 9)	3.15~3.48 m	3.10~3.95 m
3″	3.48 dd(9.1, 9.3)	3.39 t(9)	3.15~3.48 m	3.10~3.95 m
4″	3.46 m	3.49 t(9)	3.15~3.48 m	3.10~3.95 m
5″	3.37 m	3.18 ddd(9, 4, 3)	3.15~3.48 m	3.10~3.95 m
6″	3.86 m, 3.39 m	3.71 d(4), 3.72 d(3)	3.68 dd(11.9,5.6)	3.10~3.95 m
			3.66 dd(11.9, 4.7)	
Glu				
1‴	4.73 d(7.0)		4.90 d(7.5)	4.88d(7)
2‴	3.52 m		3.15~3.48 m	3.10~3.95 m
3‴	3.65 m		3.15~3.48 m	3.10~3.95 m
4‴	3.59 m		3.15~3.48 m	3.10~3.95 m
5‴	3.56 m		3.15~3.48 m	3.10~3.95 m
6‴	3.84 m		3.88 dd(11.9, 2.2)	3.10~3.95 m
OH	3.77 dd(12.3, 4.9)		3.72 dd(11.9, 2.5)	

Table 7-1-20: ^{1}H NMR spectroscopic data of simple 1,2-diphenylethenes **7-1-70** and **7-1-71**.

H	7-1-70	7-1-71	H	7-1-70	7-1-71
2	6.66 br s	6.65 d(2.1)	2″	3.30~3.45 m	3.3~3.5 m
4	6.67 br s	6.68 t(2.1)	3″	3.30~3.45 m	3.3~3.5 m
6	6.66 br s	6.65 d(2.1)	4″	3.30~3.45 m	3.3~3.5 m
α	6.38 d(12.1)	6.47 d(12.0)	5″	3.30~3.45 m	3.3~3.5 m
β	6.52 d(12.1)	6.57 d(12.0)	6″	3.80 dd(12.0, 1.0)	3.6~4.0 m
				3.67 dd(12.0, 4.2)	
2′	7.08 d(8.4)	7.18 d(8.5)	Glu		
3′	6.65 d(8.4)	6.99 d(8.5)	1‴		4.91 d(7.5)
5′	6.65 d(8.4)	6.99 d(8.5)	2‴		3.3~3.5 m
6′	7.08 d(8.4)	7.18 d(8.5)	3‴		3.3~3.5 m
Glu			4‴		3.3~3.5 m
1″	4.75 d(7.5)	4.72 d(7.5)	5‴		3.3~3.5 m
			6‴		3.6~4.0 m

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Table 7-1-21: ^{1}H NMR spectroscopic data of simple 1,2-diphenylethenes **7-1-72**~**7-1-76**.

H	7-1-72	7-1-73	7-1-74	7-1-75	7-1-76
2	6.56 t(2.0)	6.53 t(2.0)	6.55 t(2.0)	6.55 t(2.1)	6.88 t(2.0)
4	6.47 t(2.0)	6.45 t(2.0)	6.46 t(2.0)	6.48 t(2.1)	6.97 t(2.0)
6	6.56 t(2.0)	6.53 t(2.0)	6.55 t(2.0)	6.55 t(2.1)	6.88 t(2.0)
α	6.51 d(12.0)	6.53 d(12.2)	6.49 d(12.2)	6.47 d(12.0)	6.52 d(12.1)
β	6.67 d(12.0)	6.61 d(12.2)	6.65 d(12.2)	6.62 d(12.0)	6.66 d(12.1)
2′,6′	7.21 d(8.5)	7.16 d(8.0)	7.19 d(8.4)	7.17 d(8.2)	7.18 d(8.1)
3′,5′	6.84 d(8.5)	6.80 d(8.0)	6.82 d(8.4)	6.80 d(8.2)	6.80 d(8.1)
Glu					
1″	4.59 d(7.6)	4.58 d(7.9)	4.72 d(8.0)	4.68 d(7.9)	4.67 d(7.4)
2″	3.50 (ov)	3.55 dd(7.9, 8.8)	3.63 dd(8.0, 9.2)	4.21 dd(7.9, 8.6)	3.49 (ov)
3″	3.50 (ov)	3.67 dd(8.8, 9.4)	4.28 dd(9.1, 9.2)	3.64 (ov)	3.49 (ov)
4″	3.52 dd(9.0, 9.5)	4.21 dd(9.2, 9.4)	3.71 dd(9.1, 9.4)	3.56 dd(9.6, 9.3)	3.57 dd(9.0, 9.2)
5″	3.37 m	3.20 m	3.25 m	3.17 m	3.22 m
6″	4.16 m	3.76 m	3.76 m	3.67 m	3.70 m

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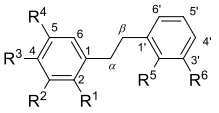
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7.2 1,2-diphenylethanes

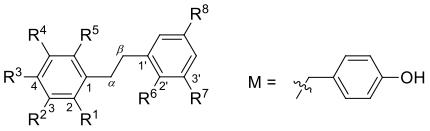
Table 7-2-1: Compounds, MFs, and test solvents of 1,2-diphenylethanes **7-2-1**~**7-2-26**.

No.	Compounds	MFs	Test solvents	References
7-2-1	3,5-dihydroxy-4-methylbibenzyl	$C_{15}H_{16}O_2$	$CDCl_3$	[42]
7-2-2	3,5-dihydroxy-2′-methoxy-4-methylbibenzyl	$C_{16}H_{18}O_3$	$CDCl_3$	[42]
7-2-3	3-hydroxy-2′,5-dimethoxy-2-methylbibenzyl	$C_{17}H_{20}O_3$	C_6D_6	[42]
7-2-4	stilbostemin A	$C_{15}H_{16}O_3$	$CDCl_3$	[42]
7-2-5	stilbostemin C	$C_{15}H_{16}O_3$	$CDCl_3$	[42]
7-2-6	stilbostemin E	$C_{16}H_{18}O_4$	$CDCl_3$	[42]
7-2-7	stilbostemin F	$C_{17}H_{20}O_4$	$CDCl_3$	[42]
7-2-8	4,5-dihydroxy-3,3″-dimethoxybibenzyl	$C_{16}H_{18}O_4$	$CDCl_3$	[42]
7-2-9	4-hydroxy-3,3′,5-trimethoxybibenzyl	$C_{17}H_{20}O_4$	$CDCl_3$	[42]
7-2-10	3,3′,4-trimethoxybibenzyl	$C_{17}H_{20}O_3$	$CDCl_3$	[42]
7-2-11	bulbocodin C	$C_{29}H_{28}O_5$	CD_3OD	[42]
7-2-12	bulbocodin D	$C_{29}H_{28}O_5$	CD_3OD	[42]
7-2-13	bulbocodin	$C_{36}H_{34}O_6$	CD_3OD	[42]
7-2-14	bulbocol	$C_{23}H_{24}O_4$	CD_3OD	[42]
7-2-15	3,3′-dihydroxy-2′,6′-bis(*p*-hydroxybenzyl)-5-methoxybibenzyl	$C_{29}H_{28}O_5$	CD_3OD	[42]
7-2-16	2,6-bis(*p*-hydroxybenzyl)-3′,5-dimethoxy-3-hydroxybibenzyl	$C_{30}H_{30}O_5$	CD_3OD	[42]
7-2-17	3,3′-dihydroxy-5-methoxy-2,5′,6-tris(*p*-hydroxybenzyl)bibenzyl	$C_{36}H_{34}O_6$	CD_3OD	[42]
7-2-18	3,3′-dihydroxy-4-(*p*-hydroxybenzyl)-5-methoxybibenzyl	$C_{22}H_{22}O_4$	CD_3OD	[42]
7-2-19	3,3′-dihydroxy-2-(*p*-hydroxybenzyl)-5-methoxybibenzyl	$C_{22}H_{22}O_4$	CD_3OD	[42]
7-2-20	3′,5-dihydroxy-2-(*p*-hydroxybenzyl)-3-methoxybibenzyl	$C_{22}H_{22}O_4$	CD_3OD	[42]
7-2-21	arundinan	$C_{22}H_{22}O_3$	CD_3COCD_3	[42]
7-2-22	dihydropinosylvindiol	$C_{14}H_{14}O_4$	CD_3COCD_3	[42]
7-2-23	1-(3′,5′-dihydroxyphenyl)-2-(4″-hydroxyphenyl)-ethane-1,2-diol	$C_{14}H_{14}O_5$	CD_3COCD_3	[42]
7-2-24	lespedezol H_1	$C_{14}H_{10}O_6$	–	[42]
7-2-25	tragopogonic acid	$C_{15}H_{12}O_6$	CD_3OD	[42]
7-2-26	typhaphthalide	$C_{15}H_{12}O_3$	–	[42]

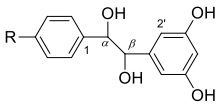
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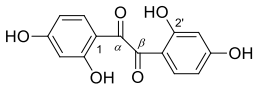
	R^1	R^2	R^3	R^4	R^5	R^6
7-2-1	H	OH	Me	OH	H	H
7-2-2	H	OH	Me	OH	OMe	H
7-2-3	Me	OH	H	OMe	OMe	H
7-2-4	H	OH	H	OH	OMe	H
7-2-5	H	OH	Me	OH	OH	H
7-2-6	H	OH	H	OMe	OMe	OH
7-2-7	Me	OH	H	OMe	OMe	OH
7-2-8	H	OMe	OH	OH	H	OMe
7-2-9	H	OMe	OH	OMe	H	OMe
7-2-10	H	OMe	OMe	H	H	OMe



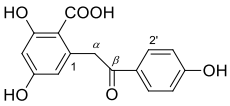
	R^1	R^2	R^3	R^4	R^5	R^6	R^7	R^8
7-2-11	M	OMe	M	OH	H	H	OH	H
7-2-12	M	OH	M	OMe	H	H	OH	H
7-2-13	M	OH	H	OMe	M	OH	H	M
7-2-14	M	OMe	H	OH	H	H	OMe	H
7-2-15	M	OMe	H	OH	M	H	OH	H
7-2-16	M	OMe	H	OH	M	H	OMe	H
7-2-17	M	OMe	H	OH	M	H	OH	M
7-2-18	H	OH	M	OMe	H	H	OH	H
7-2-19	M	OH	H	OMe	H	H	OH	H
7-2-20	M	OMe	H	OH	H	H	OH	H
7-2-21	M	OH	H	OMe	H	H	H	H



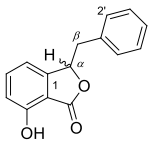
7-2-22 R = H
7-2-23 R = OH



7-2-24



7-2-25



7-2-26

Table 7-2-2: ^{1}H NMR spectroscopic data of 1,2-diphenylethanes **7-2-1**~**7-2-5**.

H	7-2-1	7-2-2	7-2-3	7-2-4	7-2-5
α	2.81 m	2.78 m	2.94 m	2.78 m	2.78 m
β	2.81 m	2.78 m	2.94 m	2.87 m	2.87 m
2	6.23 s	6.26 s		6.28 d(2.3)	6.26 s
3				4.76 s(OH)	4.66 s(OH)
4			6.01 d(2.4)	6.19 dd(2.3, 2.3)	
5				4.76 s(OH)	4.66 s(OH)
6	6.24 s	6.26 s	6.50 d(2.4)	6.28 d(2.3)	6.26 s
2′	7.18 m				4.58 s(OH)
3′	7.27 dd(7.4, 7.0)	6.85 m	6.57 dd(7.7, 1.7)	6.86 dd(7.9,1.5)	6.75 dd(7.6, 1.5)
4′	7.18 m	7.18 ddd(7.9, 7.8, 1.2)	7.09 ddd(7.7, 7.6, 1.7)	7.19 ddd(7.9, 8.1, 1.8)	7.08 ddd(7.6, 7.6, 1.7)
5′	7.27 dd(7.4,7.0)	6.86 m	6.84 ddd(7.1, 7.6, 1.2)	6.88 ddd(8.1, 8.1, 1.5)	6.86 ddd(7.6, 7.6, 1.5)
6′	7.18 m	7.10 d(7.8)	7.03 dd(7.1, 1.2)	7.10 dd(8.1, 1.8)	7.10 dd(7.6, 1.7)
Me	2.10 s	2.10 s	2.16 s		2.11 s
2′-OMe	–	3.82 s	3.31 s	3.83 s	
5-OMe			3.37 s		

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Table 7-2-3: ^{1}H NMR spectroscopic data of 1,2-diphenylethanes **7-2-6**~**7-2-10**.

H	7-2-6	7-2-7	7-2-8	7-2-9	7-2-10
α	2.84 m	2.86 m	2.82 m	2.82 m	2.87 m
β	2.90 m	2.86 m	2.84 m	2.82 m	2.87 m
2	6.31 m		6.26 d(1.7)	6.36 s	6.66 d(1.9)
4	6.27 dd(2.3, 2.3)	6.28 d(2.5)			
5					6.79 d(8.0)
6	6.37 m	6.37 d(2.5)	6.50 d(1.7)	6.36 s	6.73 dd(8.0, 1.9)
2′			6.76 d(1.1)	6.76 br s	6.72(ov)
3′	5.53 s(OH)	5.53 br s(OH)			
4′	6.83 dd(8.4, 2.0)	6.84 dd(8.5, 2.0)	6.79 m	6.79 m	6.78 dd(8.0, 2.0)
5′	6.96 dd(8.4, 8.4)	6.97 dd(8.5, 8.5)	7.22 ddd(7.8, 7.8, 1.1)	7.18 br dd(7.5, 7.5)	7.20 t(7.7)
6′	6.74 dd(8.4, 2.0)	6.76 dd(8.5, 2.0)	6.81 m	6.80 m	6.74 ddd(8.0, 2.5, 1.5)
Me		2.17 s			
3-OMe			3.80 s	3.82 s	3.86 s①
4-OMe					3.83 s①
5-OMe	3.75 s	3.74 s		3.82 s	
2′-OMe	3.77 s	3.79 s			
3′-OMe					
3-OH	4.70 br s	4.07 br s	3.81 s	3.78 s	3.78 s①

① Assignments bearing the same superscript may be exchanged.

Table 7-2-4: ^{1}H NMR spectroscopic data of 1,2-diphenylethanes **7-2-11**~**7-2-14**.

H	7-2-11	7-2-12	7-2-13	7-2-14
α	2.59 m①	2.59 m①	2.43~2.46 m①	2.56~2.64 m①
β	2.66 m①	2.77 m①	2.67~2.70 m①	2.70~2.75 m①
4			6.45 s	6.34 d(2.6)
6	6.56 s	6.33 s		6.27 d(2.6)
2′	6.50 m	6.53 m		6.55 dd(2.1, 1.7)
3′			6.57 d(8.2)	
4′	6.57 dd(8.4, 2.2)	6.57 dd(8.2, 2.3)	6.53 dd(8.2, 3.3)	6.69 dd(7.9, 1.7)
5′	7.01 t(8.4)	7.02 t(8.2)		7.11 t(7.9)
6′	6.50 m	6.53 m	6.58 d(3.3)	6.64 m
7″	3.86 s	3.94 s	3.58 s①	3.83 s
2″,6″	6.85 d(8.5)	6.90 d(8.5)	6.78 d(8.3)	6.86 d(8.6)
3″,5″	6.64 d(8.5)	6.62 d(8.5)	6.64 d(8.3)(ov)	6.63 d(8.6)
7‴	3.91 s	3.90 s	3.81 s①	
2‴,6‴	7.03 d(8.5)	7.01 d(8.5)	6.86 d(8.3)	
3‴,5‴	6.64 d(8.5)	6.65 d(8.5)	6.64 d(8.3)(ov)	
7⁗			3.86 s①	
2⁗,6⁗			6.76 d(8.3)	
3⁗,5⁗			6.60 d(8.3)	
3-OMe	3.44 s			3.74 s
5-OMe		3.68 s	3.73 s	
3′-OMe				3.72 s

① Assignments bearing the same superscript may be exchanged in each column.

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Table 7-2-5: ^{1}H NMR spectroscopic data of 1,2-diphenylethanes **7-2-15**~**7-2-18**.

H	7-2-15	7-2-16	7-2-17	7-2-18
α	2.26~2.31 m①	2.23~2.37 m①	2.42~2.47 m①	2.78 m
β	2.66~2.71 m①	2.64~2.73 m①	2.64~2.68 m①	2.78 m
2				6.25 d(1.3)
4	6.49 s	6.49~7.15 m	6.46 s	
6				6.30 d(1.3)
2′	6.50 dd(2.0,2.0)	6.49~7.15 m	6.49 d(2.7)	6.61 t(2.0)
4′	6.48 ddd(8.5, 2.0, 2.0)	6.49~7.15 m	6.53 d(2.7)	6.58 dd(7.5, 2.0)
5′	7.02 t(8.5)			7.04 t(7.7, 7.5)
6′	6.56 ddd(8.5, 2.0, 2.0)	6.49~7.15 m	6.58 d(2.7)	6.64 d(7.7)
7″	3.91 s②	3.91 s②	3.57 s②	3.79 s
2″,6″	6.86 d(8.5)③	6.49~7.15 m	6.77 d(8.8)③	7.01 d(8.6)
3″,5″	6.62 d(8.5)④	6.49~7.15 m	6.58 d(8.8)④	6.59 d(8.6)
7‴	3.94 s②	3.94 s②	3.81 s②	
2‴,6‴	6.94 d(8.5)③	6.49~7.15 m	6.79 d(8.5)③	
3‴,5‴	6.64 d(8.5)④	6.49~7.15 m	6.60 d(8.5)④	
7⁗			3.85 s②	
2⁗,6⁗			6.86 d(8.8)③	
3⁗,5⁗			6.64 d(8.8)④	
3-OMe	3.76 s	3.73 s	3.73 s	3.69 s
5-OMe		3.77 s		

①, ②, ③, and ④Assignments bearing the same superscript may be exchanged in each column.

Table 7-2-6: ^{1}H NMR spectroscopic data of 1,2-diphenylethanes **7-2-19**~**7-2-21**.

H	7-2-19	7-2-20	7-2-21	H	7-2-19	7-2-20	7-2-21
α	2.55 m①	2.56 m①	2.79 m	5′	7.03 t(7.9)	7.03 t(8.2)	7.23 t(7.5)
β	2.72 m①	2.71 m①	2.68 m	6′	6.56 dd(7.9, 2.3)	6.57 dt(8.2, 1.7)	7.14 m
4	6.30 d(2.6)	6.33 d(2.1)	6.39 d(2.5)	7″	3.87 s	3.84 s	3.93 s
6	6.24 d(2.6)	6.28 d(2.1)	6.35 d(2.5)	2″,6″	6.93 d(8.6)	6.86 d(8.6)	6.99 d(8.5)
2′	6.54 t(2.3)	6.54 m	7.14 m	3″,5″	6.64 d(8.6)	6.63 d(8.6)	6.68 d(8.5)
3′			7.23 t(7.5)	3-OMe		3.74 s	
4′	6.56 dd(7.9, 2.3)	6.54 m	7.14 m	5-OMe	3.70 s		3.69 s

①Assignments bearing the same superscript may be exchanged in each column.

Table 7-2-7: ^{1}H NMR spectroscopic data of 1,2-diphenylethanes **7-2-22**~**7-2-26**.

H	7-2-22	7-2-23	7-2-24	7-2-25	7-2-26
α	4.72 dd(6.0, 4.4)	4.52 d(7.6)		4.64 br s	5.68 t(6.5, 6.3)
β	4.63 d(6.0, 4.4)	4.41 d(7.6)			3.22 dd(6.7, 14)
2	7.28 br d(8.0)	7.24 d(8.5)			

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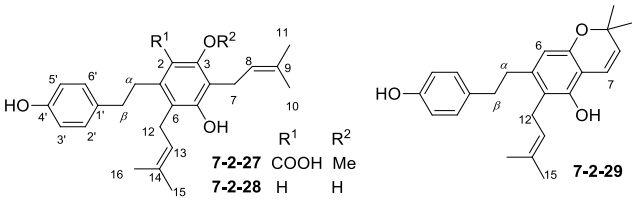
Table 7-2-7 (continued)

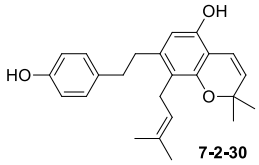
H	7-2-22	7-2-23	7-2-24	7-2-25	7-2-26
3	7.19 m	6.66 d(8.5)	6.47 d(2)		
4	7.19 m			6.18 d(2.5)	6.63 d(7.4)
5	7.19 m	6.66 d(8.5)	6.50 dd(9, 2)		7.46 t(7.9)
6	7.28 d(8.0)	7.24 d(8.5)	7.47 d(9)	6.10 d(2.5)	6.87 d(8.2)
2′	6.30 br d(2.4)	6.16 br s		7.95 d(8.5)	7.19~7.30 m
3′			6.47 d(2)	6.83 d(8.5)	7.19~7.30 m
4′	6.20 t(2.4)	6.16 br s			7.19~7.30 m
5′			6.50 dd(9, 2)	6.83 d(8.5)	7.19~7.30 m
6′	6.30 d(2.4)	6.16 br s	7.47 d(9)	7.95 d(8.5)	7.19~7.30 m
OH	4.08 d(4.4), 4.05 d(4.4), 7.97 s				7.71 br s

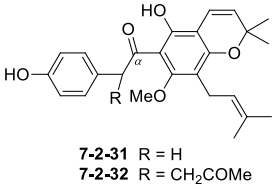
Table 7-2-8: Compounds, MFs, and test solvents of 1,2-diphenylethanes **7-2-27**~**7-2-40**.

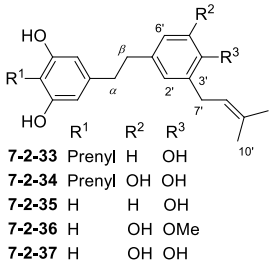
No.	Compounds	MFs	Test solvents	References
7-2-27	2-carboxy-3-methoxy-4,6-di(3-methyl-2-butenyl)-5,4′-dihydr-oxy-bibenzyl	$C_{26}H_{32}O_5$	$CDCl_3$	[42]
7-2-28	2,4-di(3-methyl-2-butenyl)-3,5,4′-trihydroxybibenzyl	$C_{24}H_{30}O_3$	$CDCl_3$	[42]
7-2-29	2,2-dimethyl-5-hydroxy-6-(3-methyl-2-butenyl)-7-[2-(4′-hydr-oxyphenyl)-ethyl]-chromene	$C_{24}H_{28}O_3$	$CDCl_3$	[42]
7-2-30	2,2-dimethyl-5-hydroxyl-7-[2-(4′-hydroxyphenyl)-methyl]-8-(3-ethyl-2-butenyl)-chromene	$C_{24}H_{28}O_3$	CD_3OD	[42]
7-2-31	6,4′-dihydroxy-3-(3,3-dimethylallyl)-2″,2″-dimethylchromene(5″,6″:5,4)-2-methoxy deoxybenzoin	$C_{25}H_{28}O_5$	$CDCl_3$	[42]
7-2-32	6,4′-dihydroxy-3-(3,3-dimethylallyl)-2″,2″-dimethylchromene(5″,6″:5,4)-2-methoxy-8-(propyl-2-one)deoxybenzoin	$C_{28}H_{32}O_6$	$CDCl_3$	[42]
7-2-33	α,α′-dihydro-3,5,4′-trihydroxy-4,5′-diisopentenylstilbene	$C_{24}H_{30}O_3$	–	[42]
7-2-34	α,α′-dihydro-3,5,3′,4′-tetrahydroxy-4,5′-diisopentenylstilbene	$C_{24}H_{30}O_4$	–	[42]
7-2-35	α,α′-dihydro-3,5,4′-trihydroxy-5′-isopentenylstilbene	$C_{19}H_{22}O_3$	–	[42]
7-2-36	α,α′-dihydro-3,5,3′-trihydroxy-4′-methoxy-5′-isopentenylstilbene	$C_{20}H_{24}O_4$	–	[42]
7-2-37	α,α′-dihydro-3,5,3′,4′-tetrahydroxy-5′-isopentenylstilbene	$C_{19}H_{22}O_4$	–	[42]
7-2-38	carexane A	$C_{20}H_{22}O_3$	CD_3OD	[42]
7-2-39	carexane B	$C_{20}H_{20}O_4$	CD_3OD	[42]
7-2-40	carexane C	$C_{20}H_{20}O_4$	CD_3OD	[42]

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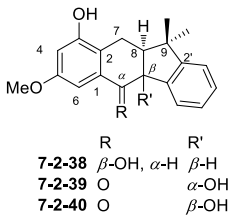


Table 7-2-9: ^{1}H NMR spectroscopic data of 1,2-diphenylethanes **7-2-27**~**7-2-30**.

H	7-2-27	7-2-28	7-2-29	7-2-30
6		6.26 s	6.28 s	6.16 s
7	3.44 d(7.1)	3.39 d(7.0)	6.61 d(9.8)	6.60 d(9.8)
8	5.25 m	5.25 m	5.53 d(9.8)	5.48 d(9.8)
10	1.75 s	1.74 s	1.41 s	1.33 s
11	1.82 s	1.81 s	1.41 s	1.33 s
12	3.36 d(6.3)	3.28 d(6.7)	3.25 d(6.7)	3.17 d(6.7)
13	5.06 m	5.11 m	5.09 m	4.99 m
15	1.68 s	1.68 s	1.75 s	1.62 s
16	1.77 s	1.80 s	1.81 s	1.71 s
α	3.13 m	2.75 br s	2.75 br s	2.68 br s
β	2.74 m	2.75 br s	2.75 br s	2.68 br s
2′,6′	7.08 d(8.4)	7.03 d(8.5)	7.01 d(8.4)	6.94 d(8.4)
3′,5′	6.78 d(8.4)	6.75 d(8.5)	6.73 d(8.3)	6.68 d(8.4)
OMe	3.95 s	–	–	–
OH	11.61 s, 6.05 s, 4.83 s	5.43 s	5.37 s, 4.87 s	

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Table 7-2-10: ^{1}H NMR spectroscopic data of 1,2-diphenylethanes **7-2-31** and **7-2-32**.

H	7-2-31	7-2-32	H	7-2-31	7-2-32
7	6.66 d(10.0)	6.53 d(10.1)	β	4.32 s	5.34 dd(10.5, 4.0)
8	5.51 d(10.0)	5.37 d(10.1)	2′,6′	7.12 d(8.5)	7.05 d(8.4)
10	1.44 s	1.34 s	3′,5′	6.80 d(8.5)	6.61 d(8.4)
11	1.44 s	1.29 s	OMe	3.74 s	3.69 s
12	3.25 d(6.9)	3.16 dd(14.5, 7.0)	β-CH_2		3.50 dd(17.8, 10.5)
		3.03 dd(14.5, 7.0)			2.57 dd(17.8, 4.0)
13	5.17 td(6.9)	5.02 m	CH_3		2.12 s
15	1.70 s	1.58 s	OH	13.20 s	12.89
16	1.79 s	1.66 s			

Table 7-2-11: ^{1}H NMR spectroscopic data of 1,2-diphenylethanes **7-2-33**~**7-2-37**.

H	7-2-33	7-2-34	7-2-35	7-2-36	7-2-37
2,6	6.25 br s	6.24 br s	6.21 d(2)	6.24 d(2)	6.19 d(2)
4			6.18 d(2)	6.20 d(2)	6.17 d(2)
7	3.40 d(7)	3.38 d(7)			
8	5.27 t(7)	5.25 t(7)			
10	1.83 br s	1.82 br s			
11	1.77 br s	1.75 br s			
α	2.75 m	2.70 m	2.70 m	2.73 m	2.66 m
β	2.75 m	2.70 m	2.70 m	2.73 m	2.66 m
2′	6.92 dd(2, 8)	6.46 d(2)	6.92 dd(2, 8)	6.61 d(2)	6.56 d(2)
3′	6.73 d(8)	–	6.83 d(8)		
6′	6.90 d(2)	6.59 d(2)	6.92 d(2)	6.48 d(2)	6.46 d(2)
7′	3.34 d(7)	3.31 d(7)	3.27 d(7)	3.31 d(7)	3.27 d(7)
8′	5.32 t(7)	5.28 t(7)	5.31 t(7)	5.24 t(7)	5.26 t(7)
10′	1.78 br s	1.78 br s	1.69 br s	1.74 br s	1.74 s
11′	1.78 br s	1.78 br s	1.69 br s	1.72 br s	1.73 s
OMe				3.76 s	

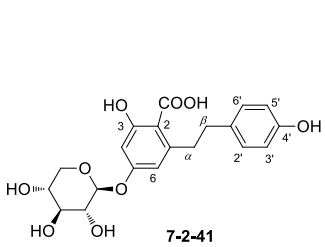
Table 7-2-12: ^{1}H NMR spectroscopic data of 1,2-diphenylethanes **7-2-38**~**7-2-40**.

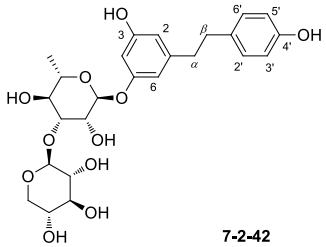
H	7-2-38	7-2-39	7-2-40	H	7-2-38	7-2-39	7-2-40
4	6.28 d(2.9)	6.63 d(2.4)	6.62 d(2.4)	α	4.49 d(8.1)		
6	6.69 d(2.9)	6.93 d(2.4)	7.11 d(2.4)	β	3.35 dd(8.1, 7.8)		
7α	3.09 dd(14.4, 5.4)	3.04 d(4.8)	3.09 dd(16.5, 10.8)	3′	7.18 m	7.18 m	7.31 m
7β	1.86 dd(14.4, 11.4)		2.94 dd(16.5, 5.4)	4′	7.20 m	7.28 m	7.35 m
8	2.16 ddd(11.4, 7.8, 5.4)	2.72 t(4.8)	2.22 dd (10.8, 5.4)	5′	7.20 m	7.23 m	7.26 m
10	1.34 s	0.75 s	1.39 s	6′	7.61 m	7.65 m	7.90 m
11	1.21 s	1.43 s	1.42 s	OMe	3.75 s	3.74 s	3.74 s

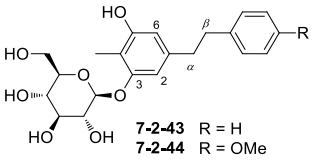
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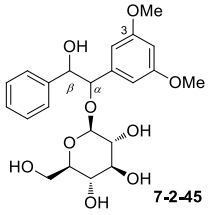
Table 7-2-13: Compounds, MFs, and test solvents of 1,2-diphenylethanes **7-2-41**~**7-2-53**.

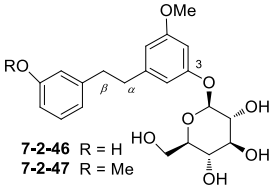
No.	Compounds	MFs	Test solvents	References
7-2-41	2-carboxyl-3,4′-dihydroxy-5-*β*-D-xylopyranosyloxybibenzyl	$C_{20}H_{22}O_9$	CD_3OD	[42]
7-2-42	5,4′-dihydroxy-3-*α*-L-rhamnosyl-(1″ →3′)-*β*-D-xylopyranosyloxy-bibenzyl	$C_{25}H_{32}O_{11}$	CD_3OD	[42]
7-2-43	stilbostemin B 3′-*β*-D-glucopyranoside	$C_{21}H_{26}O_7$	CD_3OD	[42]
7-2-44	stilbostemin H 3′-*β*-D-glucopyranoside	$C_{22}H_{28}O_8$	CD_3OD	[42]
7-2-45	stilbostemin I 2″-*β*-D-glucopyranoside	$C_{22}H_{28}O_9$	CD_3OD	[42]
7-2-46	batatsin III-3-*O*-glucoside	$C_{21}H_{26}O_8$	CD_3OD	[42]
7-2-47	3′,5-dimethoxy-bibenzyl-3-*O*-*β*-D-glucopyranoside	$C_{22}H_{28}O_8$	CD_3OD	[42]
7-2-48	tyrolobibenzyl A	$C_{23}H_{24}O_9$	CD_3OD	[42]
7-2-49	tyrolobibenzyl B	$C_{23}H_{24}O_{10}$	CD_3OD	[42]
7-2-50	tyrolobibenzyl C	$C_{22}H_{26}O_9$	CD_3OD	[42]
7-2-51	tyrolobibenzyl F	$C_{29}H_{34}O_{15}$	CD_3OD	[42]
7-2-52	tyrolobibenzyl E	$C_{28}H_{36}O_{14}$	CD_3OD	[42]
7-2-53	–	$C_{20}H_{22}O_{10}$	D_2O	[42]

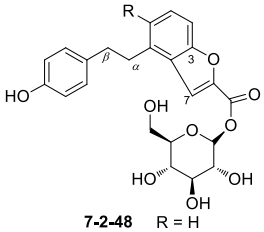


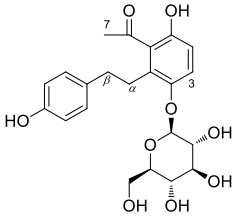


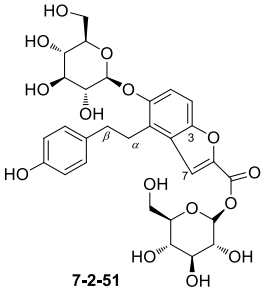




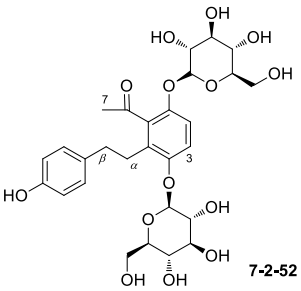




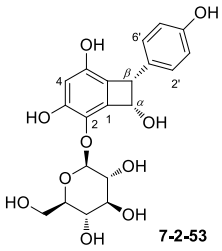




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7-2-52



7-2-53

Table 7-2-14: ^{1}H NMR spectroscopic data of 1,2-diphenylethanes **7-2-41**~**7-2-45**.

H	7-2-41	7-2-42	7-2-43	7-2-44	7-2-45
2		6.29 m(ov)	6.32 s	6.30 s	6.30 s
4	6.37 d(2.5)	6.30 m(ov)			6.30 s
6	6.24 d(2.5)	6.29 m(ov)	6.46 s	6.42 s	6.30 s
α	3.35 m(ov), 3.23 m(ov)		2.78 m	2.75 m	5.06 s
β	2.77 m(ov)	2.75 m(ov)	2.89 m	2.83 m	5.06 s
2′,6′	7.02 d(8.5)	6.97 d(8.5)	7.24 m	7.05 d(8.6)	7.21 m
3′,5′	6.67 d(8.5)	6.68 d(8.5)	7.15 m	6.80 d(8.6)	7.14 m
4′			7.15 m	–	7.21 m
OMe				3.74 s	3.62 s
1″	4.77 d,(7.0)	4.83 (ov)	4.75 d(7.4)	4.73 d(7.5)	4.16 d(7.4)
2″	3.41 m(ov)	3.62 m	3.40 m	3.37 m	3.27 m
3″	3.42 m(ov)	3.54 m(ov)	3.45 m	3.44 m	3.33 m
4″	3.55 m(ov)	3.53 m(ov)	3.37 m	3.31 m	3.26 m
5″	3.90 dd(11.0, 5.0)	3.89 m	3.43 m	3.37 m	3.09 m
	3.33 m(ov)	3.28 m			
6″			3.87 dd(1.6, 13.0)	3.86 dd(2.0, 12.1)	3.87 dd(2.1, 11.9)
			3.69 dd(5.1, 12.1)	3.69 dd(5.2, 12.0)	3.67 dd(6.0, 11.9)
1‴		5.24 d(1.5)			
2‴		3.94 m(ov)			
3‴		3.94 m(ov)			
4‴		3.39 m			
5‴		3.97 m(ov)			
6‴		1.28 d(6.0)			
4-Me			2.07 s	2.06 s	

Table 7-2-15: ^{1}H NMR spectroscopic data of 1,2-diphenylethanes **7-2-46**~**7-2-50**.

H	7-2-46	7-2-47	7-2-48	7-2-49	7-2-50
2	6.52 t(2.0)	6.52 t(2.0)			
3					7.21 d(9.0)
4	6.51 t(2.0)	6.50 t(2.0)	7.18 dd(8.0, 1.0)	7.10 br d(9.0)	6.73 d(9.0)
5			7.41 dd(8.0, 8.0)	7.14 br d(9.0)	

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Table 7-2-15 (continued)

H	7-2-46	7-2-47	7-2-48	7-2-49	7-2-50
6	6.40 t(2.0)	6.40 t(2.0)	6.96 dd(8.0, 1.0)		
7			6.04 s	6.02 s	2.33 s
α	2.83 m	2.84 m	3.75 m, 3.11 m	3.58 m, 3.33 m	2.91 m, 2.80 m
β	2.83 m	2.84 m	2.89 m, 2.77 m	2.76 m	2.80 m, 2.80 m
2′	6.59 t(2.0)	6.70 br d(1.7)	6.97①, 6.98①	7.15①, 7.14①	7.06①, 7.05①
3′			6.66①, 6.67①	6.73①, 6.72①	6.75①, 6.74①
4′	6.61 dd(7.5, 2.8)	6.73 dd(8.6, 1.7)			
5′	7.05 t(7.7, 7.5)	7.14 t(8.6, 7.7)	6.66①, 6.67①	6.73①, 6.72①	6.75①, 6.74①
6′	6.63 br d(7.7)	6.74 br d(7.7)	6.97①, 6.98①	7.15①, 7.14①	7.06①, 7.05①
1″	4.81 d(7.3)	4.80 d(7.3)	5.40 d(8.0)	5.33 d(8.0)	4.90 d(8.0)
2″	3.36~3.47 m	3.35~3.47 m	3.59 m	3.62 dd(8.0, 8.0)	3.57 dd(9.5, 8.0)
3″	3.36~3.47 m	3.35~3.47 m	3.51 dd(9.0, 9.0)	3.53 dd(9.0, 9.0)	3.52 m
4″	3.36~3.47 m	3.35~3.47 m	3.44 dd(9.0, 9.0)	3.40 m	3.46 m
5″	3.36~3.47 m	3.35~3.47 m	3.57 m	3.48 br d(9.0)	3.46 m
6″	3.71 dd(12.0, 5.6)	3.69 dd(12.0, 5.6)	3.94 dd(12.5, 2.5)	3.96 dd(12.5, 2.5)	3.96 dd(12.0, 1.5)
	3.88 dd(12.0, 2.1)	3.88 dd(12.0, 2.1)	3.75 dd(12.5, 5.5)	3.78 dd(12.5, 5.5)	3.77 dd(12.0, 5.0)
5-OMe	3.73 s	3.72 s			
3′-OMe		3.74 s			

① AA′XX′ spin-spin coupling system.

Table 7-2-16: ^{1}H NMR spectroscopic data of 1,2-diphenylethanes **7-2-51**~**7-2-53**.

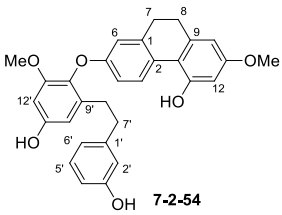
H	7-2-51	7-2-52	7-2-53	H	7-2-51	7-2-52	7-2-53
3		7.24 d(9.0)		2″	3.59 m	3.53 m	3.74 dd(7.6, 9.2)
4	7.23 d(9.0)	7.09 d(9.0)	6.37 s	3″	3.57 m	3.35~3.47 m	3.56 dd(9.1, 9.2)
5	7.58 d(9.0)			4″	3.64 m	3.35 m	3.22 dd(9.4, 9.2)
7	6.05 s	2.35 s		5″	3.42 m	3.35~3.47 m	3.12 m
α	3.60 m	2.83 m, 2.74 m	4.46 s	6″	3.95 dd(12.0, 2.0)	3.91 dd(12.0, 2.0)	3.65 dd(11.4, 2.0)
					3.75 dd(12.0, 5.5)	3.71 dd(12.0, 5.0)	3.31 m
β	2.80 m, 2.71 m	2.74 m	4.89 s	1‴	4.93 d(8.0)	4.85 d(7.5)	
2′	7.22①, 7.20①	6.99①, 6.96①	7.18 d(8.2)	2‴	3.57 m	3.38 m	
3′	6.72①, 6.70①	6.67①, 6.64①	6.83 d(8.2)	3‴	3.49 m	3.35~3.47 m	
5′	6.72①, 6.70①	6.67①, 6.64①	6.83 d(8.2)	4‴	3.41 m	3.42 m	
6′	7.22①, 7.20①	6.99①, 6.96①	7.18 d(8.2)	5‴	3.42 m	3.35~3.47 m	
1″	5.39 d(8.0)	4.91 d(7.5)	4.83 d(7.8)	6‴	3.88 dd(12.0, 2.0)	3.87 dd(12.0, 2.0)	
					3.70 dd(12.0, 5.5)	3.67 dd(12.0, 5.5)	

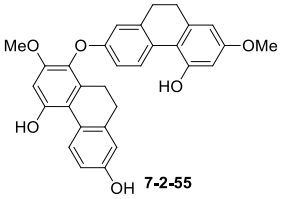
① AA′XX′ spin-spin coupling system.

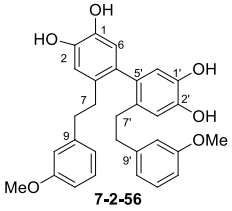
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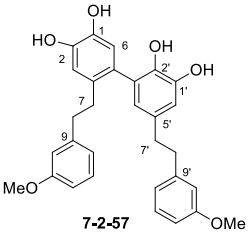
Table 7-2-17: Compounds, MFs, and test solvents of 1,2-diphenylethanes **7-2-54**~**7-2-61**.

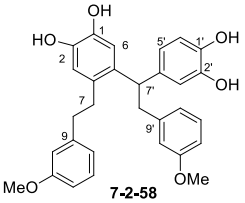
No.	Compounds	MFs	Test solvents	References
7-2-54	phoyunnanin D	$C_{30}H_{28}O_6$	CD_3COCD_3	[42]
7-2-55	phoyunnanin E	$C_{30}H_{26}O_6$	CD_3COCD_3	[42]
7-2-56	plagilin	$C_{30}H_{30}O_6$	CD_3OD	[42]
7-2-57	isoplagilin	$C_{30}H_{30}O_6$	CD_3OD	[42]
7-2-58	plagiolin	$C_{30}H_{30}O_6$	CD_3OD	[42]
7-2-59	isoplagiochin G	$C_{35}H_{26}O_7$	CD_3OD	[42]
7-2-60	riccardin C	$C_{28}H_{24}O_4$	$CDCl_3$	[42]
7-2-61	riccardin F	$C_{29}H_{26}O_4$	$CDCl_3$	[42]

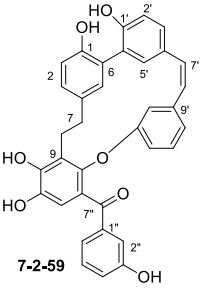












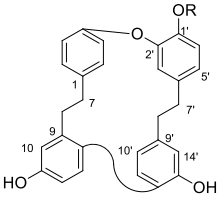


Table 7-2-18: ^{1}H NMR spectroscopic data of 1,2-diphenylethanes **7-2-54**~**7-2-57**.

H	7-2-54	7-2-55	7-2-56	7-2-57
3	8.27 d(8.7)	8.26 d(8.7)	6.70 s	6.81 s
4	6.64 dd(8.7, 2.8)	6.64 dd(8.7, 2.8)		
6	6.69 d(2.8)	6.69 d(2.8)	6.56 s	6.65 s

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Table 7-2-18 (continued)

H	7-2-54	7-2-55	7-2-56	7-2-57
7	2.69 m	2.68 m	2.42~2.60 m	2.62 s
8	2.69 m	2.68 m	2.42~2.60 m	2.62 s
10			6.35 t(1.3)	6.42 br s
12	6.43 d(2.5)	6.43 d(2.5)	6.60 dd(2.6, 8.4)	6.66 dd(2.2, 8.4)
13			7.02 t(7.7)	7.08 t(7.7)
14	6.38 d(2.5)	6.38 d(2.5)	6.51 br d(7.5)	6.49 d(7.5)
2′	6.63 m			
3′		8.29 d(8.2)	6.70 s	6.75 s
4′	6.61 ddd(7.8, 2.5, 0.9)	6.72 dd(8.2, 2.7)		
5′	7.02 t(7.8)			6.34 d(1.3)
6′	6.59 dd(7.8, 0.9)	6.70 d(2.7)	6.56 s	
7′	2.73 m	2.62 m	2.42~2.60 m	2.83 m
8′	2.73 m	2.62 m	2.42~2.60 m	2.83 m
10′			6.35 t(1.3)	6.69 s
12′	6.50 d(2.7)	6.68 s	6.60 dd(2.6, 8.4)	6.70 d
13′			7.02 t(7.7)	7.14 t(8.0)
14′	6.41 d(2.7)		6.51 br d(7.5)	6.74 d
11-OMe			3.64 s	3.69 s
13-OMe	3.80 s	3.72 s		
11′-OMe	3.70 s		3.64 s	3.75 s
13′-OMe		3.74 s		

Table 7-2-19: ^{1}H NMR spectroscopic data of 1,2-diphenylethanes **7-2-58**~**7-2-61**.

H	7-2-58	7-2-59	7-2-60	7-2-61
2		6.75 d(8.4)	6.72~6.80 m	6.76 m
3	6.47 s	7.02 dd(2.4, 8.2)	6.87 br s	6.76 m
5		6.47 d(2.2)	6.87 br s	6.76 m
6	6.88 s		6.72~6.80 m	6.76 m
7	2.57 m	2.74 m	2.88 m, 2.95 m	2.80 m
8	2.43 m	2.74 m	2.23~2.75 m, 3.03 m	2.80 m
10	6.51 m		6.96 d(2.9)	6.92 d(2.7)
12	6.68 dd(2.7,8.4)	6.92 s	6.79 dd(8.6, 2.9)	6.75 m(ov)
13	7.10 t(8.0)		7. 03 d(8.6)	6.97 d(8.4)
14	6.60~6.62 m			
2′		6.85 d(8.4)		
3′	6.60~6.62 m	7.11 dd(2.2, 8.4)	5.35 d(2.0)	5.40 d(1.8)
5′	6.45 dd(2.0, 8.2)	7.25 d(2.2)	6.73 dd(8.1, 2.0)	6.72 m(ov)
6′	6.60~6.62 m		6.92 d(8.1)	6.89 d(8.2)
7′	4.19 t(7.6)	6.50 s	2.23~2.75 m	2.80 m
8′	3.13 m	6.50 s	2.23~2.75 m	2.80 m
10′	6.51 m	6.86 br s	6.23 dd(7.8, 1.7)	6.20 dd(7.9, 1.5)
11′			6.77 d(7.8)	6.75 d(7.9)(ov)

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Table 7-2-19 (continued)

H	7-2-58	7-2-59	7-2-60	7-2-61
12′	6.63 dd	6.30 dd(2.2, 8.4)		
13′	7.04 t(8.0)	7.08 t(8.0)		
14′	6.60~6.62 m	6.63 br d(7.5)	6.39 d(1.7)	6.40 d①
2″		7.02 d(1.8)		
4″		6.94 dd(2.2, 8.4)		
5″		7.19 t(8.0)		
6″		7.09 d(8.0)		
11-Ome	3.70 s			
1′-OMe				3.94 s
11′-OMe	3.61 s			
OH			4.84 br s, 5.22 br s, 5.64 br s	

① The coupling constant was not given in the literature.

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7.3 2-phenylbenzofurans

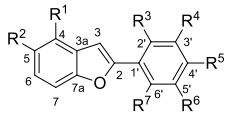
Table 7-3-1: Compounds, MFs, and test solvents of 2-phenylbenzofurans **7-3-1**~**7-3-58**.

No.	Compounds	MFs	Test solvents	References
7-3-1	stemofuran A	$C_{14}H_{10}O_3$	CD_3COCD_3	[68]
7-3-2	stemofuran B	$C_{15}H_{12}O_4$	CD_3COCD_3	[68]
7-3-3	stemofuran C	$C_{15}H_{12}O_3$	CD_3COCD_3	[68]
7-3-4	stemofuran D	$C_{16}H_{14}O_4$	CD_3COCD_3	[68]
7-3-5	stemofuran E	$C_{17}H_{16}O_4$	CD_3COCD_3	[68]
7-3-6	stemofuran F	$C_{18}H_{18}O_4$	CD_3COCD_3	[68]
7-3-7	stemofuran G	$C_{18}H_{18}O_4$	CD_3COCD_3	[68]
7-3-8	stemofuran H	$C_{19}H_{20}O_4$	CD_3COCD_3	[68]
7-3-9	stemofuran I	$C_{19}H_{20}O_4$	CD_3COCD_3	[68]
7-3-10	stemofuran J	$C_{18}H_{18}O_4$	CD_3COCD_3	[68]
7-3-11	stemofuran K	$C_{18}H_{18}O_3$	CD_3COCD_3	[68]
7-3-12	corsifuran A	$C_{16}H_{16}O_3$	C_6D_6	[69]
7-3-13	corsifuran B	$C_{15}H_{14}O_3$	C_6D_6	[69]
7-3-14	corsifuran C	$C_{16}H_{14}O_3$	C_6D_6	[69]
7-3-15	gnetucleistol C	$C_{15}H_{12}O_4$	CD_3COCD_3	[70]
7-3-16	gnetifolin A	$C_{16}H_{14}O_6$	CD_3COCD_3	[70]
7-3-17	mucodianin B	$C_{16}H_{14}O_5$	DMSO-d_6	[71]
7-3-18	mucodianin C	$C_{17}H_{16}O_6$	DMSO-d_6	[71]
7-3-19	mucodianin D	$C_{16}H_{14}O_6$	DMSO-d_6	[71]
7-3-20	lespedezavirgatol	$C_{17}H_{16}O_6$	DMSO-d_6	[72]
7-3-21	wittifuran E	$C_{14}H_{10}O_5$	CD_3COCD_3	[73]
7-3-22	moracin X	$C_{16}H_{10}O_4$	CD_3COCD_3	[74]
7-3-23	moracin Y	$C_{15}H_{10}O_5$	CD_3COCD_3	[74]
7-3-24	sarcomeginal	$C_{19}H_{16}O_5$	$CDCl_3$	[75]
7-3-25	wittifuran D	$C_{19}H_{18}O_4$	CD_3COCD_3	[73]
7-3-26	flavescenone C	$C_{20}H_{18}O_6$	CD_3COCD_3	[76]
7-3-27	moracin V	$C_{19}H_{18}O_6$	CD_3COCD_3	[74]
7-3-28	3-(*γ*,*γ*-dimethylpropenyl) moracin M	$C_{19}H_{18}O_4$	CD_3OD	[77]
7-3-29	2-[2′,4′-dihydroxy-3′-(3-methylbut-2-enyl)phenyl]-6-hydroxybenzofuran	$C_{19}H_{18}O_4$	CD_3COCD_3	[78]
7-3-30	2-[2′-methoxy-4′-hydroxy-5′-(3-methylbut-2-enyl)-phenyl]-6-hydroxybenzofuran	$C_{20}H_{20}O_4$	$CDCl_3$	[78]
7-3-31	2-(2′-methoxy-4′-hydroxyphenyl)-5-(3-methylbut-2-enyl)-6-hydroxybenzofuran	$C_{20}H_{20}O_4$	$CDCl_3$	[78]
7-3-32	demethylmoracin I	$C_{19}H_{18}O_4$	CD_3OD	[79]
7-3-33	burttinol D	$C_{20}H_{20}O_4$	$CDCl_3$	[80]
7-3-34	artoindonesianin O	$C_{20}H_{20}O_4$	CD_3COCD_3	[81]
7-3-35	moracin W	$C_{29}H_{34}O_6$	CD_3COCD_3	[74]
7-3-36	machaeriol B	$C_{24}H_{26}O_3$	$CDCl_3$	[82]
7-3-37	mornigrol D	$C_{24}H_{26}O_5$	CD_3COCD_3	[83]
7-3-38	wittifuran A	$C_{24}H_{26}O_6$	DMSO-d_6	[84]
7-3-39	wittifuran B	$C_{24}H_{24}O_5$	CD_3COCD_3	[84]
7-3-40	wittifuran C	$C_{29}H_{36}O_7$	CD_3COCD_3	[84]
7-3-41	wittifuran F	$C_{29}H_{34}O_6$	CD_3COCD_3	[84]

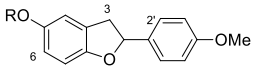
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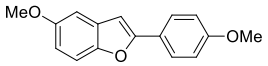
No.	Compounds	MFs	Test solvents	References
7-3-42	wittifuran G	$C_{29}H_{34}O_6$	CD_3COCD_3	[84]
7-3-43	lakoochin A	$C_{26}H_{30}O_4$	$CDCl_3$	[85]
7-3-44	lakoochin B	$C_{29}H_{34}O_4$	$CDCl_3$	[85]
7-3-45	macrourin A	$C_{29}H_{32}O_5$	CD_3COCD_3	[86]
7-3-46	artopetelin A	$C_{29}H_{32}O_4$	CD_3COCD_3	[87]
7-3-47	artopetelin B	$C_{29}H_{34}O_4$	CD_3COCD_3	[87]
7-3-48	artopetelin C	$C_{29}H_{34}O_5$	CD_3COCD_3	[87]
7-3-49	artopetelin D	$C_{29}H_{34}O_5$	CD_3COCD_3	[88]
7-3-50	artopetelin E	$C_{29}H_{34}O_5$	$CDCl_3$	[88]
7-3-51	artopetelin F	$C_{29}H_{34}O_5$	CD_3COCD_3	[88]
7-3-52	artopetelin G	$C_{29}H_{32}O_4$	CD_3COCD_3	[88]
7-3-53	artolakoochol	$C_{29}H_{32}O_4$	$CDCl_3$	[89]
7-3-54	4-hydroxyartolakoochol	$C_{29}H_{32}O_5$	CD_3COCD_3	[89]
7-3-55	cycloartolakoochol	$C_{29}H_{32}O_4$	$CDCl_3$	[89]
7-3-56	wittifuran P	$C_{29}H_{32}O_5$	CD_3COCD_3	[90]
7-3-57	wittifuran Q	$C_{29}H_{30}O_5$	CD_3COCD_3	[90]
7-3-58	wittifuran R	$C_{29}H_{32}O_6$	CD_3COCD_3	[90]



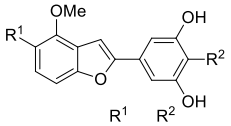
	R^1	R^2	R^3	R^4	R^5	R^6	R^7
7-3-1	H	H	H	OH	H	OH	H
7-3-2	OH	H	H	OH	H	OMe	H
7-3-3	H	H	H	OH	Me	OH	H
7-3-4	OH	H	Me	OH	H	OMe	H
7-3-5	OH	H	Me	OH	Me	OMe	H
7-3-6	OH	H	Me	OH	Me	OMe	Me
7-3-7	OH	Me	Me	OH	Me	OMe	H
7-3-8	OH	Me	Me	OH	Me	OMe	Me
7-3-9	OH	Me	Me	OMe	Me	OMe	H
7-3-10	OH	H	Me	OMe	Me	OMe	H
7-3-11	H	H	Me	OH	Me	OMe	Me



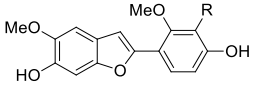
7-3-12 R = Me
7-3-13 R = H



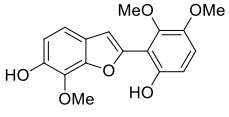
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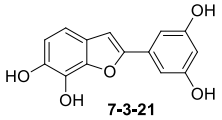
	R^1	R^2
7-3-15	H	H
7-3-16	OH	OMe



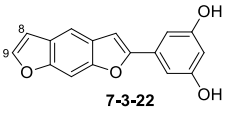
7-3-17 R = H
7-3-18 R = OMe
7-3-19 R = OH



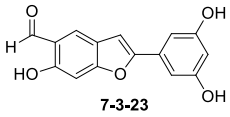
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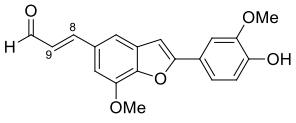
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7-3-22

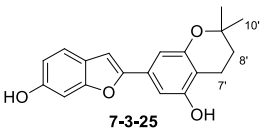


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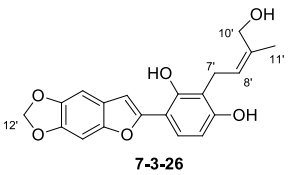


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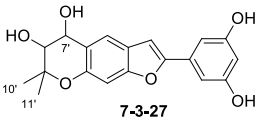
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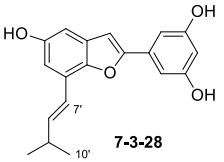
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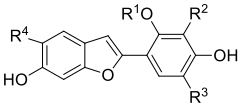
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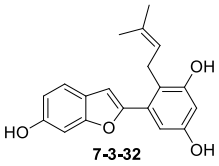
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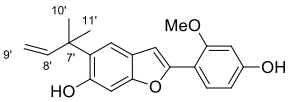
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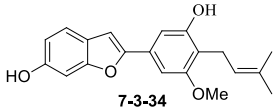
	R^1	R^2	R^3	R^4
7-3-29	H	Prenyl	H	H
7-3-30	Me	H	Prenyl	H
7-3-31	Me	H	H	Prenyl



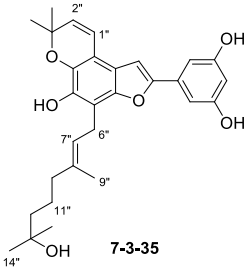
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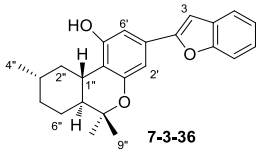
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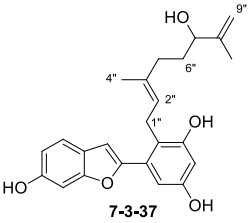
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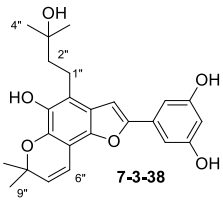
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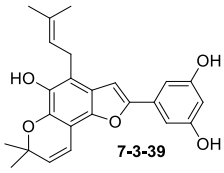
7-3-36



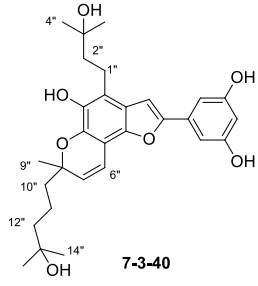
7-3-37



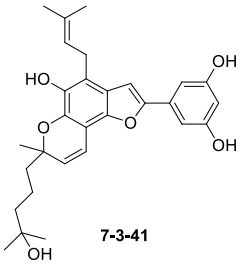
7-3-38



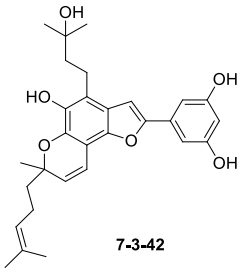
7-3-39



7-3-40

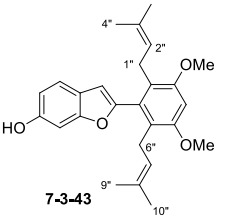


7-3-41

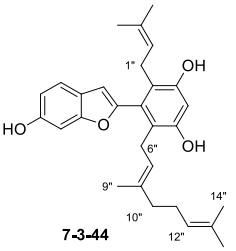


7-3-42

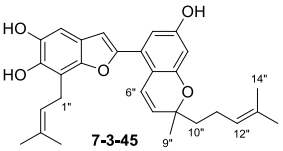
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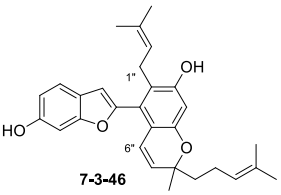
7-3-43



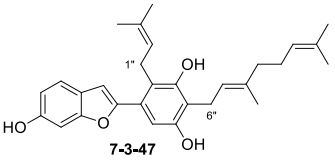
7-3-44



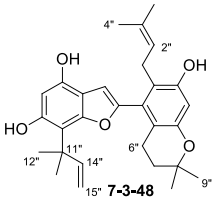
7-3-45



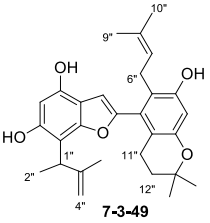
7-3-46



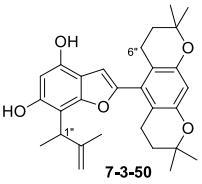
7-3-47



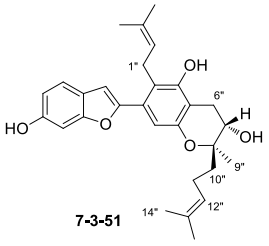
7-3-48



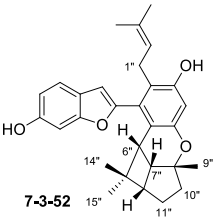
7-3-49



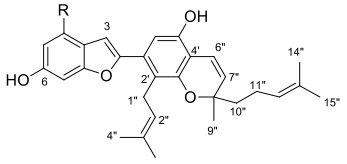
7-3-50



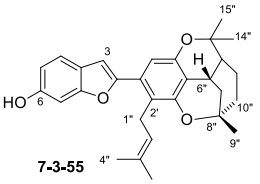
7-3-51



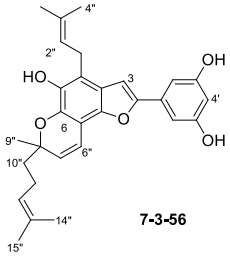
7-3-52



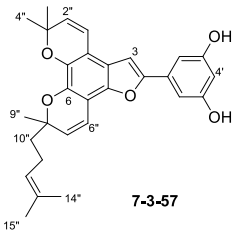
7-3-53 R = H
7-3-54 R = OH



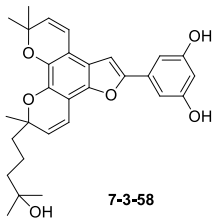
7-3-55



7-3-56



7-3-57



7-3-58

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Table 7-3-2: ^{1}H NMR spectroscopic data of 2-phenylbenzofurans **7-3-1**~**7-3-4**.

H	7-3-1	7-3-2	7-3-3	7-3-4
3	7.16 d(0.8)	7.27 d(0.8)	7.03 d(0.8)	7.09 d(0.8)
4	7.62 dd(7.7, 1.5)		7.59 dd(7.6, 1.4)	
5	7.23 ddd(7.8, 7.7, 1.5)	6.69 dd(8.2, 1.0)	7.22 ddd(7.6, 7.6, 1.4)	6.70 dd(8.0, 1.0)
6	7.30 ddd(7.7, 7.9, 1.5)	7.12 dd(8.2, 7.8)	7.27 ddd(7.6, 7.6, 1.4)	7.15 dd(8.0, 8.0)
7	7.52 ddd(7.9, 1.5, 0.8)	7.05 ddd(8.2, 1.0, 0.8)	7.50 ddd(7.6, 1.4, 0.8)	7.07 ddd(8.0, 1.0, 0.8)
2′	6.93d(2.2)	7.00 dd(2.3, 1.5)	6.99 s	
4′	6.42 d(2.2)	6.44 dd(2.3, 2.3)		6.56 d(2.4)
6′	6.93 d(2.2)	6.98 d(2.3)	6.99 s	6.90 d(2.4)
2′-Me				2.36 s
4′-Me			2.14 s	
5′-OMe		3.83 s		3.80 s

Table 7-3-3: ^{1}H NMR spectroscopic data of 2-phenylbenzofurans **7-3-5**~**7-3-8**.

H	7-3-5	7-3-6	7-3-7	7-3-8
3	7.03 d(0.9)	6.80 d(0.9)	7.10 d(0.8)	6.84 d(0.8)
5	6.69 dd(7.9, 1.0)	6.71 dd(7.9, 1.0)		
6	7.13 dd(7.9, 7.9)	7.12 dd(7.9, 7.9)	7.05 d(8.0)	7.04 d(8.0)
7	7.06 ddd(7.9, 1.0, 0.9)	7.03 ddd(7.9, 1.0, 0.9)	6.98 dd(8.0, 0.8)	6.96 dd(8.0, 0.8)
6′	6.94 s		6.93 s	
5-Me			2.30 s	2.31 s
2′-Me	2.40 s	2.08 s	2.38 s	2.07 s
4′-Me	2.17 s	2.25 s	2.17 s	2.24 s
5′-OMe	3.87 s	3.69 s	3.87 s	3.69 s
6′-Me		2.06 s		2.05 s

Table 7-3-4: ^{1}H NMR spectroscopic data of 2-phenylbenzofurans **7-3-9**~**7-3-11**.

H	7-3-9	7-3-10	7-3-11	H	7-3-9	7-3-10	7-3-11
3	7.18 d(0.8)	7.10 d(0.9)	6.76 d(0.8)	2′-Me	2.41 s	2.43 s	2.07 s
4			7.52 dd(7.6, 1.5)	3′-OMe	3.72 s	3.73 s	
5		6.71 dd(8.1, 0.9)	7.27 ddd(7.6, 7.6, 1.5)	4′-Me	2.17 s	2.17 s	2.25 s
6	7.06 d(8.1)	7.15 dd(8.1, 8.1)	7.31 ddd(7.6, 7.6, 1.5)	5′-OMe	3.90 s	3.91 s	3.69 s
7	6.99 dd(8.1, 0.8)	7.07 ddd(8.1, 0.9, 0.9)	7.67 ddd(7.6, 1.5, 0.8)	6′-Me			2.05 s
6′	7.18 s	7.19 s		5-Me	2.30 s		

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Table 7-3-5: ^{1}H NMR spectroscopic data of 2-phenylbenzofurans **7-3-12**~**7-3-15**.

H	7-3-12	7-3-13	7-3-14	7-3-15
2	5.48 t(8.6)	5.44 t(8.8)		
3	2.90 dd(15.4, 8.5)	2.84 dd(15.8, 8.5)	6.61 d(0.8)	7.15 d(0.9)
4	6.70 d(2.8)	6.45 d(2.5)	6.96 d(2.5)	
5				6.78 d(8.1)
6	6.62 dd(8.5, 2.8)	6.33 dd(8.6, 2.5)	6.84 dd(8.9, 2.5)	7.24 t(8.1)
7	6.83 d(8.5)	6.73 d(8.8)	7.30 d(8.9)	7.13 dd(8.1, 0.9)
2′	7.20 d(8.8)	7.17 d(8.8)	7.75 d(8.9)	6.93 d(2.1)
3′	6.75 d(8.8)	6.74 d(8.8)	6.79 d(8.9)	
4′				6.41 t(2.1)
5′	6.75 d(8.8)	6.74 d(8.8)	6.79 d(8.9)	
6′	7.20 d(8.8)	7.17 d(8.8)	7.75 d(8.9)	6.93 d(2.1)
4-OMe				3.96 s
5-OMe	3.38 s		3.44 s	
4′-OMe	3.28 s	3.27 s	3.27 s	

Table 7-3-6: ^{1}H NMR spectroscopic data of 2-phenylbenzofurans **7-3-16**~**7-3-19**.

H	7-3-16	7-3-17	7-3-18	7-3-19
3	7.22 s	6.98 br s	7.03 br s	7.02 br s
4		7.07 s	7.10 s	7.10 s
6	6.86 d(9.0)			
7	7.09 d(9.0)	6.94 br s	6.96 br s	6.95 br s
2′	6.99 s			
3′		6.53 d(2.4)		
5′		6.46 dd(8.7, 2.4)	6.71 d(8.7)	6.64 d(8.7)
6′	6.99 s	7.63 d(8.7)	7.38 d(8.7)	7.12 d(8.7)
4-OMe	3.85 s①			
5-OMe		3.79 s	3.79 s	3.79 s
2′-OMe		3.88 s	3.85 s	3.76 s
3′-OMe			3.79 s	
4′-OMe	4.04 s①			
OH	7.55 br s, 8.21 br s			

① Assignments may be exchanged.

Table 7-3-7: ^{1}H NMR spectroscopic data of 2-phenylbenzofurans **7-3-20**~**7-3-24**.

H	7-3-20	7-3-21	7-3-22	7-3-23	7-3-24
3	7.05 s	7.10 s	7.22 s	7.21 s	6.80 s
4	7.07 d(8.4)	7.53 d(8.4)	7.78 s	8.03 s	7.37 d(1.2)
5	6.76 d(8.4)	7.03 d(8.4)			
6					6.98 d(1.2)

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Table 7-3-7 (continued)

H	7-3-20	7-3-21	7-3-22	7-3-23	7-3-24
7			7.71 s	7.08 s	
8			6.93 d(2.1)	10.1 s	7.55 d(15.8)
9			7.82 d(2.1)		6.70 dd(15.8, 7.7)
10					9.71 d(7.7)
2′		6.67 d(2.0)	6.93 d(2.1)	6.89 d(2.1)	7.35 d(1.8)
3′					
4′	7.43 d(8.4)	6.25 t(2.0)	6.41 t(2.1)	6.42 d(2.1)	
5′	6.75 d(8.4)				6.99 d(8.2)
6′		6.67 d(2.0)	6.93 d(2.1)	6.89 d(2.1)	7.41 dd(8.2, 1.8)
7-OMe	4.01 s				4.05 s
2′-OMe	3.86 s				
3′-OMe	3.79 s				3.97 s
OH	9.20 br s, 9.76 br s				7.05 br s

Table 7-3-8: ^{1}H NMR spectroscopic data of 2-phenylbenzofurans **7-3-25**~**7-3-29**.

H	7-3-25	7-3-26	7-3-27	7-3-28	7-3-29
3	6.91 s	6.99 d(1)	7.05 s	6.90 s	7.02 s
4	7.37 d(8.4)	7.05 s	7.67 s	6.89 br s	7.37 d(8.8)
5	6.78 dd(8.4, 2.0)				6.79 dd(8.8, 2.0)
6				7.51 br s	
7	6.95 d(2.0)	6.95 d(1)	6.86 s		7.01 d(2.0)
2′	6.89 d(2.0)		6.85 d(1.0)	6.78 d(1.8)	
4′			6.36 t(1.0)	6.27 dd(1.8, 1.8)	
5′		6.53 d(8.7)			6.57 d(8.4)
6′	6.89 d(2.0)	7.40 d(8.7)	6.85 d(1.0)	6.78 d(1.8)	7.46 d(8.4)
7′	2.77 t(7.2)	3.47 d(7.2)	4.60 d(8.7)	6.72 d(15.9)	3.48 br d(6.8)
8′	1.73 t(7.2)	5.47 t(7.2)	3.56 d(8.7)	6.14 dd(15.9, 6.9)	5.28 m
9′				2.46 m	
10′	1.24 s	3.86 br s	1.44 s	1.11 d(6.7)	1.67 br s
11′	1.24 s	1.75 s	1.21 s	1.11 d(6.7)	1.80 br s
12′		5.95 s			
OH		3.59 br s, 8.62 br s, 7.75 br s			

Table 7-3-9: ^{1}H NMR spectroscopic data of 2-phenylbenzofurans **7-3-30**~**7-3-34**.

H	7-3-30	7-3-31	7-3-32	7-3-33	7-3-34
3	7.11 s	7.08 s	6.66 s	7.11 s	6.79 d(1.1)
4	7.38 d(8.4)	7.25 s	7.33 d(8.4)	7.43 s	7.43 d(8.4)
5	6.74 dd(8.4, 2.4)		6.72 dd(8.4, 2.2)		6.82 dd(8.4, 1.9)

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Table 7-3-9 (continued)

H	7-3-30	7-3-31	7-3-32	7-3-33	7-3-34
7	7.00 d(2.0)	6.98 s	6.87 d(2.1)	7.00 s	6.97 d(1.9)
2′					6.53 d(2.4)
3′	6.52 s	6.53 br s(ov)		6.52 d(2.3)	
4′			6.33 d(2.5)		
5′		6.52 dd(8.8, 2.4)(ov)		6.50 dd(9.1, 2.3)	
6′	7.72 s	7.86 d(8.8)	6.61 d(2.5)	7.84 d(9.1)	6.83 d(2.4)
7′	3.41 br d(6.8)	3.39 br d(7.6)	3.42 d(6.3)		3.46 d(6.6)
8′	5.36 m	5.37 m	5.13 m	6.24 dd(10.5, 17.7)	5.12 tq(6.6, 1.3)
9′				5.29 d(10.5)	
				5.36 d(17.7)	
10′	1.81 br s	1.80 br s	1.64 s	1.50 s	1.63 s
11′	1.84 br s	1.82 br s	1.64 s	1.50 s	1.66 s
2′-OMe	3.94 s	3.96 s		3.94 s	
3′-OMe					3.82 s
OH	5.44 s	5.14 s			8.48 br s
					8.36 br s

Table 7-3-10: ^{1}H NMR spectroscopic data of 2-phenylbenzofurans **7-3-35**~**7-3-39**.

H	7-3-35	7-3-36	7-3-37	7-3-38	7-3-39
3	7.15 s	6.78 s	6.78 s	7.06 s	7.05 s
4		7.50 br d(7.6)	7.42 d(8.4)		
5		7.22 br t(7.6, 7.3)	6.82 dd(8.4, 2.1)		
6		7.24 ddd(1.0, 7.3, 7.9)			
7		7.44 br d(7.9)	6.97 d(2.1)		
2′	6.87 d(2.1)	6.95 d(1.5)		6.70 d(2.0)	6.86 d(2.0)
4′	6.34 t(2.1)		6.49 d(1.8)	6.20 t(2.0)	6.35 t(2.0)
6′	6.87 d(2.1)	6.62 d(1.5)	6.74 d(1.8)	6.70 d(2.0)	6.86 d(2.0)
1″	6.70 d(9.6)	2.53 ddd(2.5, 11.3, 13.7)	3.52 d(6.3)	2.77 m	3.54 d(7.2)
2″	5.74 d(9.6)	3.10 br d(12.8)	5.24 m	1.59 m	5.33 t(7.2)
		0.8 br dd(12.8, 13.7)			
4″	1.43 s	0.95 d(6.6)	1.74 s	1.18 s	1.82 s
5″	1.43 s	1.85 m, 1.13 m	1.54 m	1.18 s	1.66 s
6″	3.62 d(7.2)	1.85 m, 1.13 m	2.01 m	6.72 d(10.0)	6.81 d(10.0)
7″	5.46 br t(7.2)	1.51 ddd(1.75, 9.6, 11.3)	3.96 t(6.3)	5.80 d(10.0)	5.80 d(10.0)
9″	1.87 s	1.07 s	4.84 s, 4.69 s	1.42 s	1.46 s
10″	1.97 br t(2.1)	1.41 s	1.66 s	1.42 s	1.46 s
11″	1.36 m				
12″	1.49 m				
14″	1.10 s				
15″	1.10 s				
OH		5.30 br s			

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Table 7-3-11: ^{1}H NMR spectroscopic data of 2-phenylbenzofurans **7-3-40**~**7-3-44**.

H	7-3-40	7-3-41	7-3-42	7-3-43	7-3-44
3	7.09 s	7.05 s	7.09 s	6.54 s	6.58 s
4				7.4 d(8.1)	7.44 d(8.4)
5				6.78 dd(8.1, 2.1)	6.83 dd(8.4, 2.1)
7				6.97 d(2.1)	7.01 d(2.1)
2′	6.86 d(2.0)	6.86 d(2.0)	6.87 d(2.0)		
4′	6.35 t(2.0)	6.35 t(2.0)	6.35 t(2.0)	6.61 s	6.55 s
6′	6.86 d(2.0)	6.86 d(2.0)	6.87 d(2.0)		
1″	2.94 m	3.54 d(7.2)	2.95 m	3.15 d(6.8)	3.19 d(6.8)
2″	1.71~1.80 m	5.33 t(7.2)	1.74~1.83 m	5.05 br t(7.1)	5.21 br t(6.5)
4″	1.27 s	1.82 s	1.28 s	1.39 s	1.64 s
5″	1.27 s	1.66 s	1.28 s	1.58 s	1.71 s
6″	6.84 d(10.0)	6.84 d(10.0)	6.85 d(10.0)	3.15 d(6.8)	3.19 d(6.8)
7″	5.78 d(10.0)	5.79 d(10.0)	5.78 d(10.0)	5.05 br t(7.1)	5.21 br t(6.5)
9″	1.42 s	1.42 s	1.43 s	1.39 s	1.64 s
10″	1.71~1.80 m	1.69~1.78 m	1.74~1.83 m	1.58 s	2.03 m
11″	1.50~1.64 m	1.54~1.62 m	2.16 m		2.08 m
12″	1.40~1.45 m	1.45~1.46 m	5.11 t(7.2)		5.05 br t(6.6)
14″	1.13 s	1.13 s	1.62 s		1.60 s
15″	1.13 s	1.13 s	1.55 s		1.69 s
3′,5′-OMe				3.87 s	
OH					5.37 br s, 5.43 br s(2H)

Table 7-3-12: ^{1}H NMR spectroscopic data of 2-phenylbenzofurans **7-3-45**~**7-3-48**.

H	7-3-45	7-3-46	7-3-47	7-3-48
3	6.82 s	6.66 d(0.8)	6.73 d(0.8)	6.66 s
4	6.89 s	7.46 d(8.2)	7.41 d(8.4)	
5		6.85 dd(8.2, 2.0)	6.81 dd(8.4, 2.0)	6.33 s
7		6.98 br d(2.0)	6.96 br d(2.0)	
4′	6.38 s	6.48 s		6.40 s
6′	6.89 s		6.84 s	
1″	3.48 d(6.5)	3.22 br d(7.0)	3.54 br d(6.2)	3.27 br d(6.8)
2″	5.30 t(6.5)	5.09~5.16 m	5.18 br t(6.2)	5.11 br t(6.8)
4″	1.67 s	1.40 br s	1.68 br s	1.42 s
5″	1.79 s	1.55 br s	1.66 br s	1.55 s
6″	6.74 d(10.0)	6.13 d(10.2)	3.48 br d(7.0)	2.48 t(6.8)
7″	5.53 d(10.0)	5.48 d(10.2)	5.30 br t(7.0)	1.69 t(6.8)
9″	1.40 s	1.36 s	1.81 br s	1.28 s
10″	1.75 m	1.65~1.71 m	1.99~2.02 m	1.28 s
11″	2.09 m	2.07~2.15 m	2.08~2.11 m	
12″	5.07 t(7.0)	5.09~5.16 m	5.10 br t(7.0)	1.64 s
13″				1.64 s
14″	1.65 s	1.57 br s	1.58 s	6.43 dd(10.6, 17.5)

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Table 7-3-12 (continued)

H	7-3-45	7-3-46	7-3-47	7-3-48
15″	1.55 s	1.64 br s	1.63 s	5.02 dd(1.3, 17.5) 4.91 dd(1.3, 10.6)
OH		8.51 s 8.66 s	8.40 s, 6.79 s, 8.16 s	8.46 s 7.63 s 8.17 s

Table 7-3-13: ^{1}H NMR spectroscopic data of 2-phenylbenzofurans **7-3-49**~**7-3-52**.

H	7-3-49	7-3-50	7-3-51	7-3-52
3	6.68 s	6.66 s	6.78 d(0.8)	6.59 d(0.8)
4			7.42 d(8.4)	7.44 d(8.4)
5	6.37 s	6.23 s	6.82 dd(8.4, 2.0)	6.83 dd(8.4, 2.0)
7			6.99 br d(2.0)	6.98 br d(2.0)
4′	6.40 s	6.38 s		6.56 s
6′			6.74 s	
1″	4.04 q(7.0)	4.00 q(7.0)	3.56 br d(6.5)	3.19 br d(6.9)
2″	1.51 d(7.0)	1.49 d(7.0)	5.16~5.19 m	5.13 br t(6.9)
4″	4.88 br s, 4.78 br s	5.23 br s, 5.16 br s	1.68 s	1.39 br s
5″	1.67 br s	1.77 s	1.66 s	1.55 d(1.0)
6″	3.29 br d(6.8)	2.62 t(6.8)	*α* 2.66 dd(8.1, 16.8) *β* 3.04 dd(5.7, 16.8)	3.05 d(9.7)
7″	5.13 br t(6.8)	1.71 t(6.8)	*β* 3.94 dt(5.7, 8.1)	2.50 t(9.7)
9″	1.45 br s	1.33 s	1.24 s	1.25 s
10″	1.56 br s	1.33 s	1.70~1.76 m	*α* 1.96~2.00 m *β* 1.56~1.62 m
11″	2.56 dt(7.0, 17.0) 2.42 dt(6.5, 17.0)	2.62 t(6.8)	2.20~2.24 m	*α*1.71~1.75 m *β* 1.62~1.66 m
12″	1.68 (ov)	1.71 t(6.8)	5.16~5.19 m	*β* 2.30~2.35 m
14″	1.29 s	1.33 s	1.62 br s	0.85 s
15″	1.29 s	1.33 s	1.66 br s	0.59 s
OH	8.46 s, 7.91 s, 8.17 s	4.97 br s, 5.83 s	8.40 s, 7.25 s 4.21 d(5.7)	8.35 s, 8.25 s

Table 7-3-14: ^{1}H NMR spectroscopic data of 2-phenylbenzofurans **7-3-53**~**7-3-56**.

H	7-3-53	7-3-54	7-3-56	7-3-56
3	6.72 d(0.5)	6.86 d(1.0)	6.68 d(1.0)	7.02 s
4	7.36 d(8.5)		7.36 d(8.0)	
5	6.75 dd(8.5, 2.0)	6.29 d(2.0)	6.73 dd(8.0, 2.0)	
7	6.95 d(2.0)	6.49 d(2.0)	6.96 d(2.0)	
2′				6.83 d(2.0)

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Table 7-3-14 (continued)

H	7-3-53	7-3-54	7-3-56	7-3-56
4′				6.32 t(2.0)
6′	6.70 s	6.80 s	6.81 s	6.83 d(2.0)
1″	3.45 d(6.5)	3.47 d(6.5)	*α* 3.40 dd(14.5, 7.0) *β* 3.54 dd(14.5, 7.0)	3.50 d(7.0)
2″	5.17 br t(6.5)	5.17 br t(6.5)	5.19 t(7.0)	5.30 t(7.0)
4″	1.72 s	1.74 s	1.69 s	1.79 s
5″	1.67 s	1.65 s	1.66 s	1.63 s
6″	6.68 d(10.0)	6.74 d(10.5)	2.89 br t(2.0)	6.82 d(10.5)
7″	5.57 d(10.0)	5.65 d(10.5)	ax 1.82 dd(13.0, 1.5) eq 2.21 m	5.57 d(10.5)
9″	1.36 s	1.37 s	1.39 s	1.40 s
10″	1.71 m	1.75 m	ax 1.71 m eq 1.42 m	1.66~1.84 m
11″	2.10 m	2.07 m	ax 0.70 m eq 1.25 m	2.08~2.18 m
12″	5.10 br t(7.0)	5.13 br t(7.0)	2.05 m	5.07 t(7.0)
14″	1.57 s	1.57 s	1.52 s	1.59 s
15″	1.65 s	1.64 s	1.04 s	1.51 s
OH	5.29 br s, 5.19 br s	8.83 br s, 8.38 br s 8.48 br s	4.83 s	

Table 7-3-15: ^{1}H NMR spectroscopic data of 2-phenylbenzofurans **7-3-57** and **7-3-58**.

H	7-3-57	7-3-58	H	7-3-57	7-3-58
3	7.18 s	7.18 s	6″	6.85 d(10.5)	6.85 d(10.5)
2′	6.87 d(2.0)	6.87 d(2.0)	7″	5.84 d(10.5)	5.84 d(10.5)
4′	6.37 t(2.0)	6.37 t(2.0)	9″	1.42 s	1.45 s
6′	6.87 d(2.0)	6.87 d(2.0)	10″	1.68~1.78 m	1.70~1.76 m
1″	6.71 d(10.5)	6.71 d(10.5)	11″	2.13~2.22 m	1.54~1.64 m
2″	5.80 d(10.5)	5.80 d(10.5)	12″	5.11 t(7.5)	1.40~1.46 m
4″	1.44 s	1.43 s	14″	1.62 s	1.13 s
5″	1.44 s	1.43 s	15″	1.57 s	1.13 s

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7.4 1,2-diphenylethene oligomers

7.4.1 1,2-diphenylethene dimers

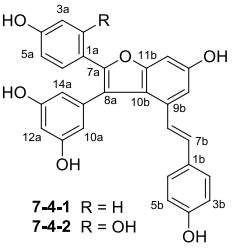
Table 7-4-1: Compounds, MFs, and test solvents of 1,2-diphenylethene dimers **7-4-1**~**7-4-50**.

No.	Compounds	MFs	Test solvents	References
7-4-1	viniferifuran	$C_{28}H_{20}O_6$	CD_3OD	[91]
7-4-2	gnetuhainin B	$C_{28}H_{20}O_7$	CD_3COCD_3	[92]
7-4-3	gnetuhainin F	$C_{30}H_{24}O_8$	CD_3COCD_3	[93]
7-4-4	gnetuhainin G	$C_{30}H_{22}O_9$	CD_3COCD_3	[93]
7-4-5	gnetuhainin H	$C_{30}H_{24}O_9$	CD_3COCD_3	[93]
7-4-6	anigopreissin A-4a-*O*-*β*-D-glucopyranoside	$C_{34}H_{30}O_{11}$	DMSO-d_6-C_6D_6(5:3)	[94]
7-4-7	anigopreissin A-4b-*O*-*β*-D-glucopyranoside	$C_{34}H_{30}O_{11}$	DMSO-d_6-C_6D_6(5:3)	[94]
7-4-8	anigopreissin A-4a,4b-di-*O*-*β*-D-glucopyranoside	$C_{40}H_{40}O_{16}$	DMSO-d_6-C_6D_6(5:3)	[94]
7-4-9	gnetuhainin A	$C_{28}H_{22}O_7$	CD_3COCD_3	[92]
7-4-10	*trans*-*ϵ*-viniferin	$C_{28}H_{22}O_6$	CD_3OD	[95]
7-4-11	*cis*-*ϵ*-viniferin	$C_{28}H_{22}O_6$	CD_3OD	[95]
7-4-12	longusol B	$C_{28}H_{22}O_7$	CD_3OD	[96]
7-4-13	*ϵ*-viniferindiol	$C_{28}H_{24}O_8$	CD_3COCD_3	[97]
7-4-14	mirabiloside A	$C_{46}H_{54}O_{21}$	DMSO-d_6	[98]
7-4-15	mirabiloside B	$C_{34}H_{34}O_{11}$	DMSO-d_6	[98]
7-4-16	gnemonoside J	$C_{40}H_{42}O_{17}$	DMSO-d_6	[99]
7-4-17	gnemonoside E	$C_{40}H_{42}O_{16}$	DMSO-d_6	[100]
7-4-18	*trans*-*ϵ*-viniferindiglucoside	$C_{40}H_{42}O_{16}$	CD_3OD	[101]
7-4-19	*cis*-*ϵ*-viniferindiglucoside	$C_{40}H_{42}O_{16}$	CD_3OD	[101]
7-4-20	hemsleyanoside B	$C_{40}H_{42}O_{18}$	CD_3OD	[102]
7-4-21	maximol A	$C_{28}H_{22}O_6$	CD_3OD	[103]
7-4-22	maximol B	$C_{28}H_{22}O_6$	CD_3OD	[103]
7-4-23	gnetuhainin Q	$C_{29}H_{24}O_7$	CD_3COCD_3	[104]
7-4-24	gnetuhainin L	$C_{29}H_{24}O_8$	CD_3COCD_3	[104]
7-4-25	parvifolol D	$C_{30}H_{26}O_8$	CD_3COCD_3	[105]
7-4-26	resveratrol (*E*)-dehydrodimer-11-*O*-*β*-D-glucopyranoside	$C_{34}H_{32}O_{11}$	CD_3COCD_3	[106]
7-4-27	resveratrol (*E*)-dehydrodimer-11′-*O*-*β*-D-glucopyranoside	$C_{34}H_{32}O_{11}$	CD_3COCD_3	[106]
7-4-28	gnetuhainin K	$C_{29}H_{24}O_8$	CD_3COCD_3	[104]
7-4-29	longusol A	$C_{28}H_{22}O_7$	CD_3OD	[96]
7-4-30	bisisorhapontigenin B	$C_{30}H_{26}O_8$	CD_3COCD_3	[107]
7-4-31	gneafricanin A	$C_{29}H_{24}O_8$	CD_3COCD_3	[107]
7-4-32	gneafricanin B	$C_{29}H_{24}O_8$	CD_3COCD_3	[107]
7-4-33	gneafricanin C	$C_{28}H_{22}O_8$	CD_3COCD_3	[108]
7-4-34	gneafricanin D	$C_{28}H_{24}O_6$	CD_3COCD_3	[108]
7-4-35	gneafricanin E	$C_{28}H_{24}O_7$	CD_3COCD_3	[108]
7-4-36	gnetumontanin A	$C_{28}H_{22}O_8$	CD_3COCD_3	[109]
7-4-37	gnemonoside H	$C_{46}H_{52}O_{21}$	DMSO-d_6	[99]
7-4-38	gnemonoside I	$C_{40}H_{42}O_{17}$	DMSO-d_6	[99]

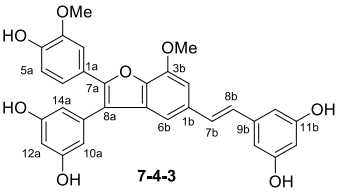
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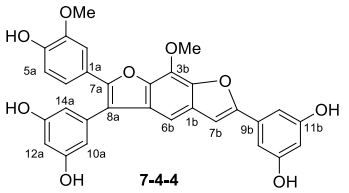
No.	Compounds	MFs	Test solvents	References
7-4-39	gnetin C	$C_{28}H_{22}O_6$	CD_3COCD_3	[110]
7-4-40	gnemonoside A	$C_{40}H_{42}O_{16}$	DMSO-d_6	[110]
7-4-41	gnemonoside C	$C_{34}H_{32}O_{11}$	CD_3COCD_3	[110]
7-4-42	gnemonoside D	$C_{34}H_{32}O_{11}$	CD_3COCD_3	[110]
7-4-43	gnemonoside B	$C_{40}H_{42}O_{16}$	DMSO-d_6	[110]
7-4-44	gnemonol G	$C_{28}H_{20}O_7$	CD_3COCD_3	[111]
7-4-45	shorealactone	$C_{34}H_{28}O_{12}$	CD_3COCD_3	[112]
7-4-46	yaccaol A	$C_{29}H_{20}O_8$	CD_3OD	[113]
7-4-47	yaccaol B	$C_{29}H_{20}O_8$	CD_3OD	[113]
7-4-48	yaccaol C	$C_{30}H_{22}O_{10}$	CD_3OD	[113]
7-4-49	yaccaol D	$C_{30}H_{22}O_{10}$	CD_3OD	[114]
7-4-50	yaccaol E	$C_{30}H_{22}O_{10}$	CD_3OD	[114]



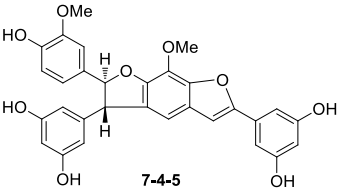
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7-4-2 R = OH



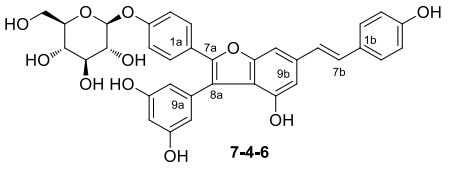
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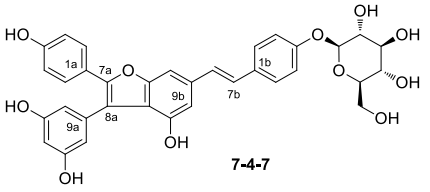
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7-4-5

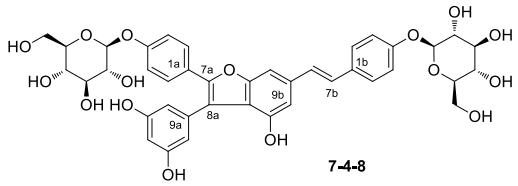


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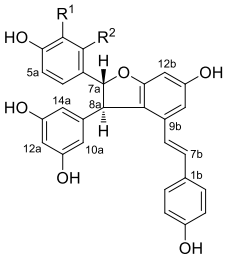


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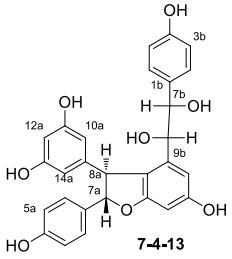
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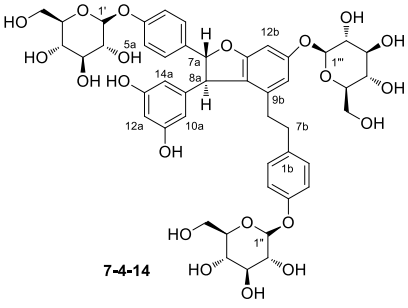
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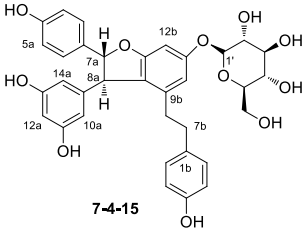
	R^1	R^2	
7-4-9	H	OH	
7-4-10	H	H	
7-4-11	H	H	H-7b,8b *cis*)
7-4-12	OH	H	H-7a,8a *cis*



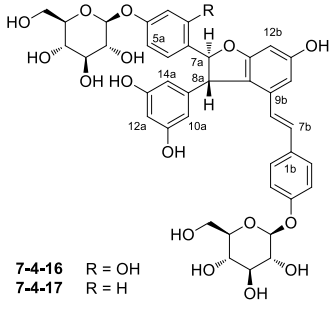
7-4-13



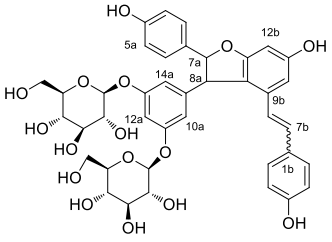
7-4-14



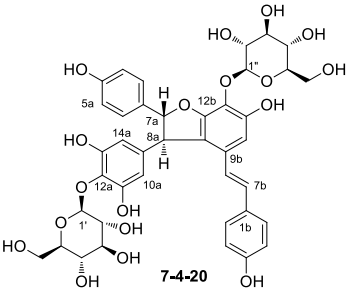
7-4-15



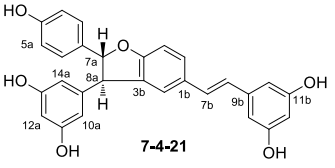
7-4-16 R = OH
7-4-17 R = H



7-4-18 H-7b,8b *trans*
7-4-19 H-7b,8b *cis*

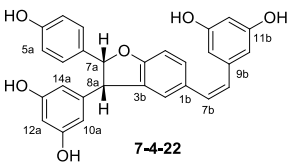


7-4-20

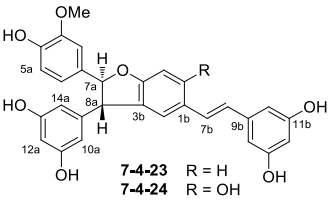


7-4-21

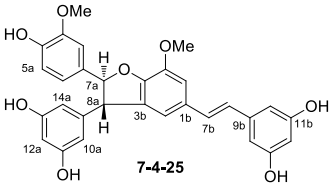
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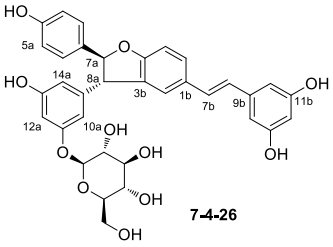
7-4-22



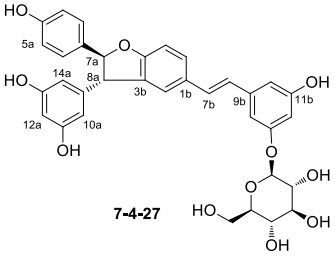
7-4-23 R = H
7-4-24 R = OH



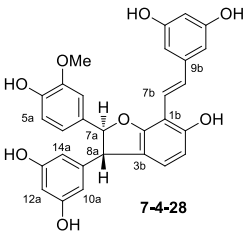
7-4-25



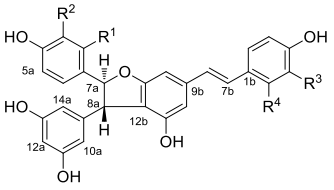
7-4-26



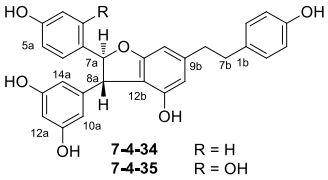
7-4-27



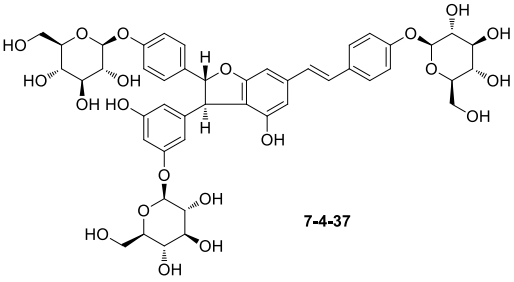
7-4-28



	R^1	R^2	R^3	R^4
7-4-29	H	OH	H	H
7-4-30	H	OMe	OMe	H
7-4-31	OH	H	OMe	H
7-4-32	H	OH	OMe	H
7-4-33	H	OH	OH	H
7-4-36	OH	H	H	OH

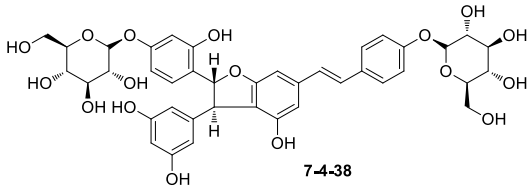


7-4-34 R = H
7-4-35 R = OH

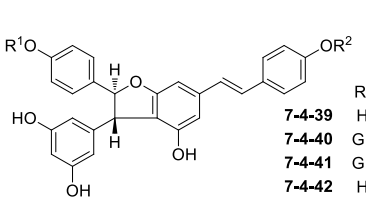


7-4-37

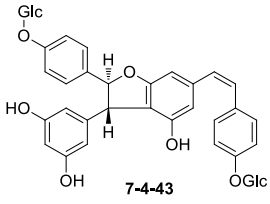
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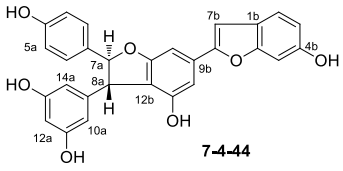
7-4-38



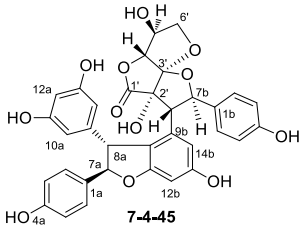
	R^1	R^2
7-4-39	H	H
7-4-40	Glc	Glc
7-4-41	Glc	H
7-4-42	H	Glc



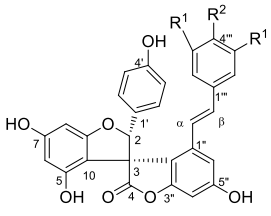
7-4-43



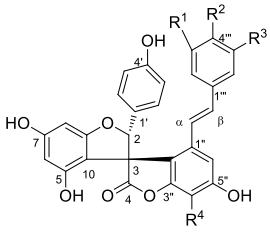
7-4-44



7-4-45



	R^1	R^2
7-4-46	H	OH
7-4-49	OH	OMe



	R^1	R^2	R^3	R^4
7-4-47	H	OH	H	H
7-4-48	OH	OMe	OH	H
7-4-50	OH	H	OH	OMe

Table 7-4-2: ^{1}H NMR spectroscopic data of 1,2-diphenylethene dimers **7-4-1**~**7-4-5**.

H	7-4-1	7-4-2	7-4-3	7-4-4	7-4-5
2a	7.42 d(8.8)		7.20 d(2.1)	7.26 d(2.1)	7.00 d(2.1)
3a	6.69 d(8.8)	6.37 d(2.1)			
5a	6.69 d(8.8)	6.20 dd(8.4, 2.1)	6.80 d(8.7)	6.85 d(8.4)	6.77 d(8.4)
6a	7.42 d(8.8)	6.97 d(8.4)	7.19 dd(8.7, 2.1)	7.25 dd(8.4, 2.1)	6.83 dd(8.4, 2.1)
7a					5.53 d(8.4)
8a					4.53 d(8.4)
10a	6.40 d(2.2)	6.38 d(2.1)	6.43 d(2.1)	6.50 d(2.1)	6.18 d(2.1)

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Table 7-4-2 (continued)

H	7-4-1	7-4-2	7-4-3	7-4-4	7-4-5
12a	6.47 t(2.2)	6.39 t(2.1)	6.38 t(2.1)	6.42 t(2.1)	6.23 t(2.1)
14a	6.40 d(2.2)	6.38 d(2.1)	6.43 d(2.1)	6.50 d(2.1)	6.18 d(2.1)
2b	6.98 d(8.8)	7.02 d(8.7)			
3b	6.65 d(8.8)	6.68 d(8.7)			
5b	6.65 d(8.8)	6.68 d(8.7)			
6b	6.98 d(8.8)	7.02 d(8.7)	7.10 br s	6.76 s	6.37 s
7b	6.94 d(16.3)	6.90 d(16.2)	7.12 d(16.5)	7.26 s	7.09 s
8b	6.85 d(16.3)	7.07 d(16.2)	6.98 d(16.5)		
10b			6.52 d(2.1)	6.85 d(2.1)	6.86 d(2.1)
12b	6.80 d(2.0)	6.82 d(2.1)	6.21 t(2.1)	6.38 t(2.1)	6.33 t(2.1)
14b	6.99 d(2.0)	7.07 d(2.1)	6.52 d(2.1)	6.85 d(2.1)	6.86 d(2.1)
3a-OMe			3.64 s	3.75 s	3.77 s
3b-OMe			4.04 s	3.96 s	3.78 s

Table 7-4-3: ^{1}H NMR spectroscopic data of 1,2-diphenylethene dimers **7-4-6**~**7-4-8**.

H	7-4-6	7-4-7	7-4-8
2a,6a	7.95 d(8.8)	7.54 d(8.8)	7.56 d(8.8)
3a,5a	7.07 d(8.8)	6.86 d(8.8)	7.05 d(8.8)
10a,14a	6.49 d(2.2)	6.59 d(2.2)	6.51 d(2.2)
12a	6.41 t(2.2)	6.54 t(2.2)	6.47 t(2.2)
2b,6b	7.49 d(8.6)	7.55 d(8.6)	7.54 d(8.6)
3b,5b	6.91 d(8.6)	7.19 d(8.6)	7.14 d(8.6)
7b	7.17 d(16.3)	7.21 d(16.3)	7.32 d(16.3)
8b	7.11 d(16.3)	7.21 d(16.3)	7.19 d(16.3)
10b	7.32 s	7.35 s	7.34 s
14b	6.98 s	7.06 s	7.02 s
1′	5.01 d(7.8)		5.00 d(7.8)
2′	3.39~3.49 m		3.41~3.48 m
3′	3.39~3.49 m		3.41~3.48 m
4′	3.39~3.49 m		3.41~3.48 m
5′	3.39~3.49 m		3.41~3.48 m
6′	3.84 dd(12.0, 5.5)		3.84 dd(12.0, 5.5)
	3.64 m		3.66 m
1″		5.07 d(7.8)	5.02 d(7.8)
2″		3.51~3.56 m	3.41~3.48 m
3″		3.51~3.56 m	3.41~3.48 m
4″		3.51~3.56 m	3.41~3.48 m
5″		3.51~3.56 m	3.41~3.48 m
6″		3.96 dd(12.0, 5.5)	3.91 dd(12.0, 5.5)
		3.74 m	3.66 m

Note: Signals of hydroxyls of **7-4-6** were resonated at *δ* 9.71 s, 9.70 s, 9.38 s(2H), 5.45 d(4.9), 5.23 d(4.2), 5.16 d(5.9), and 4.68 t(5.9); Signals of hydroxyls of **7-4-7** were resonated at *δ* 9.89 s, 9.71 s, 9.40 s(2H), 5.52 d(4.9), 5.30 d(4.2), 5.24 d(5.9), and 4.78 t(5.9); Signals of hydroxyls of **7-4-8** were resonated at *δ* 9.75 s, 9.39 s(2H), 5.47 d(4.9), 5.45d(4.9), 5.26 br s, 5.23 d(4.2), 5.20 d(4.5), 5.18 d(5.9), 4.74 t(5.9), and 4.69 t(5.9).

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Table 7-4-4: ^{1}H NMR spectroscopic data of 1,2-diphenylethene dimers **7-4-9**~**7-4-13**.

H	7-4-9	7-4-10	7-4-11	7-4-12	7-4-13
2a		7.14 d(8.5)	6.94 d(8.5)	6.61 d(1.9)	7.17 d(8.5)
3a	6.47 d(2.1)	6.76 d(8.5)	6.71 d(8.5)		6.83 d(8.5)
5a	6.31 dd(8.4, 2.1)	6.76 d(8.5)	6.71 d(8.5)	6.56 d(8.4)	6.83 d(8.5)
6a	7.02 d(8.4)	7.14 d(8.5)	6.94 d(8.5)	6.50 dd(1.9, 8.4)	7.17 d(8.5)
7a	5.79 d(3.9)	5.36 d(6.0)	5.17 d(5.4)	5.76 d(8.7)	5.37 d(4.0)
8a	4.51 d(3.9)	4.35 d(6.0)	3.77 d(5.4)	4.55 d(8.7)	4.40 d(4.0)
10a	6.32 d(2.1)	6.16 d(2.0)	5.92 d(2.0)	5.78 d(2.2)	6.18 d(2.5)
12a	6.23 t(2.1)	6.18 t(2.0)	6.08 t(2.0)	6.50 t(2.2)	6.32 t(2.5)
14a	6.32 d(2.1)	6.16 d(2.0)	5.92 d(2.0)	5.78 d(2.2)	6.18 d(2.5)
2b,6b	7.23 d(8.7)	7.03 d(8.5)	6.91 d(8.5)	7.11 d(8.6)	6.77 d(8.6)
3b,5b	6.78 d(8.7)	6.65 d(8.5)	6.57 d(8.5)	6.67 d(8.6)	6.62 d(8.6)
7b	6.94 d(16.5)	6.82 d(16.0)	6.19 d(12.0)	6.85 d(16.2)	4.35 d(4.0)
8b	6.76 d(16.5)	6.57 d(16.0)	6.02 d(12.0)	6.64 d(16.2)	4.51 d(4.0)
12b	6.38 d(2.1)	6.25 d(2.0)	6.21 d(2.0)	6.31 d(1.9)	6.34 d(2.0)
14b	6.72 d(2.1)	6.63 d(2.0)	6.23 d(2.0)	6.63 d(1.9)	6.68 d(2.0)

Table 7-4-5: ^{1}H NMR spectroscopic data of 1,2-diphenylethene dimers **7-4-14**~**7-4-17**.

H	7-4-14	7-4-15	7-4-16	7-4-17
2a	7.22 d(8.4)	7.05 d(8.0)		7.27 d(8.8)
3a	7.04 d(8.4)	6.75 d(8.0)	6.63 d(2.0)	7.05 d(8.8)
5a	7.04 d(8.4)	6.75 d(8.0)	6.40 d(8.4, 2.0)	7.05 d(8.8)
6a	7.22 d(8.4)	7.05 d(8.0)	6.95 d(8.4)	7.27 d(8.8)
7a	5.45 d(5.2)	5.30 d(6.0)	5.60 d(3.6)	5.43 d(5.0)
8a	4.27 d(5.2)	4.15 d(6.0)	4.38 d(3.6)	4.48 d(5.0)
10a,14a	6.08 d(2.0)	6.02 d(2.0)	6.10 d(2.0)	6.10 d(2.0)
12a	6.11 t(2.0)	6.09 t(2.0)	6.03 t(2.0)	6.07 t(2.0)
2b,6b	6.88 d(8.4)	6.75 d(8.4)	7.28 d(8.4)	7.28 d(8.8)
3b,5b	6.85 d(8.4)	6.59 d(8.4)	6.95 d(8.4)	6.96 d(8.8)
7b	2.45 m	2.47 m	6.87 d(16.0)	6.92 d(16.0)
8b	2.46 m	2.57 m	6.67 d(16.0)	6.70 d(16.0)
12b	6.52 d(2.0)	6.45 d(2.0)	6.31 br s	6.32 d(1.8)
14b	6.46 d(2.0)	6.43 d(2.0)	6.60 br s	6.61 d(1.8)
1′	4.87 d(7.2)①	4.82 d(7.6)	4.72 d(7.2)②	4.86 d(7.7)
2′	3.19 m	3.23 m	3.15~3.32 m	3.18~3.27 m
3′	3.30 m	3.28 m	3.15~3.32 m	3.18~3.27 m
4′	3.27 m	3.19 m	3.15~3.32 m	3.18~3.27 m
5′	3.35 m	3.33 m	3.15~3.32 m	3.18~3.27 m
6′	3.49 m, 3.70 m	3.48 m, 3.73 m	3.64 m, 3.82 m	3.47 m, 3.75 m
1″	4.78 d(7.6)		4.84 d(7.6)②	4.86 d(7.7)
2″	3.19 m		3.15~3.32 m	3.18~3.27 m
3″	3.30 m		3.15~3.32 m	3.18~3.27 m
4″	3.27 m		3.15~3.32 m	3.18~3.27 m

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Table 7-4-5 (continued)

H	7-4-14	7-4-15	7-4-16	7-4-17
5″	3.35 m		3.15~3.32 m	3.18~3.27 m
6″	3.49 m, 3.70 m		3.64 m, 3.82 m	3.47 m, 3.75 m
1‴	4.84 d(7.2)①			
2‴	3.19 m			
3‴	3.30 m			
4‴	3.27 m			
5‴	3.35 m			
6‴	3.49 m, 3.70 m			

① Assignments may be exchanged.
② Typographic error exists in the literature, designating both of the two signals as 'Glc(a)', here, the placements are only to display the data.

Table 7-4-6: ^{1}H NMR spectroscopic data of 1,2-diphenylethene dimers **7-4-18**~**7-4-20**.

H	7-4-18	7-4-19	7-4-20	H	7-4-18	7-4-19	7-4-20
2a,6a	7.15 m	6.95 m	7.24 d(8.5)	1′	4.8(ov)	4.81 d(7.5)	4.79 d(9.8)
3a,5a	6.77 m	6.72 m	6.75 d(8.5)	2′	3.4 m	3.4 m	4.15 m
7a	5.34 d(6)	5.22 d(6)	5.42 d(5.4)	3′	3.4 m	3.4 m	3.48 m
8a	4.52 d(6)	3.97 d(6)	4.31 d(5.4)	4′	3.4 m	3.4 m	3.39~3.48 m
10a	6.61 d(1.5)	6.55 d(2)	6.28 br s	5′	3.4 m	3.4 m	3.39~3.48 m
12a	6.78 t(1.5)	6.74 s		6′	3.66 dd(12.5, 4.5)(2H)	3.68 dd(12.5, 4.5)(2H)	3.72~3.93 m
14a	6.60 d(1.5)	6.57 d(2)	6.28 br s		3.82 br d(12.5)(2H)	3.80 dd(12.5, 2.0)(1H)	
2b,6b	7.06 m	6.91 m	7.08 d(8.8)			3.86 dd(12.5, 2)(1H)	
3b,5b	6.67 m	6.60 m	6.67 d(8.8)	1″			4.91 d(9.8)
7b	6.84 d(16)	6.24 d(12)	6.83 d(14.9)	2″			3.93 m
8b	6.53 d(16)	6.06 d(12)	6.56 d(14.9)	3″			3.45 m
12b	6.27 d(2)	6.38 s		4″			3.39~3.48 m
14b	6.65 d(2)	6.39 s	6.68 s	5″			3.39~3.48 m
				6″			3.72~3.93 m

Table 7-4-7: ^{1}H NMR spectroscopic data of 1,2-diphenylethene dimers **7-4-21**~**7-4-25**.

H	7-4-21	7-4-22	7-4-23	7-4-24	7-4-25
2a	7.17 d(8.3)	7.17 d(10.7)	7.02 d(2.1)	6.93 d(2.1)	7.05 d(2.0)
3a	6.78 d(8.3)	6.78 d(10.7)			
5a	6.78 d(8.3)	6.78 d(10.7)	6.84 (ov)	6.76 d(8.4)	6.28 m
6a	7.17 d(8.3)	7.17 d(10.7)	6.82 (ov)	6.75 dd(8.4, 2.1)	6.28 m
7a	5.39 d 8.3)	5.31 d(8.8)	5.42 d(8.4)	5.34 d(7.8)	5.45 d(9.0)

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Table 7-4-7 (continued)

H	7-4-21	7-4-22	7-4-23	7-4-24	7-4-25
8a	4.40 d(8.3)	4.32 d(8.8)	4.50 d(8.4)	4.31 d(7.8)	4.54 d(9.0)
10a,14a	6.13 d(2.4)	6.04 d(2.4)	6.19 d(2.1)	6.16 d(2.1)	6.20 d(2.0)
12a	6.21 t(2.4)	6.15 t(2.4)	6.27 t(2.1)	6.15 t(2.1)	6.28 t(2.0)
2b	7.17 s	6.88 br s	7.24 br s	7.13 s	7.17 d(1.0)
5b	6.84 d(8.3)	6.70 d(8.3)	6.81 d(8.1)	6.44 s	
6b	7.36 d(8.3)	7.17 d(8.3)	7.42 dd(8.1, 1.8)		6.28 d(1.0)
7b	6.97 d(16.2)	6.44 d(12.7)	7.05 d(15.9)	7.30 d(16.5)	7.02 d(16.0)
8b	6.78 d(16.2)	6.33 d(12.7)	6.91 d(15.9)	6.78 d(16.5)	6.92 d(16.0)
10b,14b	6.44 d(2.4)	6.22 d(2.4)	6.52 d(2.1)	6.44 d(2.1)	6.53 d(2.0)
12b	6.16 t(2.4)	6.11 t(2.4)	6.24 t(2.1)	6.21 t(2.1)	6.25 t(2.0)
3a-OMe			3.82 s	3.75 s	3.84 s
5b-OMe					3.94 s
OH					8.23, 8.21, 7.70

Table 7-4-8: ^{1}H NMR spectroscopic data of 1,2-diphenylethene dimers **7-4-26**~**7-4-28**.

H	7-4-26	7-4-27	7-4-28	H	7-4-26	7-4-27	7-4-28
2a	7.25 d(8.5)	7.25 d(8.6)	6.98 d(2.1)	4b			6.62 d(8.7)
3a	6.86 d(8.5)	6.85 d(8.6)		5b	6.87 d(8.2)	6.88 d(8.2)	6.34 d(8.7)
5a	6.86 d(8.5)	6.85 d(8.6)	6.76 d(8.4)	6b	7.43 br d(8.2)	7.44 br d(8.2)	
6a	7.25 d(8.5)	7.25 d(8.6)	6.64 dd(8.4, 2.1)	7b	7.06 d(16.3)	7.14 d(16.3)	7.34 d(16.5)
7a	5.52 d(7.8)	5.46 d(8)	5.48 d(7.5)	8b	6.90 d(16.3)	6.95 d(16.3)	7.48 d(16.5)
8a	4.53 d(7.8)	4.47 d(8)	4.28 d(7.5)	10b	6.53 d(2)	6.81 br s	6.43 d(2.1)
10a	6.35 t(2)	6.19 d(2.1)	6.15 d(2.1)	12b	6.25 t(2)	6.53 t(2)	6.20 t(2.1)
12a	6.52 t(2)	6.28 t(2.1)	6.17 t(2.1)	14b	6.53 d(2)	6.68 br s	6.43 d(2.1)
14a	6.44 t(2)	6.19 d(2.1)	6.15 d(2.1)	1′	4.94 d(7.6)	4.94 d(7.4)	
2b	7.26 br s	7.27 br s		3a-OMe			3.75 s

Table 7-4-9: ^{1}H NMR spectroscopic data of 1,2-diphenylethene dimers **7-4-29**~**7-4-32**.

H	7-4-29	7-4-30	7-4-31	7-4-32
2a	6.76 d(2.0)	7.00 d(2.0)		6.83 d(2.0)
3a			6.42 d(2.2)	
5a	6.72 d(8.2)	6.83 d(8.7)	6.25 dd(2.2, 8.2)	6.83 d(8.4)
6a	6.65 dd(2.0, 8.2)	6.83 dd(2.0, 8.7)	6.98 d(8.2)	6.73 dd(2.0, 8.4)
7a	5.25 d(5.0)	5.38 d(5.4)	5.70 d(3.7)	5.33 d(4.5)
8a	4.33 d(5.0)	4.42 d(5.4)	4.39 d(3.7)	4.37 d(4.5)
10a,14a	6.12 d(2.0)	6.18 d(2.0)	6.22 d(2.4)	6.16 d(2.0)
12a	6.14 t(2.0)	6.24 t(2.0)	6.17 t(2.4)	6.23 t(2.0)
2b	7.36 d(8.4)	7.24 d(2.0)	7.19 d(2.0)	7.26 d(2.0)

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Table 7-4-9 (continued)

H	7-4-29	7-4-30	7-4-31	7-4-32
3b	6.76 d(8.4)			
5b	6.76 d(8.4)	6.84 d(8.7)	6.78 d(8.2)	6.85 d(8.4)
6b	7.36 d(8.4)	7.04 dd(2.0, 8.7)	7.00 dd(2.0, 8.2)	7.05 dd(2.0, 8.4)
7b	7.00 d(16.3)	7.11 d(16.0)	7.06 d(16.0)	7.13 d(16.2)
8b	6.87 d(16.3)	7.01 d(16.0)	6.97 d(16.0)	7.04 d(16.2)
10b	6.50 br s	6.70 br s	6.68 br s	6.70 d(1.0)
14b	6.62 br s	6.60 br s	6.52 br s	6.59 d(1.0)
3a-OMe		3.83 s		
3b-OMe		3.90 s	3.85 s	3.90 s

Table 7-4-10: ^{1}H NMR spectroscopic data of 1,2-diphenylethene dimers **7-4-33**~**7-4-36**.

H	7-4-33	7-4-34	7-4-35	7-4-36
2a	6.83 d(2.0)	7.14 d(8.6)		
3a		6.80 d(8.6)	6.46 d(2.4)	6.50 br s
5a	6.81 d(8.6)	6.80 d(8.6)	6.30 dd(2.4, 8.6)	6.33 dd(2.1, 8.4)
6a	6.71 dd(2.0, 8.6)	7.14 d(8.6)	7.00 d(8.6)	7.07 d(8.4)
7a	5.32 d(4.6)	5.30 d(4.8)	5.72 d(3.4)	5.78 d(3.6)
8a	4.36 d(4.6)	4.30 d(4.8)	4.40 d(3.4)	4.46 d(3.6)
10a,14a	6.16 d(2.0)	6.12 d(2.0)	6.26 d(2.4)	6.30 d(2.4)
12a	6.23 t(2.0)	6.19 t(2.0)	6.21 t(2.4)	6.24 t(2.4)
2b	7.10 d(2.0)	7.02 d(8.8)	7.06 d(8.6)	
3b		6.71 d(8.8)	6.77 d(8.6)	6.50 br s
5b	6.82 d(8.6)	6.71 d(8.8)	6.77 d(8.6)	6.44 dd(2.4, 8.4)
6b	6.92 dd(8.6, 2.0)	7.02 d(8.8)	7.06 d(8.6)	7.47 d(2.4)
7b	7.04 d(16.2)	2.75 m	2.79 m	7.43 d(16.5)
8b	6.91 d(16.2)	2.76 m	2.81 m	7.03 d(16.5)
10b	6.78 br s	6.28 br s	6.72 br s	6.61 br s
14b	6.57 br s	6.25 br s	6.34 br s	6.72 br s

Table 7-4-11: ^{1}H NMR spectroscopic data of 1,2-diphenylethene dimers **7-4-37**~**7-4-40**.

H	7-4-37	7-4-38	7-4-39	7-4-40
2a	7.27 d(8.8)		7.23 d(8.8)	7.22 d(8.8)
3a	7.09 d(8.8)	6.22 d(2.0)	6.86 d(8.8)	7.03 d(8.8)
5a	7.09 d(8.8)	6.51 dd(2.0, 8.8)	6.86 d(8.8)	7.03 d(8.8)
6a	7.27 d(8.8)	7.08 d(8.8)	7.23 d(8.8)	7.22 d(8.8)
7a	5.37 d(4.8)	5.67 d(5.0)	5.39 d(4.5)	5.40 d(4.2)
8a	4.38 d(4.8)	4.35 d(5.0)	4.39 d(4.5)	4.32 d(4.2)
10a	6.44 t(2.0)	6.21 d(2.0)	6.20 d(2.0)	6.00 d(2.1)

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Table 7-4-11 (continued)

H	7-4-37	7-4-38	7-4-39	7-4-40
12a	6.37 t(2.0)	6.12 t(2.0)	6.26 t(2.0)	6.05 t(2.1)
14a	6.23 t(2.0)	6.21 d(2.0)	6.20 d(2.0)	6.00 d(2.1)
2b,6b	7.40 d(8.8)	7.47 d(8.8)	7.09 d(8.8)	7.52 d(8.8)
3b,5b	7.11 d(8.8)	7.06 d(8.8)	6.86 d(8.8)	7.03 d(8.8)
7b	7.07 d(16.0)	7.05 d(16.0)	7.12 d(16.0)	7.08 d(16.0)
8b	6.97 d(16.0)	6.95 d(16.0)	6.99 d(16.0)	7.01 d(16.0)
10b	6.67 br s	6.69 br s	6.73 br s	6.70 d(1.8)
14b	6.54 br s	6.50 br s	6.61 br s	6.51 d(1.8)
1′	4.70 d(7.5)①	4.69 d(7.6)		4.84 d(7.7)
2′	2.98~3.48 m	3.15~3.45 m		3.25 m
3′	2.98~3.48 m	3.15~3.45 m		3.29 m
4′	2.98~3.48 m	3.15~3.45 m		3.16 m
5′	2.98~3.48 m	3.15~3.45 m		3.33 m
6′	3.70 m, 3.83 m	3.47 m, 3.68 m		3.45 m, 3.68 m
1″	4.83 d(7.5)①	4.87 d(7.6)		4.88 d(7.7)
2″	2.98~3.48 m	3.15~3.45 m		3.25 m
3″	2.98~3.48 m	3.15~3.45 m		3.29 m
4″	2.98~3.48 m	3.15~3.45 m		3.16 m
5″	2.98~3.48 m	3.15~3.45 m		3.33 m
6″	3.70 m, 3.83 m	3.47 m, 3.68 m		3.45 m, 3.68 m
1‴	4.86 d(7.5)			
2‴	2.98~3.48 m			
3‴	2.98~3.48 m			
4‴	2.98~3.48 m			
5‴	2.98~3.48 m			
6‴	3.70 m, 3.83 m			
OH			8.48 br s(2H)	9.37 br s
			8.20 br s(2H)	9.10 br s(2H)
			8.18 br s	

① Assignments may be exchanged in the column.

Table 7-4-12: ^{1}H NMR spectroscopic data of 1,2-diphenylethene dimers **7-4-41**~**7-4-45**.

H	7-4-41	7-4-42	7-4-43	7-4-44	7-4-45
2a,6a	7.30 d(8.8)	7.20 d(8.8)	7.21 d(8.8)	7.23 d(8.5)	6.76 s
3a,5a	7.08 d(8.8)	6.85 d(8.8)	7.03 d(8.8)	6.85 d(8.5)	6.76 s
7a	5.44 d(4.8)	5.38 d(4.9)	5.35 d(4.4)	5.43 d(4.9)	5.04 d(7.3)
8a	4.40 d(4.8)	4.32 d(4.9)	4.21 d(4.4)	4.43 d(4.9)	3.26 br s
10a,14a	6.18 d(1.8)	6.17 d(2.0)	6.00 d(2.2)	6.19 d(2.2)	5.92 br d(2.0)
12a	6.22 t(1.8)	6.25 t(2.0)	6.06 t(2.2)	6.25 t(2.2)	6.16 t(2.0)
2b	7.45 d(8.8)	7.51 d(8.8)	7.24 d(8.8)		6.97 d(8.3)
3b	6.85 d(8.8)	7.08 d(8.8)	6.95 d(8.8)	7.01 d(2.2)	6.77 d(8.3)

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Table 7-4-12 (continued)

H	7-4-41	7-4-42	7-4-43	7-4-44	7-4-45
5b	6.85 d(8.8)	7.08 d(8.8)	6.95 d(8.8)	6.82 dd(8.3, 2.2)	6.77 d(8.3)
6b	7.45 d(8.8)	7.51 d(8.8)	7.24 d(8.8)	7.42 d(8.3)	6.97 d(8.3)
7b	7.11 d(16.0)	7.12 d(16.0)	6.50 d(12.6)	7.12 br s	5.28 d(10.7)
8b	6.98 d(16.0)	6.99 d(16.0)	6.45 d(12.6)		3.28 d(10.7)
10b	6.72 br s	6.72 br s	6.29 d(2.4)	6.97 br s(ov)	6.18 d(2.0)
14b	6.60 br s	6.61 br s	6.32 d(2.4)	6.97 br s(ov)	7.16 br s
1′	4.96 d(7.3)	4.99 d(7.6)	5.00 d(7.2)		
2′	3.40~3.82 m	3.48~3.51 m	3.26 m		
3′	3.40~3.82 m	3.48~3.51 m	3.35~3.46 m		
4′	3.40~3.82 m	3.48~3.51 m	3.17 m		4.43 br s
5′	3.40~3.82 m	3.48~3.51 m	3.35~3.46 m		4.23 br s
6′	3.88 m	3.86 m	3.51 m, 3.75 m		3.97 dd(9.8, 4.4)
					4.07 dd(9.8, 2.4)
1″			5.00 d(7.2)		
2″			3.26 m		
3″			3.35~3.46 m		
4″			3.17 m		
5″			3.35~3.46 m		
6″			3.15 m, 3.75 m		

Note: Signals of hydroxyls of **7-4-41** were resonated at δ 8.51 br s, 8.17 br s(2H), and 8.16 br s; Signals of hydroxyls of **7-4-42** were resonated at δ 8.55 br s, 8.20 br s, and 8.19 br s(2H); Signals of hydroxyls of **7-4-43** were resonated at δ 9.29 br s and 9.14 br s(2H); Signals of hydroxyls of **7-4-44** were resonated at δ 8.54 br s, 8.43 br s, 8.33 br s, and 8.16 br s(2H); Signals of hydroxyls of **7-4-45** were resonated at δ 5.24 br s(2′-OH) and 4.79 br s(5′-OH).

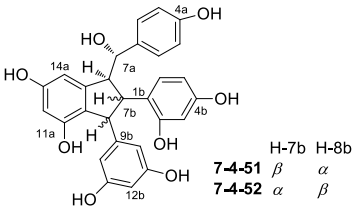
Table 7-4-13: ^{1}H NMR spectroscopic data of 1,2-diphenylethene dimers **7-4-46**~**7-4-50**.

H	7-4-46	7-4-47	7-4-48	7-4-49	7-4-50
2	6.00 s	5.87 s	5.89 s	6.01 s	5.87 s
6	5.90 d(1.5)	5.97 d(1.5)	5.95 d(1.5)	5.90 d(1.5)	5.95 d(1.5)
8	6.21 d(1.5)	6.16 d(1.5)	6.16 d(1.5)	6.29 d(1.5)	6.16 d(1.5)
2′,6′	6.99 d(8.3)	6.92 d(8.3)	6.93 d(8.3)	7.02 d(8.0)	6.91 d(8.0)
3′,5′	6.52 d(8.3)	6.70 d(8.3)	6.70 d(8.3)	6.54 d(8.0)	6.70 d(8.0)
4″	6.36 d(1.5)	6.41 d(1.5)	6.42 d(1.5)	6.38 d(1.5)	
6″	6.65 d(1.5)	6.96 d(1.5)	6.94 d(1.5)	6.61 d(1.5)	7.02 s
2‴,6‴	7.24 d(8.3)	7.14 d(8.3)	6.38 s	6.47 s	6.26 d(1.5)
3‴,5‴	6.81 d(8.3)	6.73 d(8.3)			
4‴					6.19 d(1.5)
α	6.53 d(16.2)	6.96 d(16.2)	6.95 d(16.2)	6.56 s	7.02 d(16.0)
β	6.73 d(16.2)	7.05 d(16.2)	6.93 d(16.2)	6.56 s	6.88 d(16.0)
OMe			3.82 s	3.85 s	3.85 s

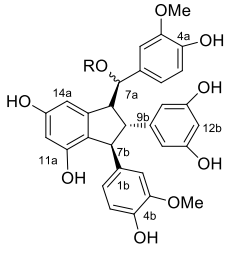
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Table 7-4-14: Compounds, MFs, and test solvents of 1,2-diphenylethene dimers **7-4-51**~**7-4-81**.

No.	Compounds	MFs	Test solvents	References
7-4-51	gnetuhainin D	$C_{28}H_{24}O_8$	CD_3COCD_3	[92]
7-4-52	gnetuhainin E	$C_{28}H_{24}O_8$	CD_3COCD_3	[92]
7-4-53	gnetuhainin I	$C_{30}H_{28}O_9$	CD_3COCD_3	[93]
7-4-54	lehmbachol A	$C_{31}H_{30}O_9$	CD_3OD	[115]
7-4-55	lehmbachol B	$C_{31}H_{30}O_9$	CD_3OD	[115]
7-4-56	lehmbachol C	$C_{32}H_{32}O_9$	CD_3OD	[115]
7-4-57	leachianol F	$C_{28}H_{24}O_7$	CD_3COCD_3	[116]
7-4-58	leachianol G	$C_{28}H_{24}O_7$	CD_3COCD_3	[116]
7-4-59	parthenostilbenin A	$C_{29}H_{26}O_7$	CD_3COCD_3	[117]
7-4-60	parthenostilbenin B	$C_{29}H_{26}O_7$	CD_3COCD_3	[117]
7-4-61	quadrangularin B	$C_{30}H_{28}O_7$	CD_3OD	[118]
7-4-62	quadrangularin C	$C_{30}H_{28}O_7$	CD_3OD	[118]
7-4-63	quadrangularin A	$C_{28}H_{22}O_6$	CD_3OD	[118]
7-4-64	gnetuhainin J	$C_{29}H_{24}O_8$	CD_3COCD_3	[93]
7-4-65	gnetulin	$C_{30}H_{26}O_8$	CD_3COCD_3	[105]
7-4-66	(–)-ampelopsin D	$C_{28}H_{22}O_6$	CD_3OD	[119]
7-4-67	parthenocissin A	$C_{28}H_{22}O_6$	CD_3COCD_3	[120]
7-4-68	hemsleyanoside A	$C_{40}H_{42}O_{16}$	CD_3OD	[102]
7-4-69	caraphenol B	$C_{28}H_{22}O_7$	CD_3COCD_3	[121]
7-4-70	caraphenol C	$C_{28}H_{22}O_7$	CD_3COCD_3	[121]
7-4-71	parvifolol A	$C_{28}H_{22}O_7$	CD_3COCD_3	[105]
7-4-72	parvifolol B	$C_{28}H_{22}O_7$	CD_3COCD_3	[105]
7-4-73	parvifolol C	$C_{28}H_{22}O_8$	CD_3COCD_3	[105]
7-4-74	orientoside A	$C_{34}H_{30}O_{12}$	CD_3OD	[122]
7-4-75	gneafricanin F	$C_{30}H_{26}O_8$	CD_3OCD_3	[108]
7-4-76	pallidol	$C_{28}H_{22}O_6$	CD_3OCD_3	[123]
7-4-77	cararosinol C	$C_{28}H_{22}O_7$	CD_3COCD_3	[124]
7-4-78	cararosinol D	$C_{28}H_{22}O_8$	CD_3COCD_3	[124]
7-4-79	pallidol 3-*O*-glucoside	$C_{34}H_{32}O_{11}$	CD_3OD	[101]
7-4-80	pallidol 3,3″-diglucoside	$C_{40}H_{42}O_{16}$	CD_3OD	[101]
7-4-81	vitisinol D	$C_{28}H_{22}O_6$	CD_3COCD_3	[125]

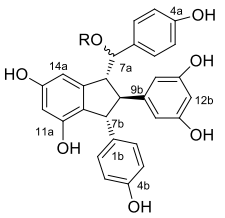


	H-7b	H-8b
7-4-51	β	α
7-4-52	α	β

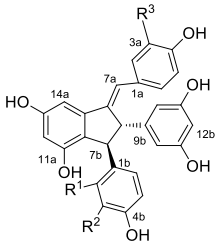


	R	H-7a
7-4-53	H	α
7-4-54	Me	α or β
7-4-55	Me	β or α
7-4-56	Et	

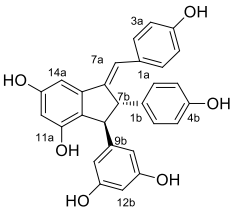
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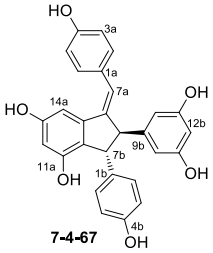
	R	H-7a
7-4-57	H	β
7-4-58	H	α
7-4-59	Me	α
7-4-60	Me	β
7-4-61	Et	α
7-4-62	Et	β



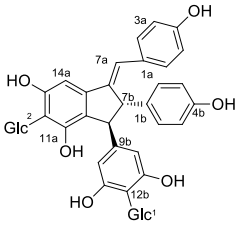
	R^1	R^2	R^3
7-4-63	H	H	H
7-4-64	OH	H	OMe
7-4-65	H	OMe	OMe



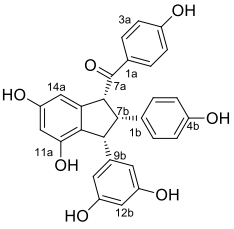
7-4-66



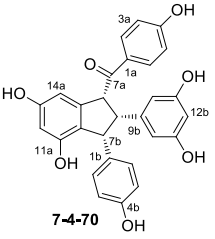
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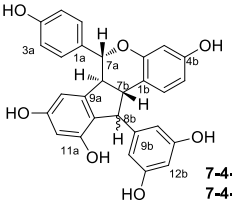
7-4-68



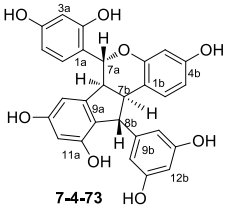
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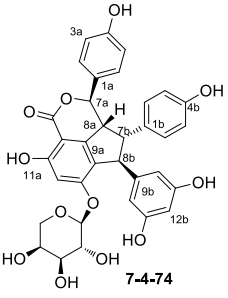
7-4-70



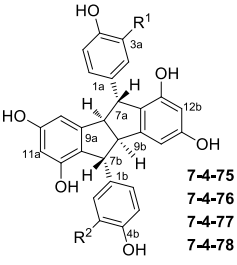
7-4-71 H-8b α
7-4-72 H-8b β



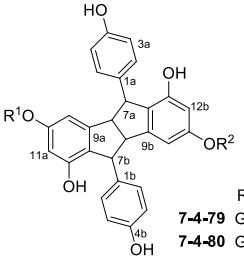
7-4-73



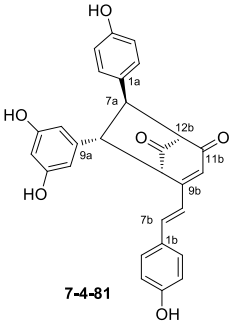
7-4-74



	R^1	R^2
7-4-75	OMe	OMe
7-4-76	H	H
7-4-77	H	OH
7-4-78	OH	OH



	R^1	R^2
7-4-79	Glc	H
7-4-80	Glc	Glc



7-4-81

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Table 7-4-15: ^{1}H NMR spectroscopic data of 1,2-diphenylethene dimers **7-4-51**~**7-4-54**.

H	7-4-51	7-4-52	7-4-53	7-4-54
2a	7.40 d(8.4)	7.14 d(8.4)	6.52 d(2.1)	6.32 d(1.6)
3a	6.95 d(8.4)	6.81 d(8.4)		
5a	6.95 d(8.4)	6.81 d(8.4)	6.64 d(8.4)	6.65 d(8.0)
6a	7.40 d(8.4)	7.14 d(8.4)	6.48 dd(8.4, 2.1)	6.38 dd(8.0, 1.6)
7a	5.32 d(10.5)	4.67 d(8.4)	4.48 d(8.1)	3.93 d(8.0)
8a	3.30 t(10.5)	3.51 (ov)	3.32 (ov)	3.32 dd(4.0, 8.0)
12a	6.07 br s	6.19 d(1.9)	6.28 t(2.1)	6.25 d(2.1)
14a	5.47 br s	5.59 d(1.9)	6.57 d(2.1)	6.67 d(2.1)
2b			6.60 d(2.1)	6.51 d(1.9)
3b	6.28 d(2.1)	6.29 d(2.1)		
5b	6.29 dd(2.1, 8.4)	6.28 dd(2.1, 8.4)	6.67 d(8.4)	6.68 d(8.2)
6b	6.94 d(8.4)	6.64 d(8.4)	6.41 dd(8.4, 2.1)	6.39 dd(8.2, 1.9)
7b	3.46 (ov)	3.50 (ov)	4.16 d(5.7)	4.16 d(4.0)
8b	4.02 d(10.5)	4.10 d(7.2)	2.91 dd(5.7, 8.1)	2.71 dd(4.0, 4.0)
10b	6.51 d(2.1)	6.28 d(2.1)	5.88 d(2.1)	5.73 d(2.1)
12b	6.29 t(2.1)	6.28 t(2.1)	6.09 d(2.1)	6.00 d(2.1)
14b	6.51 d(2.1)	6.28 d(2.1)	5.88 d(2.1)	5.73 d(2.1)
7a-OMe				3.09 s
3a-OMe			3.62 s	3.61 s
3b-OMe			3.69 s	3.72 s

Table 7-4-16: ^{1}H NMR spectroscopic data of 1,2-diphenylethene dimers **7-4-55**~**7-4-58**.

H	7-4-55	7-4-56	7-4-57	7-4-58
2a	6.81 d(1.6)	6.31 d(1.7)	6.87 d(8)	7.07 d(8)
3a			6.68 d(8)	6.72 d(8)
5a	6.69 d(8.0)	6.63 d(7.8)	6.68 d(8)	6.72 d(8)
6a	6.58 dd(8.0, 1.6)	6.38 dd(7.8, 1.7)	6.87 d(8)	7.07 d(8)
7a	4.00 d(7.0)	4.00 d(9.3)	4.47 dd(8, 4)	4.48 dd(8, 4)
8a	3.52 dd(5.2, 7.0)	3.30 dd(2.9, 9.3)	3.37 dd(8, 4)	3.40 dd(8, 4)
12a	6.14 d(2.0)	6.25 d(2.1)	6.30 d(2)	6.22 d(2)
14a	6.11 d(2.0)	6.69 d(2.1)	6.57 d(2)	5.75 d(2)
2b	6.38 d(1.7)	6.53 d(1.8)	6.85 d(8)	6.87 d(8)
3b			6.73 d(8)	6.71 d(8)
5b	6.61 d(8.0)	6.69 d(7.9)	6.73 d(8)	6.71 d(8)
6b	6.33 dd(8.0, 1.7)	6.41 dd(7.9, 1.8)	6.85 d(8)	6.87 d(8)
7b	4.13 d(4.9)	4.18 d(2.9)	4.23 d(4)	4.26 d(4)
8b	3.16 dd(4.9, 5.2)	2.71 dd(2.9, 3.1)	2.95 t(4)	3.48 t(4)
10b,14b	4.8 m	5.73 d(2.1)	5.92 d(2)	6.14 d(2)
12b	4.8 m	5.99 d(2.1)	6.12 t(2)	6.16 t(2)
7a-OMe	3.06 s			
3a-OMe	3.61 s	3.61 s		
3b-OMe	3.70 s	3.72 s		
7a-OEt		3.18 m, 3.25 m, 1.11 t(6.9)		

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Table 7-4-17: ^{1}H NMR spectroscopic data of 1,2-diphenylethene dimers **7-4-59**~**7-4-62**.

H	7-4-59	7-4-60	7-4-61	7-4-62
2a,6a	6.88 d(8.5)	7.05 d(8.5)	6.95 d(8.5)	6.66 d(8.5)
3a,5a	6.72 d(8.5)	6.82 d(8.5)	6.12 d(8.5)	6.60 d(8.5)
7a	3.94 d(9.1)	4.30 d(8.0)	3.95 d(8.5)	3.95 d(9.5)
8a	3.33 dd(9.1, 3.0)	3.42 dd(8.4, 3.5)	3.31 m	3.27 m
12a	6.38 d(2.1)	6.27 d(2.0)	6.12 d(2)	6.24 d(2)
14a	6.69 d(2.1)	5.74 d(2.0)	5.62 d(2)	6.67 d(2)
2b,6b	6.79 d(8.6)	6.89 d(8.4)	6.81 d(8.5)	6.79 d(8.5)
3b,5b	6.77 d(8.8)	6.77 d(8.6)	6.65 d(8.5)	6.68 d(8.5)
7b	4.25 d(2.6)	3.93 d(3.0)	4.21 d(3)	4.17 d(2.5)
8b	2.84 t(2.9)	3.46 t(3.5)	3.39 m	2.74 dd(3, 2.5)
10b,14b	5.85 d(2.2)	6.09 d(1.8)	6.09 d(2)	5.73 d(2)
12b	6.14 t(2.2)	6.20 d(1.8)	6.07 t(2)	5.99 t(2)
7a-OMe	3.06 s	2.96 s		
7a-OEt			2.96 dq(9, 7)	3.14 dq(9.5, 7)
			3.20 dq(9, 7)	3.28 dq(9.5, 7)
			0.96 t(7)	1.09 t(7)

Table 7-4-18: ^{1}H NMR spectroscopic data of 1,2-diphenylethene dimers **7-4-63**~**7-4-66**.

H	7-4-63	7-4-64	7-4-65	7-4-66
2a	7.11 d(8.5)	6.85 d(2.1)	6.89 d(2)	7.08 d(8.8)
3a	6.59 d(8.5)			6.56 d(8.8)
5a	6.59 d(8.5)	6.64 d(8.4)	6.69 d(8)	6.56 d(8.8)
6a	7.11 d(8.5)	6.76 dd(8.4, 2.1)	6.83 dd(8, 2)	7.08 d(8.8)
7a	6.97 s	6.94 br s	7.05 br s	6.96 d(2.2)
12a	6.16 d(2.0)	6.19 d(2.1)	6.31 d(2)	6.18 d(2.2)
14a	6.69 d(2.0)	6.69 d(2.1)	6.78 d(2)	6.69 d(2.2)
2b	6.87 d(8.5)		6.74 d(2)	7.02 d(8.8)
3b	6.62 d(8.5)	6.36 d(2.1)		6.67 d(8.8)
5b	6.62 d(8.5)	6.06 dd(8.4, 2.1)	6.64 d(8)	6.67 d(8.8)
6b	6.87 d(8.5)	6.34 d(8.4)	6.51 dd(8, 2)	7.02 d(8.8)
7b	4.16 s	4.51 br s	4.27 br s	4.17 br s
8b	4.02 s	4.21 br s	4.19 br s	4.05 br s
10b,14b	6.21 d(2.0)	6.37 d(2.1)	6.34 d(2)	6.06 d(2.2)
12b	6.09 t(2.0)	6.12 t(2.1)	6.20 t(2)	6.04 t(2.2)
3a-OMe		3.53 s	3.57 s	
3b-OMe			3.71 s	

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Table 7-4-19: ^{1}H NMR spectroscopic data of 1,2-diphenylethene dimers **7-4-67**~**7-4-70**.

H	7-4-67	7-4-68	7-4-69	7-4-70
2a,6a	7.20 d(8.3)	7.07 d(8.8)	7.90 d(8.8)	7.93 d(8.4)
3a,5a	6.72 d(8.3)	6.58 d(8.8)	6.92 d(8.8)	6.96 d(8.4)
7a	6.31 br s	6.97 br s		
8a			5.12 d(8.7)	5.10 d(8.2)
12a	6.26 d(1.5)		6.26 d(1.4)	6.26 d(1.3)
14a	6.52 d(1.5)	6.78 s	5.99 d(1.4)	6.00 d(1.3)
2b,6b	6.99 d(8.8)	7.02 d(8.5)	7.08 d(8.6)	6.94 d(8.3)
3b,5b	6.80 d(8.8)	6.67 d(8.5)	6.72 d(8.6)	6.70 d(8.3)
7b	4.26 d(1.8)	4.17 br s	3.95 t(8.7)	4.36 d(8.2)
8b	3.45 br s	4.09 br s	4.24 d(8.7)	3.81 t(8.2)
10b,14b	6.19 br s	6.15 br s	6.15 d(2.2)	6.24 d(1.9)
12b	6.19 br s		6.18 t(2.2)	6.17 t(1.9)
1′		4.82 d(9.8)		
2′		3.63 m		
3′		3.43 m		
4′		3.48 m		
5′		3.28 m		
6′		3.72 m, 3.78 m		
1″		4.93 d(9.8)		
2″		3.85 m		
3″		3.44 m		
4″		3.42 m		
5″		3.38 m		
6″		3.67 m, 3.76 m		

Table 7-4-20: ^{1}H NMR spectroscopic data of 1,2-diphenylethene dimers **7-4-71**~**7-4-74**.

H	7-4-71	7-4-72	7-4-73	7-4-74
2a	7.43 br d(9)	7.29 d(8)		6.90 d(8.6)
3a	6.95 d(9)	6.83 d(8)	6.39 d(2)	6.73 d(8.6)
5a	6.95 d(9)	6.83 d(8)	6.37 dd(8, 2)	6.73 d(8.6)
6a	7.43 br d(9)	7.29 d(8)	7.14 d(8)	6.90 d(8.6)
7a	5.36 br d(10)	5.05 d(10)	5.17 d(9)	4.80 d(12.3)
8a	3.35 br dd(10, 11)	3.78 br dd(10, 11)	3.77 dd(9, 7)	4.29 dd(12.2, 7.7)
12a	6.07 d(2.0)	6.05 d(2.0)	6.10 d(2)	6.70 br s
14a	5.54 dd(2, 1)	5.35 br s	5.82 d(2)	
2b				6.51 d(8.6)
3b	6.26 d(2)	6.06 d(2)	6.31 d(2)	6.58 d(8.7)
5b	6.23 dd(8, 2)	6.08 dd(9, 2)	6.30 dd(8, 2)	6.58 d(8.7)
6b	6.99 dd(8, 1)	6.91 br d(9)	6.69 d(8)	6.51 d(8.6)
7b	3.51 dd(11, 11)	3.55 dd(11, 7)	3.50 dd(7, 7)	3.43 d(7.8)
8b	4.07 br d(11)	4.58 d(7)	4.16 d(7)	4.50 br s
10b,14b	6.56 d(2)	6.12 d(2)	6.29 d(2)	6.10 d(2.1)

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Table 7-4-20 (continued)

H	7-4-71	7-4-72	7-4-73	7-4-74
12b	6.33 t(2)	5.96 t(2)	6.28 t(2)	6.15 t(2.1)
1′				5.04 d(6.7)
2′				3.72 dd(8.6, 6.8)
3′				3.58 dd(8.6, 3.6)
4′				3.86 m
5′				3.91 dd(12.4, 3.2)
				3.60 dd(12.0, 1.5)

Note: Signals of hydroxyls of **7-4-71** were resonated at *δ* 8.53, 8.21(2H), 8.07, 8.03, and 8.40; Signals of hydroxyls of **7-4-72** were resonated at *δ* 8.63, 8.07, 8.06, 7.97, and 7.69(2H); Signals of hydroxyls of **7-4-73** were resonated at *δ* 8.35, 8.28, 8.19(2H), 8.15, 8.02, and 6.74.

Table 7-4-21: ^{1}H NMR spectroscopic data of 1,2-diphenylethene dimers **7-4-75**~**7-4-78**.

H	7-4-75	7-4-76	7-4-77	7-4-78
2a	6.83 d(2.0)	6.98 d(8.0)	6.95 d(8.5)	6.57 d(2.0)
3a		6.71 d(8.0)	6.68 d(8.5)	
5a	6.68 d(8.0)	6.71 d(8.0)	6.68 d(8.5)	6.67 d(8.0)
6a	6.55 dd(8, 2)	6.98 d(8.0)	6.95 d(8.5)	6.50 dd(8, 2)
7a	4.57 br s	4.57 br s	4.51 s	4.46 s
8a	3.86 br s	3.82 br s	3.75 d(6.6)	3.76 s
12a	6.20 d(2.0)	6.19 d(2.0)	6.16 br s	6.15 d(2.0)
14a	6.64 d(2.0)	6.62 d(2.0)	6.58 d(2.3)	6.57 d(2.0)
2b	6.83 d(2.0)	6.98 d(8.0)	6.57 d(2.0)	6.57 d(2.0)
3b		6.71 d(8.0)		
5b	6.68 d(8.0)	6.71 d(8.0)	6.66 d(8.1)	6.67 d(8.0)
6b	6.55 dd(8.0, 2.0)	6.98 d(8.0)	6.49 dd(8.1, 2.0)	6.50 dd(8, 2)
7b	4.57 br s	4.57 br s	4.47 s	4.46 s
8b	3.86 br s	3.82 br s	3.78 d(6.6)	3.76 s
12b	6.20 d(2.0)	6.19 d(2.0)	6.16 br s	6.15 d(2.0)
14b	6.64 d(2.0)	6.62 d(2.0)	6.58 d(2.3)	6.57 d(2.0)
3a-OMe	3.78 s			
3b-OMe	3.78 s			

Table 7-4-22: ^{1}H NMR spectroscopic data of 1,2-diphenylethene dimers **7-4-79**~**7-4-81**.

H	7-4-79	7-4-80	7-4-81	H	7-4-79	7-4-80
2a, 6a	6.93 m	6.93 m	7.06 d(8.5)	1′	4.90 d(7.5)	4.8 (ov)
3a, 5a	6.66 m	6.65 m	6.72 d(8.5)	2′	3.44 m	3.40 m
7a	4.50 s	4.53 br s	3.76 t(9.0)	3′	3.44 m	3.40 m
8a	3.77 d(7)	3.78 br s	3.41 d(9.0)	4′	3.44 m	3.40 m
10a			6.17 d(1.5)	5′	3.44 m	3.40 m

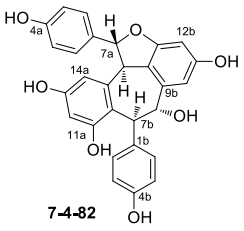
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Table 7-4-22 (continued)

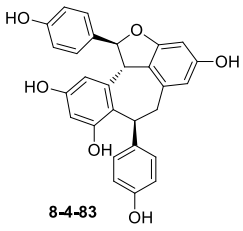
H	7-4-79	7-4-80	7-4-81	H	7-4-79	7-4-80
12a	6.39 d(2)	6.39 d(2)	6.23 d(1.5)	6′	3.70 dd(12.5, 5.5) 3.93 dd(12.5, 2)	3.70 dd(12.5, 5.5) 3.93 dd(12.5, 2)
14a	6.87 d(2)	6.87 d(2)	6.17 d(1.5)	1″		4.8 (ov)
2b, 6b	6.91 m	6.93 m	7.54 d(8.5)	2″		3.40 m
3b, 5b	6.65 m	6.65 m	6.86 d(8.5)	3″		3.40 m
7b	4.49 m	4.53 br s	7.26 d(16.0)	4″		3.40 m
8b	3.73 d(7)	3.78 br s	7.13 d(16.0)	5″		3.40 m
10b			6.24 s	6″		3.70 dd(12.5, 5.5) 3.93 dd(12.5, 2)
12b	6.10 d(1.5)	6.39 d(2)	3.64 br d(9.0)			
14b	6.51 d(1.5)	6.87 d(2)	3.86 br s			

Table 7-4-23: Compounds, MFs, and test solvents of 1,2-diphenylethene dimers **7-4-82**~**7-4-99**.

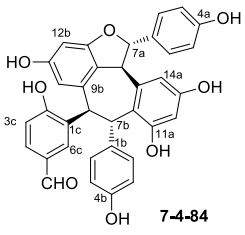
No.	Compounds	MFs	Test solvents	References
7-4-82	hemsleyanol A	$C_{28}H_{22}O_7$	CD_3COCD_3	[126]
7-4-83	(+)-ampelopsin B	$C_{28}H_{22}O_6$	CD_3OD	[119]
7-4-84	vitisinol B	$C_{35}H_{26}O_8$	CD_3COCD_3	[125]
7-4-85	(–)-ampelopsin A	$C_{28}H_{22}O_7$	CD_3COCD_3	[127]
7-4-86	(+)-balanocarpol	$C_{28}H_{22}O_7$	CD_3COCD_3	[127]
7-4-87	hopeahainanphenol	$C_{28}H_{20}O_8$	DMSO-d_6	[128]
7-4-88	hemsleyanoside F	$C_{34}H_{32}O_{12}$	CD_3OD	[129]
7-4-89	hopeafuran	$C_{28}H_{18}O_7$	CD_3COCD_3	[130]
7-4-90	malibatol A	$C_{28}H_{20}O_7$	CD_3COCD_3	[130]
7-4-91	malibatol B	$C_{28}H_{20}O_9$	CD_3OD	[131]
7-4-92	(+)-isoampelopsin F	$C_{28}H_{22}O_6$	CD_3COCD_3	[121]
7-4-93	(–)-ampelopsin F	$C_{28}H_{22}O_6$	CD_3COCD_3	[121]
7-4-94	(+)-ampelopsin F	$C_{28}H_{22}O_6$	CD_3OD	[119]
7-4-95	2b-hydroxyampelopsin F	$C_{28}H_{22}O_7$	CD_3COCD_3	[105]
7-4-96	gnetuhainin C	$C_{28}H_{22}O_7$	CD_3COCD_3	[92]
7-4-97	gnemonol M	$C_{30}H_{26}O_8$	CD_3COCD_3	[132]
7-4-98	(–)-heimiol A	$C_{28}H_{22}O_7$	CD_3COCD_3	[133]
7-4-99	parviflorol	$C_{21}H_{16}O_7$	CD_3COCD_3	[127]



7-4-82

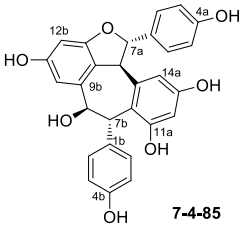


8-4-83

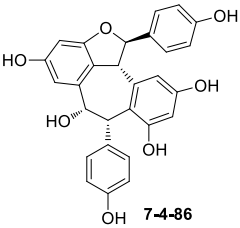


7-4-84

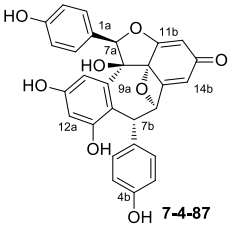
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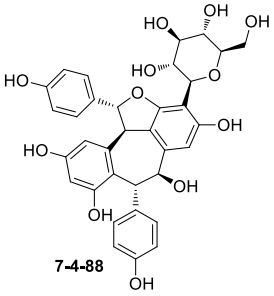
7-4-85



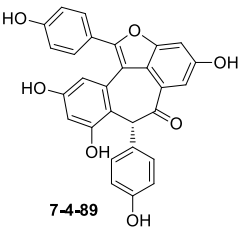
7-4-86



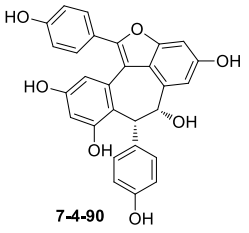
7-4-87



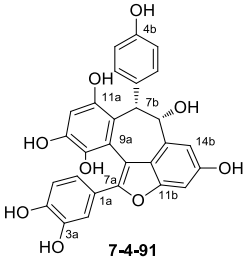
7-4-88



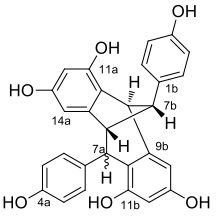
7-4-89



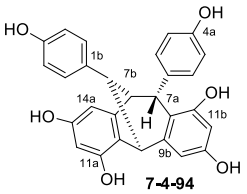
7-4-90



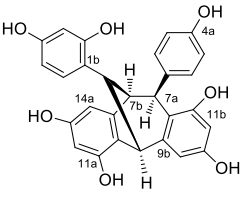
7-4-91



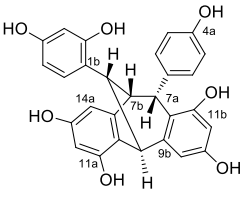
7-4-92 H-7aβ
7-4-93 H-7aα



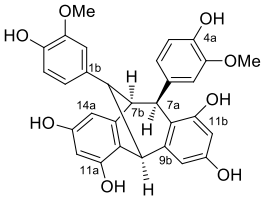
7-4-94



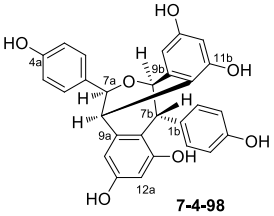
7-4-95



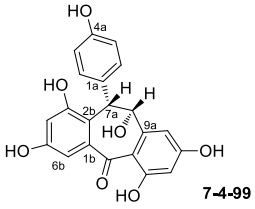
7-4-96



7-4-97



7-4-98



7-4-99

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Table 7-4-24: ^{1}H NMR spectroscopic data of 1,2-diphenylethene dimers **7-4-82**~**7-4-86**.

H	7-4-82	7-4-83	7-4-84	7-4-85	7-4-86
2a,6a	7.48 d(8.3)	7.00 d(8.8)	7.12 d(8.5)	7.09 d(8.8)	7.50 d(8.3)
3a,5a	6.94 d(8.3)	6.68 d(8.8)	6.76 d(8.5)	6.75 d(8.8)	6.95 d(8.3)
7a	5.75 d(9.8)	5.64 d(11.4)	5.84 d(11.5)	5.42 d(11.3)	5.69 d(9.3)
8a	5.41 d(9.8)	4.04 d(11.4)	4.26 d(11.5)	4.15 br d(11.3)	5.16 br d(9.3)
12a	6.24 br s	6.28 d(2.2)	6.02 br s	6.42 d(2.5)	6.09 br s
14a	6.23 br s	6.08 d(2.2)	6.21 s	6.21 br s	5.96 d(2.3)
2b,6b	6.72 d(8.3)	6.88 d(8.4)	7.04 d(8.5)	6.88 d(8.3)	6.75 d(8.3)
3b,5b	6.48 d(8.3)	6.58 d(8.4)	6.67 d(8.5)	6.62 d(8.3)	6.42 d(8.3)
7b	5.07 d(5.9)	5.13 t(4.0)	5.47 d(3.5)	5.45 d(4.9)	4.90 br s
8b	4.76 d(5.9)	3.52 dd(17.7, 4.0) 3.15 br d(17.7)	5.57 d(3.5)	5.42 br d(4.9)	5.40 br s
12b	6.04 d(2.0)	5.99 d(2.2)	6.10 d(2.0)	6.14 br d(1.9)	6.20 br s
14b	5.70 d(2.0)	6.25 d(2.2)	6.14 d(2.0)	6.64 d(1.9)	6.26 d(2.0)
3c			6.95 d(8.5)		
4c			7.42dd(8.5, 2.0)		
6c			6.66 d(2.0)		
7c			9.31 s		

Note: Signals of hydroxyls of **7-4-82** were resonated at δ 8.63 br s, 8.02 br s, 8.01 br s, 7.91 br s(2H), 4.45 br s; Signals of hydroxyls of **7-4-85** were resonated at δ 8.40 br s, 8.32 br s, 8.26 br s, 8.17 br s, 8.08 br s, 3.57 br s; Signals of hydroxyls of **7-4-86** were resonated at δ 8.56 br s, 8.04 br s, 7.97 br s, 7.85 br s, 7.74 br s, 4.36 br s.

Table 7-4-25: ^{1}H NMR spectroscopic data of 1,2-diphenylethene dimers **7-4-87**~**7-4-91**.

H	7-4-87	7-4-88	7-4-89	7-4-90	7-4-91
2a	7.57 d(8.5)	7.05 d(8.8)	7.70 d(8.8)	7.45 d(8.8)	9.34 d(2.0)
3a	6.88 d(8.5)	6.69 d(8.8)	6.98 d(8.8)	6.92 d(8.8)	
5a	6.88 d(8.5)	6.69 d(8.8)	6.98 d(8.8)	6.92 d(8.8)	8.17 d(9.0)
6a	7.57 d(8.5)	7.05 d(8.8)	7.70 d(8.8)	7.54 d(8.8)	7.12 dd(9.0, 2.0)
7a	5.93 s	5.77 d(11.4)			
8a		4.06 d(11.4)			
12a	6.47 d(2.2)	6.31 d(1.8)	6.57 d(2.6)	6.49 d(2.4)	6.74 s
14a	6.09 d(2.2)	6.14 br s	6.70 d(2.6)	6.66 d(2.4)	
2b,6b	6.85 d(8.5)	6.82 d(8.4)	6.85 dd(8.3, 1.3)	7.20 d(8.6)	6.77 dd(9.0, 2.0)
3b,5b	6.54 d(8.5)	6.57 d(8.4)	6.55 d(8.3)	6.45 d(8.6)	6.27 dd(9.0, 2.0)
7b	5.98 br s	5.37 br s	6.12 br s	5.59 br s	5.77 d(3.0)
8b	4.53 t(1.7)	5.38 br s		5.43 br s	5.46 dd(3.0, 1.0)
12b	5.51 d(1.0)		7.04 d(2.1)	6.67 d(2.0)	6.86 d(2.0)
14b	6.02 t(1.7)	6.56 s	7.34 d(2.1)	7.22 d(2.0)	6.96 dd(2.0, 1.0)
1′		4.60 d(9.9)			
2′		4.04 t(9.9)			

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Table 7-4-25 (continued)

H	7-4-87	7-4-88	7-4-89	7-4-90	7-4-91
3′		3.38 dd(9.9, 8.7)			
4′		3.42 m			
5′		3.33 m			
6′		3.69 dd(12.0, 4.6)			
		3.82 dd(12.0, 2.6)			

Note: Signals of hydroxyls of **7-4-87** were resonated at *δ* 9.82 br s, 9.71 br s, 9.40 br s, 9.06 br s, and 6.01 br s; Signals of hydroxyls of **7-4-89** were resonated at *δ* 8.92 br s, 8.80 br s(2H), 8.36 br s, and 8.00 br s; Signals of hydroxyls of **7-4-90** were resonated at *δ* 8.46-7.81 br s(5H) and 5.35 br d.

Table 7-4-26: ^{1}H NMR spectroscopic data of 1,2-diphenylethene dimers **7-4-92**~**7-4-95**.

H	7-4-92	7-4-93	7-4-94	7-4-95
2a	5.83 dd(8.4, 2.2)	7.08 d(8.5)	6.97 d(7.5)	7.10 br d(9.0)
3a	6.37 dd(8.4, 2.6)	6.76 d(8.5)	6.63 d(7.5)	6.17 d(9.0)
5a	6.80 dd(8.2, 2.6)	6.76 d(8.5)	6.63 d(7.5)	6.17 d(9.0)
6a	7.32 dd(2.2, 8.2)	7.08 d(8.5)	6.97 d(7.5)	7.10 br d(9.0)
7a	4.51 d(5.5)	4.18 d(1.5)	4.07 br s	4.28 br s
8a	3.39 d(5.5)	3.34 br s	3.23 br s	3.40 br s
12a	6.04 d(1.9)	6.07 d(1.9)	5.94 d(2.5)	6.04 d(2)
14a	5.20 d(1.9)	6.51 d(1.9)	6.39 d(2.5)	5.68 br d(2)
2b	6.97 d(8.5)	6.78 d(8.5)	6.66 d(7.5)	
3b	6.64 d(8.5)	6.58 d(8.5)	6.44 d(7.5)	6.28 d(2)
5b	6.64 d(8.5)	6.58 d(8.5)	6.44 d(7.5)	6.03 dd(8, 2)
6b	6.97 d(8.5)	6.78 d(8.5)	6.66 d(7.5)	6.58 br d(8)
7b	3.58 br s	3.64 br s	3.52 br s	3.92 br s
8b	4.03 br s	4.12 br s	4.01 br s	4.14 br s
12b	6.14 d(2.5)	6.17 d(2.4)	6.03 d(2.5)	6.14 d(2)
14b	6.44 d(2.5)	6.44 d(2.4)	6.32 d(2.5)	6.24 br d(2)

Note: Signals of hydroxyls of **7-4-95** were resonated at *δ* 7.95, 7.90, 7.87, 7.84, 7.70, 7.17, and 7.81.

Table 7-4-27: ^{1}H NMR spectroscopic data of 1,2-diphenylethene dimers **7-4-96**~**7-4-99**.

H	7-4-96	7-4-97	7-4-98	7-4-99
2a	5.78 dd(8.7, 2.4)	6.96 d(2.0)	6.90 d(8.5)	6.86 br d(8.6)
3a	6.31 dd(8.7, 2.4)		6.60 d(8.5)	6.49 d(8.6)
5a	6.73 dd(8.7, 2.4)	6.73 d(8.4)	6.60 d(8.5)	6.49 d(8.6)
6a	7.23 dd(8.7, 2.4)	6.67 dd(2.0, 8.4)	6.90 d(8.5)	6.86 br d(8.6)
7a	4.44 d(5.4)	4.21 br s	5.57 br s	5.15 br s
8a	3.32 d(5.4)	3.45 br s	4.23 br s	5.32 br s
12a	5.96 d(2.4)	6.07 d(2.0)	6.16 d(2.4)	6.10 d(2.5)

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Table 7-4-27 (continued)

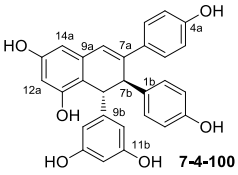
H	7-4-96	7-4-97	7-4-98	7-4-99
14a	5.13 d(2.4)	6.55 d(2.0)	6.40 d(2.4)	6.74 br d(2.5)
2b		6.61 d(2.0)	7.14 d(8.4)	
3b	6.30 d(2.4)		6.71 d(8.4)	
4b				6.73 d(1.9)
5b	5.98 dd(8.4, 2.4)	6.56 d(8.4)	6.71 d(8.4)	
6b	6.50 d(8.4)	6.40 dd(2.0, 8.4)	7.14 d(8.4)	7.41 d(1.9)
7b	3.76 br s	3.70 br s	4.32 d(3.3)	
8b	3.98 br s	4.14 br s	4.96 d(3.3)	
12b	6.06 d(2.4)	6.16 d(2.4)	6.23 d(2.1)	
14b	6.37 d(2.4)	6.44 d(2.4)	6.47 d(2.1)	
OMe		3.80 s(3a-OMe)		
		3.65 s(3b-OMe)		

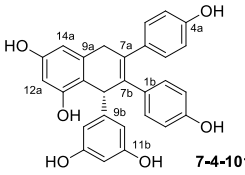
Note: Signals of hydroxyls of **7-4-90** were resonated at δ 14.10 s, 9.15 br s, 8.65 br s, 8.48 br s, 7.87 br s, and 5.20 d(4.0).

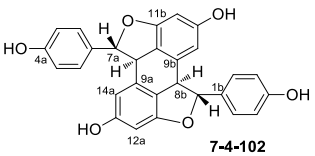
Table 7-4-28: Compounds, MFs, and test solvents of 1,2-diphenylethene dimers **7-4-100**~**7-4-123**.

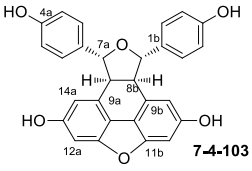
No.	Compounds	MFs	Test solvents	References
7-4-100	restrytisol C	$C_{28}H_{22}O_6$	CD_3COCD_3	[134]
7-4-101	cyphostemmin A	$C_{28}H_{22}O_6$	CD_3COCD_3	[135]
7-4-102	betulifol A	$C_{28}H_{20}O_6$	C_5D_5N	[136]
7-4-103	vitisinol A	$C_{28}H_{20}O_6$	CD_3OD	[125]
7-4-104	longusol C	$C_{28}H_{22}O_8$	CD_3OD	[96]
7-4-105	–	$C_{40}H_{34}O_{14}$	$CDCl_3$	[137]
7-4-106	–	$C_{40}H_{32}O_{14}$	$CDCl_3$	[137]
7-4-107	–	$C_{40}H_{36}O_{14}$	$CDCl_3$	[137]
7-4-108	restrytisol A	$C_{28}H_{24}O_7$	CD_3COCD_3	[134]
7-4-109	restrytisol B	$C_{28}H_{24}O_7$	CD_3COCD_3	[134]
7-4-110	artogomezianol	$C_{28}H_{24}O_8$	DMSO-d_6	[138]
7-4-111	tibeticanol	$C_{28}H_{22}O_8$	DMSO-d_6	[139]
7-4-112	gnetuhainin P	$C_{30}H_{28}O_9$	CD_3COCD_3	[104]
7-4-113	kompasinol A	$C_{25}H_{24}O_8$	CD_3OD	[140]
7-4-114	13-hydroxykompasinol A	$C_{25}H_{24}O_9$	CD_3OD	[141]
7-4-115	gnetifolin F	$C_{25}H_{24}O_7$	CD_3COCD_3	[142]
7-4-116	lehmbachol D	$C_{26}H_{26}O_8$	CD_3OD	[115]
7-4-117	gnetoforan A	$C_{25}H_{24}O_7$	CD_3COCD_3	[142]
7-4-118	gnetumontanin C	$C_{25}H_{22}O_7$	CD_3COCD_3	[109]
7-4-119	gnetumontanin D	$C_{31}H_{32}O_{12}$	CD_3COCD_3	[109]
7-4-120	vitisinol C	$C_{27}H_{24}O_5$	CD_3COCD_3	[125]
7-4-121	longusone A	$C_{27}H_{24}O_6$	CD_3OD	[96]
7-4-122	aiphanol	$C_{25}H_{24}O_8$	CD_3COCD_3	[143]
7-4-123	austrafuran A	$C_{25}H_{22}O_9$	CD_3COCD_3	[144]

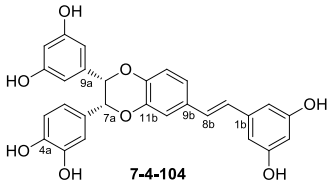
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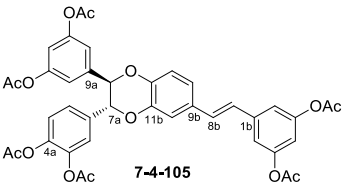

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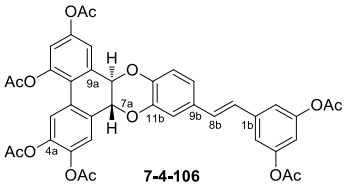

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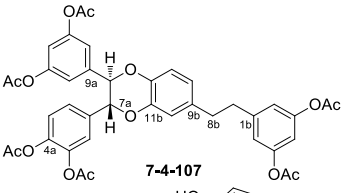

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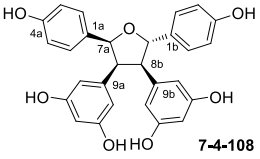

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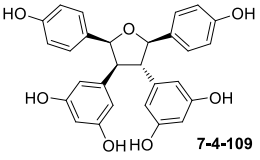

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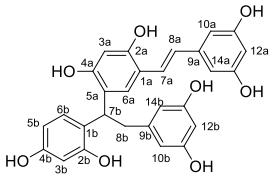

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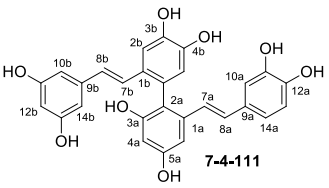

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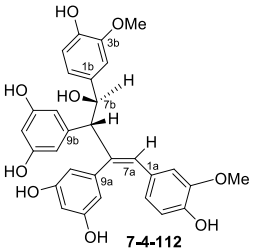

7-4-107


7-4-108

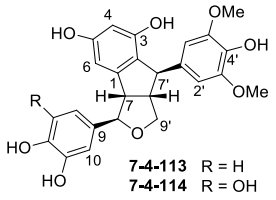

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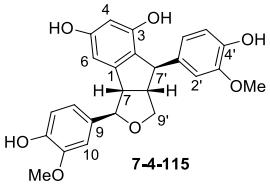

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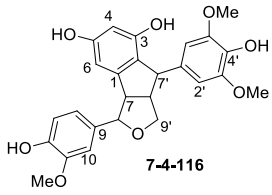

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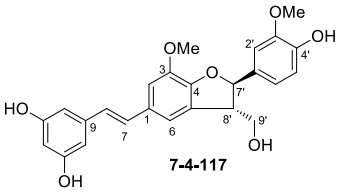

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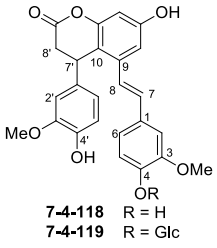
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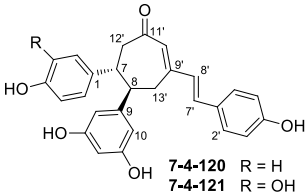


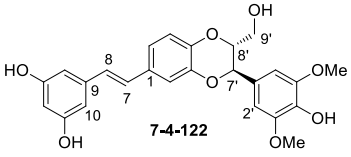












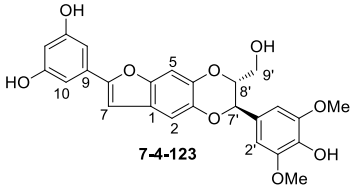


Table 7-4-29: ^{1}H NMR spectroscopic data of 1,2-diphenylethene dimers **7-4-100**~**7-4-103**.

H	7-4-100	7-4-101	7-4-102	7-4-103
2a,6a	6.34 d(8.0)	7.29 d(9)	7.73 d(8.3)	7.52 d(8.5)
3a,5a	6.41 d(8.0)	6.91 d(9)	7.25 d(8.3)	6.90 d(8.5)
7a			5.79 d(10.3)	5.43 d(11)
8a	6.84 br s	*β* 4.13 d(15) *α* 4.02 br d(15)	4.81 d(10.3)	4.49 d(11)
12a	6.28 br s	6.28 d(2.5)	6.83 br s	6.12 d(1.5)
14a	6.00 br s	6.32 d(2.5)	6.76 br s	6.15 d(1.5)
2b,6b	7.26 d(8.1)	7.08 d(9)	7.73 d(8.3)	7.52 d(8.5)
3b,5b	6.84 d(8.0)	6.79 d(9)	7.25 d(8.3)	6.90 d(8.5)
7b	4.79 d(4.0)		5.79 d(10.3)	5.43 d(11)
8b	4.62 d(4.4)	5.08 d(1)	4.81 d(10.3)	4.49 d(11)
10b	6.50 d(2.2)	6.49 d(2.5)		

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Table 7-4-29 (continued)

H	7-4-100	7-4-101	7-4-102	7-4-103
12b	6.28 t(2.2)	6.31 t(2.5)	6.83 br s	6.12 d(1.5)
14b	6.50 d(2.2)	6.49 d(2.5)	6.76 br s	6.15 d(1.5)
OH	8.30 br s, 8.19 br s 8.10 br s, 8.06 br s			

Table 7-4-30: ^{1}H NMR spectroscopic data of 1,2-diphenylethene dimers **7-4-104**~**7-4-106**.

H	7-4-104	7-4-105	7-4-106	H	7-4-104	7-4-105	7-4-106
2a	6.56 d(2.2)	7.09 d(2.1)	7.72 d(0.9)	2b,6b	6.47 d(2.1)	7.11 d(2.1)	7.11 d(2.0)
5a	6.58 d(8.1)	7.06 d(8.4)	7.91 s	4b	6.17 t(2.1)	6.81 t(2.1)	6.82 t(2.0)
6a	6.39 dd(2.2, 8.1)	6.85 dd(2.1, 8.4)		7b	6.96 d(16.4)②	6.91 d(15.2)	6.94 d(16.5)
7a	5.29 d(3.0)①	4.85 s	4.98 dd(10.3, 0.9)	8b	6.87 d(16.4)②	7.02 d(15.2)	6.98 d(16.5)
8a	5.24 d(3.0)①	4.85 s	4.89 ddd(10.3, 1.0, 0.5)	10b	7.14 d(2.1)	7.18 d(2.1)	7.24 br t
10a	6.06 d(2.1)	6.71 d(2.1)		13b	6.95 d(8.4)	7.08 d(8.4)	7.08 br d
12a	6.11 t(2.1)	6.89 t(2.1)	7.06 dd(2.5, 0.5)	14b	7.09 dd(2.1, 8.4)	7.02 dd (2.1, 8.4)	7.08 br d
14a	6.06 d(2.1)	6.71 d(2.1)	7.57 dd(2.5, 1.0)	OAc		2.31 s(2Me) 2.25 s(2Me) 2.28 s 2.27 s	2.31 s(2Me) 2.33 s 2.34 s 2.35 s 2.37 s

①, ②Assignments bearing the same superscript may be exchanged in each column.

Table 7-4-31: ^{1}H NMR spectroscopic data of 1,2-diphenylethene dimers **7-4-107**~**7-4-109**.

H	7-4-107	7-4-108	7-4-109	H	7-4-107	7-4-108	7-4-109
2a	6.88 d(2.1)	7.17 d(8.4)	7.09 d(8.4)	2b,6b	6.84 d(2.0)	7.28 d(8.4)	7.31 d(8.4)
3a		6.64 d(8.4)	6.62 d(8.4)	3b,5b		6.77 d(8.4)	6.82 d(8.4)
5a	6.95 d(8.3)	6.64 d(8.4)	6.62 d(8.4)	4b	6.78 t(2.0)		
6a	6.74 dd(2.1, 8.3)	7.17 d(8.4)	7.09 d(8.4)	7b	2.87 s	5.51 d(10.3)	5.00 d(9.5)
7a	4.79 d(8.0)①	5.82 d(4.4)	5.49 d(8.8)	8b	2.87 s	3.95 dd(6.4, 10.4)	3.41 t(9.5)
8a	4.82 d(8.0)①	3.84 dd(4.4, 6.2)	3.97 t(9.2)	10b	7.07 d(2.0)	6.08 d(2.2)	6.26 d(2.2)
10a	6.69 d(2.1)	6.11 d(2.3)	6.06 d(2.2)	12b		6.05 t(2.2)	6.18 t(2.0)
12a	6.87 t(2.1)	5.95 t(2.3)	5.96 t(2.2)	13b	7.05 d(8.4)		

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Table 7-4-31 (continued)

H	7-4-107	7-4-108	7-4-109	H	7-4-107	7-4-108	7-4-109
14a	6.69 d(2.1)	6.11 d(2.3)	6.06 d(2.2)	14b	6.84 dd(2.0, 8.4)	6.08 d(2.2)	6.26 d(2.2)
OH		7.80 br s 8.00 br s 8.25 br s	8.19 br s 8.63 br s	OAc	2.27 s(2Me) 2.23 s(2Me) 2.24 s 2.25 s		

① Assignments may be exchanged.

Table 7-4-32: ^{1}H NMR spectroscopic data of 1,2-diphenylethene dimers **7-4-110**~**7-4-112**.

H	7-4-110	7-4-111	7-4-112	H	7-4-110	7-4-111	7-4-112
2a			6.45 d(2.1)	2b		7.17 s	6.84 d(2.1)
3a	6.30 s			3b	6.21 d(2.4)		
4a		6.30 d(1.7)		5b	6.10 dd(8.5, 2.4)	6.41 s	6.61 d(8.4)
5a			6.62 d(8.4)	6b	6.85 d(8.5)		6.74 dd(8.4, 2.1)
6a	7.20 s	6.63 d(1.7)	6.65 dd(8.4, 2.1)	7b	4.70 dd(7.9, 7.9)	6.49 d(16.3)	5.05 d(9.9)
7a	7.08 d(16.2)	6.34 d(16.1)	6.77 s	8b	2.95 d(7.9)	6.59 d(16.3)	3.70 d(9.9)
8a	6.63 d(16.2)	6.74 d(16.1)		10b,14b	6.09 d(2.1)	6.08 d(1.7)	6.06 d(2.1)
10a	6.31 d(2.1)	6.60(ov)	6.08 d(2.1)	12b	5.90 dd(2.1, 2.1)	6.00 br s	6.03 t(2.1)
12a	6.05 dd(2.1, 2.1)		6.24 t(2.1)	3a-OMe			3.46 s
13a		6.61 d(8.2)		3b-OMe			3.70 s
14a	6.31 d(2.1)	6.51 dd(8.2, 1.7)	6.08 d(2.1)				

Table 7-4-33: ^{1}H NMR spectroscopic data of 1,2-diphenylethene dimers **7-4-113**~**7-4-116**.

H	7-4-113	7-4-114	7-4-115	7-4-116
4	6.21 d(1.7)	6.18 d(2.0)	6.27 d(2.0)	6.19 d(1.6)
6	6.26 d(1.7)	6.25 d(2.0)	6.35 d(2.0)	6.25 d(1.6)
7	3.77 m	3.75 dd(8.8, 4.4)	3.81 dd(8.8, 4.0)	3.77 dd(4.7, 9.0)
8	4.66 d(5.1)	4.59 d(4.4)	4.71 d(4.0)	4.69 d(4.7)
10	6.87 d(1.7)	6.42 s	7.03 d(2.0)	6.97 d(1.8)
13	6.78 d(8.6)		6.82 d(8.0)	6.80 d(8.1)
14	6.74 dd(8.6, 1.7)	6.42 s	6.89 dd(8.0, 2.0)	6.87 dd(1.8, 8.1)
2′	6.33 s	6.31 s	6.73 d(2.0)	6.32 s
5′			6.66 d(8.0)	
6′	6.33 s	6.31 s	6.50 dd(8.0, 2.0)	6.32 s
7′	4.14 br s	4.12 s(0.8)	4.18 s	4.14 br s

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Table 7-4-33 (continued)

H	7-4-113	7-4-114	7-4-115	7-4-116
8′	3.03 ddd(8.6, 7.7, 1.7)	3.01 dq(0.8, 8.8)	3.03 q(8.8)	3.05 ddd(1.6, 8.4, 8.4)
9′	4.46 dd(8.6, 7.7) 3.54 t(8.6)	3.52 t(8.5) 4.45 t(8.5)	*β* 4.46 t(8.8) *α* 3.51 t(8.8)	*α* 4.49 dd(8.4, 8.4) *β* 3.56 dd(8.4, 8.4)
3-OMe				
11-OMe			3.86 s	3.87 s
3′-OMe	3.72 s	3.72s	3.74 s	3.73 s
5′-OMe	3.72 s	3.72s		3.73 s
OH			8.13 s, 7.81 s, 7.48 s, 7.23 s	

Table 7-4-34: ^{1}H NMR spectroscopic data of 1,2-diphenylethene dimers **7-4-117**~**7-4-119**.

H	7-4-117	7-4-118	7-4-119	H	7-4-117	7-4-118	7-4-119
2	6.98 br s	7.13 d(2.1)	7.12 d(2.0)	8′	3.41 dt(5.4, 12.2)	2.98 dd(15.6, 1.8)	2.93 dd(15.5, 1.5)
5		6.83 d(8.7)	7.10 d(8.0)			3.21 dd(15.6, 6.9)	3.21 dd(15.5, 6.5)
6	7.00 br s	7.00 dd(8.7, 2.1)	6.98 dt(8.0, 2.0)	9′	3.74 m		
7	6.89 d(16.4)	7.02 d(15.6)	7.00 d(16.5)	3-OMe	3.73 s	3.89 s	3.83 s
8	6.78 d(16.4)	7.14 d(15.6)	7.16 d(16.5)	3′-OMe	3.69 s	3.80 s	3.72 s
10	6.41 d(2.1)			1″			4.93 d(7.5)
12	6.14 t(2.1)	6.59 d(2.1)	6.55 d(2.5)	2″ ~6″			3.40~3.83 (ov)
14	6.41 d(2.1)	7.06 d(2.1)	7.02 d(2.5)	OH	8.06 s(2H), 7.47 s, 4.01 br s		
2′	6.92 d(2.1)	6.94 d(1.8)	6.89 d(2.5)				
5′	6.67 d(8.1)	6.78 d(7.8)	6.73 dd(8.0, 0.5)				
6′	6.75 dd(8.1, 2.1)	6.59 dd(7.8, 1.8)	6.54 dt(8.0, 2.5)				
7′	5.45 d(5.4)	4.75 dd(6.9, 1.8)	4.72 dd(6.5, 1.5)				

Table 7-4-35: ^{1}H NMR spectroscopic data of 1,2-diphenylethene dimers **7-4-120**~**7-4-123**.

H	7-4-120	7-4-121	7-4-122	7-4-123
2	6.90 d(8.5)	6.51 d(2.0)	7.13 d(1.9)	7.08 s
3	6.62 d(8.5)			
5	6.62 d(8.5)	6.58 d(8.1)	6.90 d(8.3)	7.08 s
6	6.90 d(8.5)	6.37 dd(2.0, 8.1)	7.08 dd(8.4, 1.9)	
7	3.31 m	3.05 m	6.94 d(16.4)	7.02 s

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Table 7-4-35 (continued)

H	7-4-120	7-4-121	7-4-122	7-4-123
8	3.16 m	3.16 m	7.02 d(16.3)	
10,14	6.12 d(2.0)	6.08 d(2.1)	6.56 d(2.0)	6.86 d(2.0)
12	6.10 d(2.0)	6.05 t(2.1)	6.28 br t(1.9)	6.37 t(2.0)
2′,6′	7.36 d(8.5)	7.27 d(8.6)	6.84 s	6.83 s
3′,5′	6.79 d(8.5)	6.73 d(8.6)		
7′	6.74 d(17.0)	6.66 d(16.1)	4.97 d(8.1)	4.97 d(8.0)
8′	6.88 d(17.0)	6.83 d(16.1)	4.14 m	4.18 m
9′			3.53 dd(4.1, 12.3)	3.55 m
			3.74 dd(2.3, 12.4)	3.75 m
10′	6.16 s	6.21 s		
12′	3.00 d(6.0)	2.98 m		
13′	3.15 m	3.10 m		
OMe			3.86 s	3.85 s

7.4.2 1,2-diphenylethene trimers

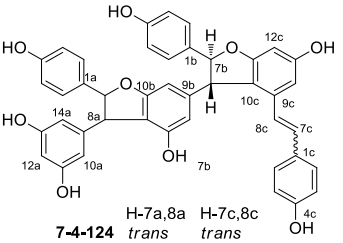
Table 7-4-36: Compounds, MFs, and test solvents of 1,2-diphenylethene trimers **7-4-124**~**7-4-153**.

No.	Compounds	MFs	Test solvents	References
7-4-124	gnemonol K	$C_{42}H_{32}O_9$	CD_3OD	[132]
7-4-125	gnemonol L	$C_{42}H_{32}O_9$	CD_3OD	[132]
7-4-126	gnemonoside K	$C_{60}H_{62}O_{24}$	DMSO-d_6	[132]
7-4-127	gnetin E	$C_{42}H_{32}O_9$	DMSO-d_6	[99]
7-4-128	gnemonoside F	$C_{60}H_{62}O_{24}$	DMSO-d_6	[99]
7-4-129	gnemonoside G	$C_{54}H_{52}O_{19}$	CD_3COCD_3	[99]
7-4-130	latifolol	$C_{42}H_{32}O_{10}$	CD_3COCD_3	[145]
7-4-131	*cis*-miyabenol C	$C_{42}H_{32}O_9$	CD_3OD	[146]
7-4-132	mirabilol A	$C_{42}H_{34}O_{10}$	CD_3COCD_3	[98]
7-4-133	mirabilol B	$C_{42}H_{34}O_9$	CD_3COCD_3	[98]
7-4-134	*cis*-diptoindonesin B	$C_{42}H_{32}O_9$	CD_3OD	[147]
7-4-135	*trans*-diptoindonesin B	$C_{42}H_{32}O_9$	CD_3OD	[147]
7-4-136	amurensin C	$C_{42}H_{30}O_9$	CD_3COCD_3	[148]
7-4-137	amurensin D	$C_{42}H_{30}O_9$	CD_3COCD_3	[148]
7-4-138	gnetumontanin B	$C_{42}H_{32}O_{11}$	CD_3COCD_3	[109]
7-4-139	gnemonol D	$C_{42}H_{32}O_{10}$	CD_3COCD_3	[149]
7-4-140	gnemonol E	$C_{42}H_{32}O_{10}$	CD_3COCD_3	[149]
7-4-141	genetuhainin M	$C_{42}H_{32}O_{11}$	CD_3COCD_3	[150]
7-4-142	genetuhainin N	$C_{45}H_{38}O_{12}$	CD_3COCD_3	[150]
7-4-143	genetuhainin O	$C_{45}H_{38}O_{12}$	CD_3COCD_3	[150]
7-4-144	nepalensinol A	$C_{42}H_{34}O_{10}$	–	[151]
7-4-145	nepalensinol C	$C_{42}H_{34}O_{10}$	–	[151]
7-4-146	parthenocissin B	$C_{42}H_{32}O_9$	CD_3COCD_3	[120]
7-4-147	leachianol D	$C_{42}H_{32}O_9$	CD_3COCD_3	[116]
7-4-148	leachianol E	$C_{42}H_{32}O_9$	CD_3COCD_3	[116]
7-4-149	carasiphenol C	$C_{42}H_{32}O_9$	CD_3COCD_3	[152]

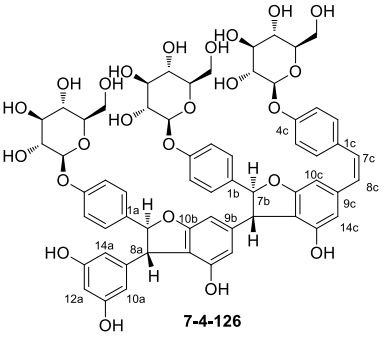
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Table 7-4-36 (continued)

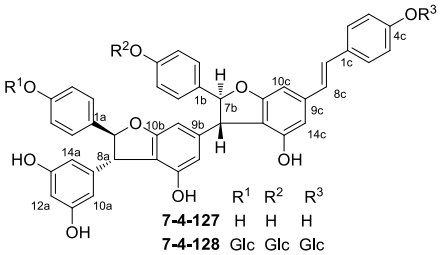
No.	Compounds	MFs	Test solvents	References
7-4-150	davidiol B	$C_{42}H_{32}O_{10}$	CD_3COCD_3	[153]
7-4-151	(–)-viniferal	$C_{35}H_{26}O_8$	–	[154]
7-4-152	gloriosaol A	$C_{45}H_{30}O_{15}$	CD_3OD	[155]
7-4-153	gloriosaol B	$C_{45}H_{30}O_{15}$	CD_3OD	[155]



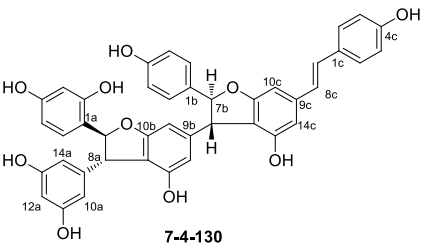
	H-7a,8a	H-7c,8c
7-4-124	*trans*	*trans*
7-4-125	*trans*	*cis*



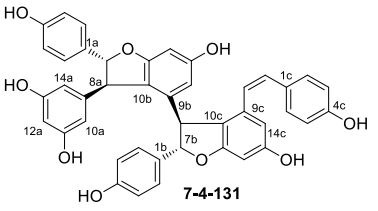
7-4-126



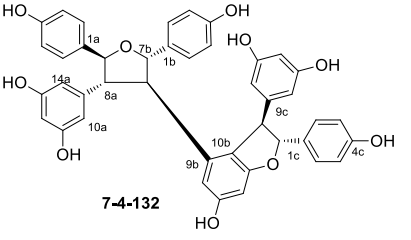
	R^1	R^2	R^3
7-4-127	H	H	H
7-4-128	Glc	Glc	Glc
7-4-129	Glc	H	Glc



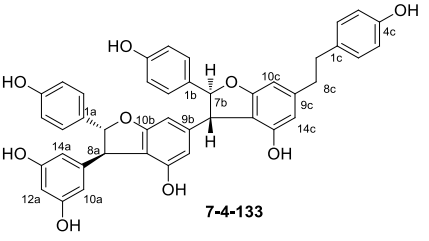
7-4-130



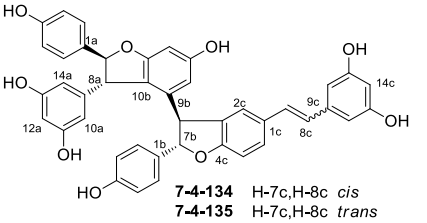
7-4-131



7-4-132

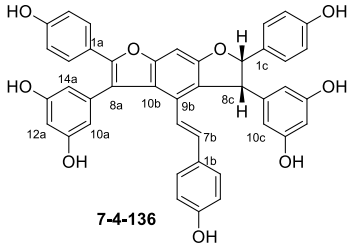


7-4-133

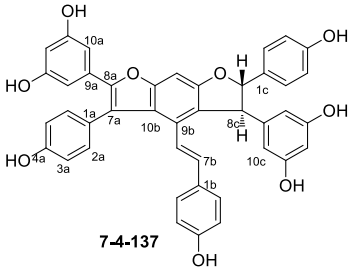


7-4-134	H-7c,H-8c	*cis*
7-4-135	H-7c,H-8c	*trans*

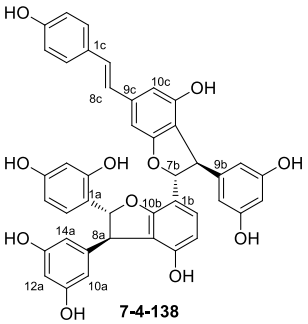
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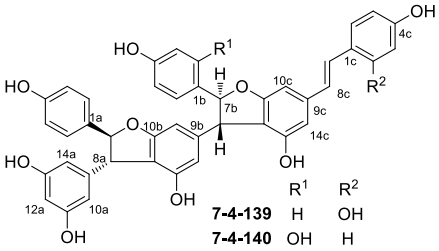
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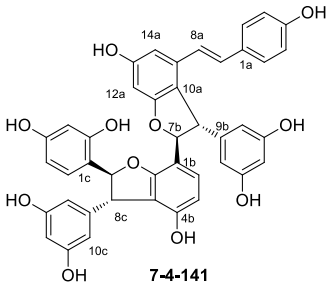
7-4-137



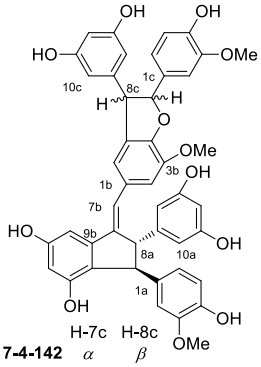
7-4-138



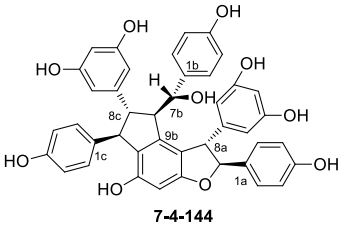
	R^1	R^2
7-4-139	H	OH
7-4-140	OH	H



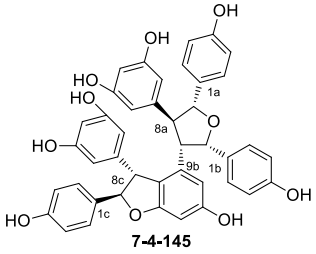
7-4-141



	H-7c	H-8c
7-4-142	α	β
7-4-143	β	α

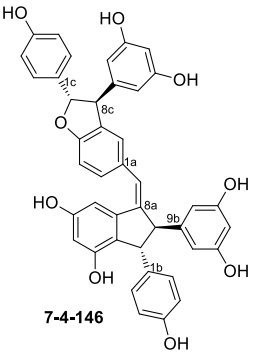


7-4-144

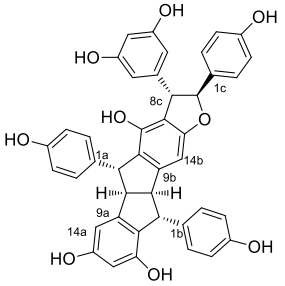


7-4-145

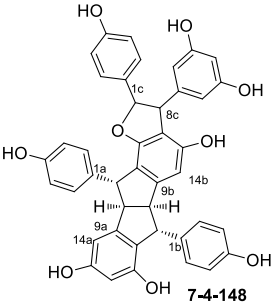
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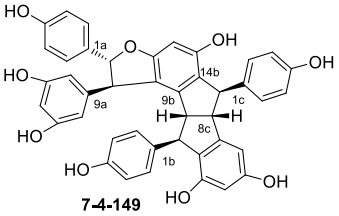
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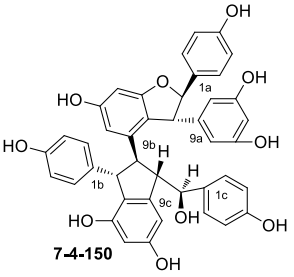
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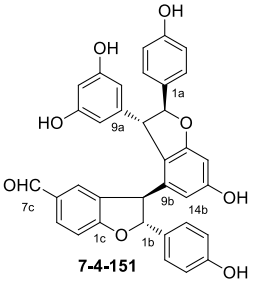
7-4-148



7-4-149

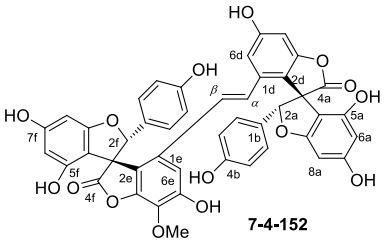


7-4-150

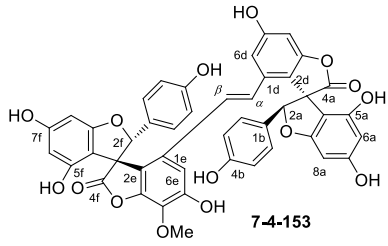


7-4-151

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7-4-152



7-4-153

Table 7-4-37: ^{1}H NMR spectroscopic data of 1,2-diphenylethene trimers **7-4-124**~**7-4-126**, **7-4-128**, and **7-4-129**.

H	7-4-124	7-4-125	7-4-126	7-4-128	7-4-129
2a	7.18 d(8.8)	7.03 d(8.8)	7.20 d(8.8)	7.23 d(8.3)	7.28 d(8.8)
3a	6.80 d(8.8)①	6.70 d(8.8)	7.00 d(8.8)	7.03 d(8.3)	7.07 d(8.8)
5a	6.80 d(8.8)①	6.70 d(8.8)	7.00 d(8.8)	7.03 d(8.3)	7.07 d(8.8)
6a	7.18 d(8.8)	7.03 d(8.8)	7.20 d(8.8)	7.23 d(8.3)	7.28 d(8.8)
7a	5.42 d(5.4)	5.21 d(5.4)	5.32 d(5.6)	5.36 d(5.4)	5.43 d(5.6)
8a	4.35 d(5.4)	4.21 d(5.4)	4.21 d(5.6)	4.24 d(5.4)	4.38 d(5.6)
10a	6.22 d(2.4)	6.04 d(2.0)	5.97 d(2.0)	6.00 d(2.2)	6.19 d(2.0)
12a	6.26 t(2.4)	6.10 t(2.0)	6.05 t(2.0)	6.05 t(2.2)	6.24 t(2.0)
14a	6.22 d(2.4)	6.04 d(2.0)	5.97 d(2.0)	6.00 d(2.2)	6.19 d(2.0)
2b,6b	7.25 d(8.8)	6.97 d(8.8)	7.23 d(8.8)	7.28 d(8.8)	7.25 d(8.8)
3b,5b	6.80 d(8.8)①	6.67 d(8.8)	7.02 d(8.8)	7.03 d(8.8)	6.85 d(8.8)
7b	5.52 d(4.9)	5.26 d(5.4)	5.43 d(3.9)	5.50 d(4.2)	5.48 d(4.4)
8b	4.61 d(4.9)	3.97 d(5.4)	4.31 d(3.9)	4.36 d(4.2)	4.49 d(4.4)
10b	6.55 br s	6.06 br s	6.20 br s	6.23 br s	6.33 br s
14b	6.21 br s	5.97 br s	6.17 br s	6.16 br s	6.25 br s
2c,6c	7.24 d(8.8)	6.88 d(8.8)	7.23 d(8.8)	7.54 d(8.3)	7.52 d(8.8)
3c,5c	6.85 d(8.8)	6.52 d(8.8)	6.92 d(8.8)	7.03 d(8.3)	7.07 d(8.8)
7c	6.94 d(16.6)	6.16 d(12.2)	6.48 d(12.2)	7.11 d(16.6)	7.15 d(16.0)
8c	6.79 d(16.6)	5.95 d(12.2)	6.42 d(12.2)	7.04 d(16.6)	7.05 d(16.0)
10c			6.28 br s	6.75 br s	6.74 br s
12c	6.37 d(2.0)	6.18 d(2.0) (ov)			
14c	6.75 d(2.0)	6.18 d(2.0)(ov)	6.37 br s	6.55 br s	6.64 br s
1′,1″,1‴			4.86 d(8.0)	4.87 d(7.5)	4.98 d(8.4, 1′-H)
				4.89 d(7.5, 1‴-H)	5.00 d(7.8, 1″-H)
2′,2″,2‴			3.24 m	3.33 m	3.53 m
3′,3″,3‴			3.28 m	3.34 m	3.57 m
4′,4″,4‴			3.22 m	3.25 m	3.45 m
5′,5″,5‴			3.30 m	3.40 m	3.57 m
6′,6‴,6‴			3.43~3.69 m	3.47 m, 3.70 m	3.74 m, 3.88 m
OH				9.47 br s	
				9.27 br s	
				9.13 br s(2H)	

① Assignments may be exchanged.

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Table 7-4-38: ^{1}H NMR spectroscopic data of 1,2-diphenylethene trimers **7-4-127** and **7-4-130**~**7-4-133**.

H	7-4-127	7-4-130	7-4-131	7-4-132	7-4-133
2a	7.16 d(8.8)		7.05 d(8.5)	6.78 d(8.8)	7.22 d(8.8)
3a	6.74 d(8.8)	6.46 d(2.4)	6.77 d(8.5)	6.58 d(8.8)	6.86 d(8.8)
5a	6.74 d(8.8)	6.30 dd(8.4, 2.4)	6.77 d(8.5)	6.58 d(8.8)	6.86 d(8.8)
6a	7.16 d(8.8)	7.03 d(8.4)	7.05 d(8.5)	6.78 d(8.8)	7.22 d(8.8)
7a	5.27 d(6.0)	5.76 d(4.0)	5.23 d(2.8)	5.30 d(8.8)	5.40 d(6.0)
8a	4.22 d(6.0)	4.46 d(4.0)	4.15 d(2.8)	4.27 dd(8.8, 12.4)	4.43 d(6.0)
10a	5.97 d(2.0)	6.28 d(2.0)	5.84 d(2.2)	5.75 d(1.6)	6.21 d(1.6)
12a	6.03 t(2.0)		6.07 d(2.2)	5.88 t(1.6)	6.27 t(1.6)
14a	5.97 d(2.0)	6.22 t(2.0)	5.84 d(2.2)	5.75 d(1.6)	6.21 d(1.6)
2b,6b	7.10 d(8.4)	7.25 d(8.8)	6.36 d(8.5)	7.07 d(8.4)	7.24 d(8.8)
3b,5b	6.74 d(8.4)	6.87 d(8.8)	6.48 d(8.5)	6.83 d(8.4)	6.88 d(8.8)
7b	5.40 d(4.0)	5.47 d(4.4)	5.23 d(2.8)	4.62 d(9.6)	5.46 d(4.2)
8b	4.30 d(4.0)	4.49 d(4.4)	3.82 d(2.8)	3.45 dd(9.6, 12.4)	4.48 d(4.2)
10b	6.16 br s	6.35 br s			6.32 br s
12b			6.21 d(2.0)	6.17 d(2.0)	
14b	6.13 br s	6.21 br s	6.09 d(2.0)	6.47 d(2.0)	6.27 d br s
2c,6c	7.40 d(8.4)	7.45 d(8.8)	6.63 d(8.5)	6.95 d(8.8)	7.07 d(8.2)
3c,5c	6.76 d(8.4)	6.85 d(8.8)	6.42 d(8.5)	6.81 d(8.8)	6.78 d(8.2)
7c	7.03 d(16.0)	7.09 d(16.0)	5.73 d(12.1)	5.07 d(9.4)	2.84 m
8c	6.91 d(16.0)	6.96 d(16.0)	5.81 d(12.1)	3.04 d(9.4)	2.82 m
10c	6.67 br s	6.73 br s		6.03 d(1.6)	6.37 br s
12c			6.25 d(2.0)	6.34 t(1.6)	
14c	6.50 br s	6.63 br s	6.06 d(2.0)	6.03 d(1.6)	6.34 br s
OH		8.53 br s(2H)			
		8.52 br s			
		8.28 br s			
		8.25 br s			
		8.10 br s			
		8.03 br s			

Table 7-4-39: ^{1}H NMR spectroscopic data of 1,2-diphenylethene trimers **7-4-134**~**7-4-138**.

H	7-4-134	7-4-135	7-4-136	7-4-137	7-4-138
2a	6.91 d(8.6)	6.96 d(8.5)	7.46 d(8.7)	7.22 br d(8.3)	
3a	6.74 d(8.6)	6.75 d(8.5)	6.78 d(8.7)	6.96 br d(8.3)	6.48 d(2.1)
5a	6.74 d(8.6)	6.75 d(8.5)	6.78 d(8.7)	6.96 br d(8.3)	6.36 dd(8.1, 2.1)
6a	6.91 d(8.6)	6.96 d(8.5)	7.46 d(8.7)	7.22 br d(8.3)	6.99 d(8.1)
7a	5.14 d(5.2)	5.23 d(4.9)			5.80 d(2.7)
8a	3.49 d(5.2)	3.68 d(4.9)			4.44 d(2.7)
10a,14a	5.84 d(2.1)	5.93 d(2.1)	6.37 br s, 6.48 br s①	6.60 d(2.2)	6.34 d(2.4)
12a	6.09 t(2.1)	6.13 t(2.1)	6.53 t(2.2)	6.27 t(2.2)	6.26 t(2.4)
2b	6.98 d(8.5)	7.01 d(8.5)	6.76 d(8.6)	6.64 d(8.8)	

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Table 7-4-39 (continued)

H	7-4-134	7-4-135	7-4-136	7-4-137	7-4-138
3b	6.67 d(8.5)	6.68 d(8.5	6.63 d(8.6)	6.60 d(8.8)	
5b	6.67 d(8.5)	6.68 d(8.5	6.63 d(8.6)	6.60 d(8.8)	6.42 d(8.1)
6b	6.98 d(8.5)	7.01 d(8.5)	6.76 d(8.6)	6.64 d(8.8)	7.13 d(8.1)
7b	5.13 d(10.0)	5.27 d(9.1)	6.67 d(16.7)	6.49 d(16.7)	5.74 d(5.4)
8b	4.28 d(10.0)	4.33 d(9.1)	6.95 d(16.7)	6.62 d(16.7)	4.78 d(5.4)
10b					6.30 d(2.1)
12b	6.25 d(2.1)	6.27 d(2.1)	7.05 s	7.05 s	6.25 t(2.1)
14b	6.18 d(2.1)	6.19 d(2.1)			6.30 d(2.1)
2c	6.62 br s	6.84 br s	7.06 d(8.5)	7.22 d(8.6)	7.48 d(8.7)
3c			6.63 d(8.5)	6.81 d(8.6)	6.89 d(8.7)
5c	6.59 d(8.3)	6.75 d(8.2)	6.63 d(8.5)	6.81 d(8.6)	6.89 d(8.7)
6c	7.08 br d(8.3)	7.25 br d(8.2)	7.06 d(8.5)	7.22 d(8.6)	7.48 d(8.7)
7c	6.36 d(12.2)	6.89 d(16.2)	5.87 d(7.3)	5.47 d(3.5)	7.13 d(16.5)
8c	6.29 d(12.2)	6.76 d(16.2)	4.72 d(7.3)	4.63 d(3.5)	7.00 d(16.5)
10c	6.22 d(2.1)	6.45 d(2.1)	5.81 d(2.1)	6.18 d(2.0)	6.63 d(1.2)
12c	6.12 t(2.1)	6.15 t(2.1)	5.99 t(2.1	6.18 t(2.0)	
14c	6.22 d(2.1)	6.45 d(2.1)	5.81 d(2.1)	6.18 d(2.0)	6.75 d(1.2)

① Assignments H-14a and H-14b may be exchanged.

Table 7-4-40: ^{1}H NMR spectroscopic data of 1,2-diphenylethene trimers **7-4-139**~**7-4-143**.

H	7-4-139	7-4-140	7-4-141	7-4-142	7-4-143
2a	7.14 d(8.8)	7.20 d(8.8)	7.10 d(8.7)	6.69 d(2.1)	6.69 d(2.1)
3a	6.78 d(8.8)	6.84 d(8.8)	6.69 d(8.7)		
5a	6.78 d(8.8)	6.84 d(8.8)	6.69 d(8.7)	6.59 d(8.4)	6.58 d(8.4)
6a	7.14 d(8.8)	7.20 d(8.8)	7.10 d(8.7)	6.40 dd(8.4, 2.1)	6.37 dd(8.4, 2.1)
7a	5.32 d(5.4)	5.37 d(6.0)	6.85 d(16.5)	4.19 br s	4.18 br s
8a	4.33 d(5.4)	4.40 d(6.0)	6.67 d(16.5)	4.13 br s	4.07 br s
10a	6.13 d(2.0)	6.19 d(2.0)		6.27 d(2.1)	6.26 d(2.1)
12a	6.19 t(2.0)	6.24 t(2.0)	6.27 d(2.1)	6.16 t(2.1)	6.17 t(2.1)
14a	6.13 d(2.0)	6.19 d(2.0)	6.64 d(2.1)	6.27 d(2.1)	6.26 d(2.1)
2b	7.19 d(8.8)			6.79 d(2.1)	6.77 d(2.1)
3b	6.80 d(8.8)	6.50 d(2.0)			
5b	6.80 d(8.8)	6.31 dd(2.0, 8.4)	6.33 d(8.4)		
6b	7.19 d(8.8)	7.05 d(8.4)	7.03 d(8.4)	6.53 d(2.1)	6.53 d(2.1)
7b	5.42 d(4.4)	5.84 d(2.9)	5.69 d(6.3)	6.97 br s	6.96 br s
8b	4.42 d(4.4)	4.52 d(2.9)	4.74 d(6.3)		
10b	6.28 br s	6.50 br s	6.26 d(2.1)		
12b			6.15 t(2.1)	6.23 d(2.1)	6.24 d(2.1)
14b	6.18 br s	6.28 br s	6.26 d(2.1)	6.70 d(2.1)	6.71 d(2.1)
2c		7.44 d(8.8)		6.91 d(2.1)	6.92 d(2.1)
3c	6.42 d(2.4)	6.85 d(8.8)	6.37 d(2.1)		
5c	6.34 dd(2.4, 8.3)	6.85 d(8.8)	6.22 dd(8.4, 2.1)	6.70 d(8.4)	6.71 d(8.4)

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Table 7-4-40 (continued)

H	7-4-139	7-4-140	7-4-141	7-4-142	7-4-143
6c	7.37 d(8.3)	7.44 d(8.8)	6.79 d(8.4)	6.70 dd(8.4, 2.1)	6.70 dd(8.4, 2.1)
7c	7.33 d(16.1)	7.11 d(16.4)	5.68 d(2.4)	5.35 d(8.4)	5.39 d(8.4)
8c	6.92 d(16.1)	6.97 d(16.4)	4.29 d(2.4)	4.35 d(8.4)	4.33 d(8.4)
10c	6.63 br s	6.79 br s	6.23 d(2.1)	6.09 d(2.1)	6.12 d(2.1)
12c			6.18 t(2.1)	6.19 t(2.1)	6.23 t(2.1)
14c	6.57 br s	6.62 br s	6.23 d(2.1)	6.09 d(2.1)	6.12 d(2.1)
3a-OMe				3.65 s	3.67 s
3b-OMe				3.50 s	3.50 s
3c-OMe				3.72 s	3.72 s
OH	8.55 br s	8.73 br s			
	8.40 br s(2H)	8.52 br s			
	8.36 br s	8.46 br s			
	8.17 br s	8.29 br s			
	8.11 br s	8.24 br s			
	8.01 br s	8.18 br s			
		8.00 br s			

Table 7-4-41: ^{1}H NMR spectroscopic data of 1,2-diphenylethene trimers **7-4-144**~**7-4-147**.

H	7-4-144	7-4-145	7-4-146	7-4-147
2a	7.31 d(8.6)	7.16 d(8.5)	6.98 br d(1.0)	6.97 d(9)
3a	6.87 d(8.6)	6.76 d(8.5)		6.69 d(9)
5a	6.87 d(8.6)	6.76 d(8.5)	6.96 d(8.3)	6.69 d(9)
6a	7.31 d(8.6)	7.16 d(8.5)	7.33 br dd(8.3,1.0)	6.97 d(9)
7a	5.48 d(7.2)	4.50 d(9.5)	6.34 br s	4.63 br s
8a	4.95 d(7.2)	3.54 dd(11.3, 9.5)		3.83 br d(7.0)
10a	6.40 br s	5.86 d(2.1)		
12a	6.30 t(2.2)	6.08 t(2.1)	6.29 d(1.5)	6.21 br s
14a	6.40 br s	5.86 d(2.1)	6.61 d(1.5)	6.64 br s
2b	6.58 d(8.7)	7.04 d(8.5)	6.96 d(8.8)	7.01 d(8)
3b	6.54 d(8.7)	6.64 d(8.5)	6.71 d(8.8)	6.71 d(8)
5b	6.54 d(8.7)	6.64 d(8.5)	6.71 d(8.8)	6.71 d(8)
6b	6.58 d(8.7)	7.04 d(8.5)	6.96 d(8.8)	7.01 d(8)
7b	4.30 dd(3.5, 9.6)	5.33 d(9.4)	4.27 d(1.7)	4.65 br s
8b	3.05 d(9.6)	3.98 dd(11.3, 9.4)	3.75 br s	3.81 br d(7)
10b		6.12 d(1.9)	6.18 d(2.0)	
12b	6.40 s	6.02 d(1.9)	6.19 t(2.0)	
14b			6.18 d(2.0)	6.73 br s
2c	6.93 d(8.5)	7.06 d(8.5)	7.26 d(8.3)	7.18 d(8)
3c	6.77 d(8.5)	6.88 d(8.5)	6.98 d(8.3)	6.80 d(8)
5c	6.77 d(8.5)	6.88 d(8.5)	6.98 d(8.3)	6.80 d(8)

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Table 7-4-41 (continued)

H	7-4-144	7-4-145	7-4-146	7-4-147
6c	6.93 d(8.5)	7.06 d(8.5)	7.26 d(8.3)	7.18 d(8)
7c	4.16 s	5.28 d(6.0)	5.43 d(8.3)	5.32 d(6)
8c	2.89 s	4.32 d(6.0)	4.90 br d(8.3)	4.37 d(6)
10c	5.90 d(2.1)	6.29 d(2.1)	6.20 d(2.0)	6.12 br s
12c	6.06 t(2.1)	6.41 t(2.1)	6.23 t(2.0)	6.17 m
14c	5.90 d(2.1)	6.29 d(2.1)	6.20 d(2.0)	6.12 br s
OH	3.87 d(3.6)			7.41 br s
	8.70, 8.50, 8.39, 8.13, 7.94			7.81 br s
				8.00 br s(2H)
				8.08 br s(3H)
				8.39 br s

Table 7-4-42: ^{1}H NMR spectroscopic data of 1,2-diphenylethene trimers **7-4-148**~**7-4-151**.

H	7-4-148	7-4-149	7-4-150	7-4-151
2a,6a	7.06 d(9)	7.22 d(8.5)	6.98 d(8.8)	7.15 d(8.4)
3a,5a	6.76 d(9)	6.86 d(8.5)	6.86 d(8.8)	6.80 d(8.4)
7a	4.57 br s	5.25 d(7.5)	5.05 br s	5.32 d(4.8)
8a	3.99 br d(7)	4.82 d(7.5)	3.13 br s	4.36 d(4.8)
10a		6.25 d(2.3)	5.90 m	5.94 d(2.2)
12a	6.26 br s	6.31 d(2.1)	6.33 m	6.04 t(2.2)
14a	6.67 br s	6.25 d(2.3)	5.90 m	5.94 d(2.2)
2b,6b	7.01 d(8)	6.44 d(8.6)	6.12 d(8.3)	6.66 d(8.8)
3b,5b	6.73 d(8)	6.35 d(8.4)	6.54 d(8.3)	6.57 d(8.8)
7b	4.59 br s	4.51 br s	4.10 br s	5.63 d(5.9)
8b	3.95 br d(7)	3.66 d(5.9)	2.82 br s	4.39 d(5.9)
12b		6.25 s	6.17 m	6.30 d(2.2)
14b	6.66 br s		6.00 m	6.14 d(2.2)
2c	6.73 d(8)	6.98 d(8.3)	6.44 m (ov)	7.34 d(1.8)
3c	6.62 d(8)	6.70 d(8.3)	6.44 m (ov)	
5c	6.62 d(8)	6.70 d(8.3)		6.96 d(8.4)
6c	6.73 d(8)	6.98 d(8.3)		7.72 dd(8.4, 1.8)
7c	5.34 d(4)	4.61 br s	3.98 br d(9.8)	9.62 s
8c	4.20 d(4)	3.61 d(5.9)	2.95 d(9.8)	
10c	6.14 d(2)			
12c	6.18 m	6.17 d(1.3)	6.38 br s	
14c	6.14 d(2)	6.61 d(1.3)	6.68 br s	
OH	7.14 br s		3.78 br s, 7.82 br s	
	7.81 br s		7.96 br s, 8.03 br s	
	8.00 br s(2H)		8.10 br s, 8.19 br s(2H)	
	8.08 br s(3H)		8.28 br s, 8.32 br s	
	8.39 br s			

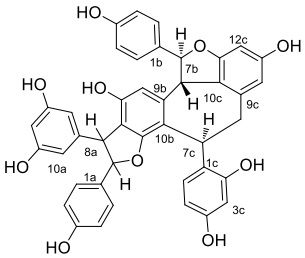
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Table 7-4-43: ^{1}H NMR spectroscopic data of 1,2-diphenylethene trimers **7-4-152** and **7-4-153**.

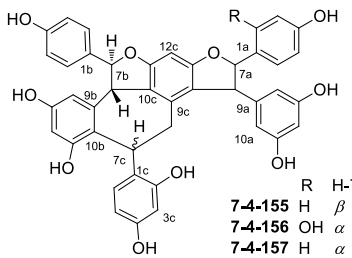
H	7-4-152	7-4-153	H	7-4-152	7-4-153
2a	5.86 s	5.86 s	*β*	7.00 d(16.1)	7.02 d(16.1)
6a	5.96 d(1.8)	5.92 d(1.8)	6e	6.57 s	6.69 s
8a	6.16 d(1.8)	6.16 d(1.8)	2f	5.83 s	5.87 s
2b,6b	6.90 d(8.5)	6.90 d(8.5)	6f	5.98 d(1.8)	5.91 d(1.8)
3b,5b	6.73 d(8.5)	6.73 d(8.5)	8f	6.17 d(1.8)	6.17 d(1.8)
4d	6.41 d(1.8)	6.41 d(1.8)	2g,6g	6.91 d(8.5)	6.91 d(8.5)
6d	6.47 d(1.8)	6.60 d(1.8)	3g,5g	6.71 d(8.5)	6.71 d(8.5)
α	7.06 d(16.1)	7.08 d(16.1)	4e-OMe	3.84 s	3.84 s

Table 7-4-44: Compounds, MFs, and test solvents of 1,2-diphenylethene trimers **7-4-154**~**7-4-171**.

No.	Compounds	MFs	Test solvents	References
7-4-154	gnemonol H	$C_{42}H_{32}O_{10}$	CD_3COCD_3	[111]
7-4-155	gnemonol I	$C_{42}H_{32}O_{10}$	CD_3COCD_3	[111]
7-4-156	gnemonol J	$C_{42}H_{32}O_{11}$	CD_3COCD_3	[111]
7-4-157	gnemonol A	$C_{42}H_{32}O_{10}$	CD_3COCD_3	[100]
7-4-158	uponoside B	$C_{48}H_{42}O_{14}$	CD_3COCD_3	[156]
7-4-159	vaticanol A	$C_{42}H_{32}O_9$	CD_3COCD_3	[157]
7-4-160	hemsleyanol B	$C_{42}H_{32}O_{10}$	CD_3COCD_3	[126]
7-4-161	ampelopsin C	$C_{42}H_{32}O_9$	CD_3COCD_3	[158]
7-4-162	davidiol A	$C_{42}H_{32}O_9$	CD_3COCD_3	[153]
7-4-163	(+)-viniferol D	$C_{42}H_{32}O_9$	CD_3OD	[159]
7-4-164	hemsleyanoside E	$C_{48}H_{42}O_{14}$	CD_3OD	[129]
7-4-165	pauciflorol A	$C_{42}H_{32}O_9$	CD_3COCD_3	[160]
7-4-166	pauciflorol B	$C_{42}H_{32}O_9$	CD_3COCD_3	[160]
7-4-167	suffruticosol A	$C_{42}H_{32}O_9$	CD_3OD	[161]
7-4-168	suffruticosol B	$C_{42}H_{32}O_9$	CD_3OD	[161]
7-4-169	carasiphenol B	$C_{42}H_{32}O_9$	CD_3COCD_3	[162]
7-4-170	viticanol G	$C_{42}H_{32}O_9$	CD_3COCD_3	[163]
7-4-171	vaticaside D	$C_{48}H_{42}O_{14}$	CD_3COCD_3	[163]

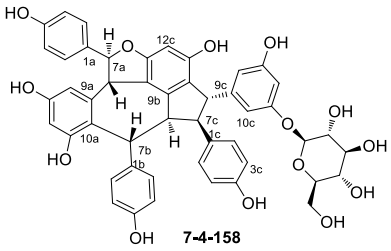


7-4-154 H-7a, H-8a *trans*

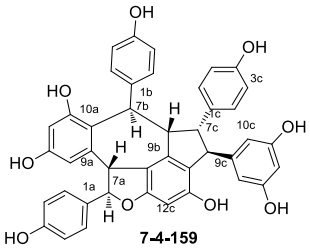


	R	H-7c	H-7a,8a
7-4-155	H	*β*	*trans*
7-4-156	OH	*α*	*trans*
7-4-157	H	*α*	

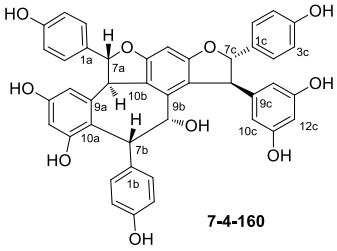
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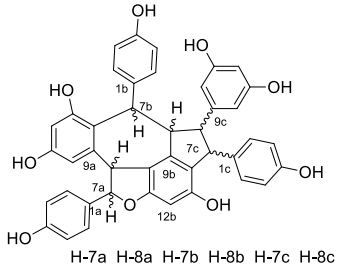
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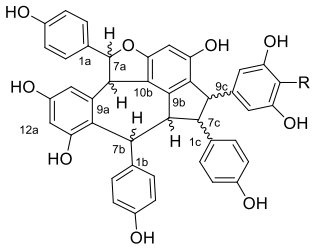
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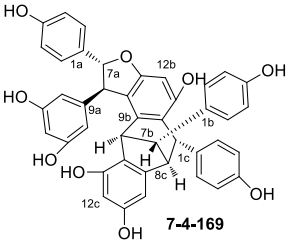
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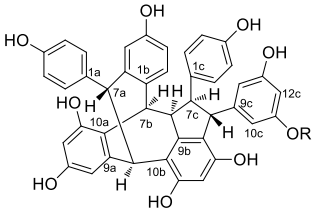
	H-7a	H-8a	H-7b	H-8b	H-7c	H-8c
7-4-161	α	β	α	α	α	β
7-4-162	α	β	α	β	β	α
7-4-163	β	β	α	α	α	β



	R	H-7a	H-8a	H-7b	H-8b	H-7c	H-8c
7-4-164	Glc	α	β	α	α	α	β
7-4-165	H	α	β	α	α	α	β
7-4-166	H	α	β	α	α	β	α
7-4-167	H	α	α	β	β	β	α
7-4-168	H	α	α	α	β	β	α



7-4-169



7-4-170 R = H
7-4-171 R = Glc

Table 7-4-45: ^{1}H NMR spectroscopic data of 1,2-diphenylethene trimers **7-4-154**~**7-4-157**.

H	7-4-154	7-4-155	7-4-156	7-4-157
2a	7.22 d(8.4)	6.79 d(8.8)	–	7.15 d(8.8)
3a	6.83 d(8.4)	6.83 d(8.8)	6.42 d(2.4)	6.75 d(8.8)
5a	6.83 d(8.4)	6.83 d(8.8)	6.22 dd(8.4, 2.4)	6.75 d(8.8)

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Table 7-4-45 (continued)

H	7-4-154	7-4-155	7-4-156	7-4-157
6a	7.22 d(8.4)	6.79 d(8.8)	6.96 d(8.4)	7.15 d(8.8)
7a	5.37 d(5.6)	5.07 d(6.8)	5.76 d(3.0)	5.41 d(3.9)
8a	4.37 d(5.6)	3.91 d(6.8)	4.26 d(3.0)	4.29 d(3.9)
10a	6.11 d(2.0)	6.11 br s	6.34 d(2.1)	6.29 d(2.0)
12a	6.16 t(2.0)	6.21 br s	6.20 t(2.1)	6.23 t(2.0)
14a	6.11 d(2.0)	6.11 br s	6.34 d(2.1)	6.29 d(2.0)
2b	7.20 d(8.4)	7.51 d(8.8)	7.16 d(8.7)	7.16 d(8.8)
3b	6.76 d(8.4)	6.95 d(8.8)	6.75 d(8.7)	6.79 d(8.8)
5b	6.76 d(8.4)	6.95 d(8.8)	6.75 d(8.7)	6.79 d(8.8)
6b	7.20 d(8.4)	7.51 d(8.8)	7.16 d(8.7)	7.16 d(8.8)
7b	5.76 d(11.2)	5.80 d(9.3)	5.87 d(10.8)	5.92 d(11.3)
8b	4.57 d(11.2)	5.19 d(9.3)	4.58 d(10.8)	4.62 d(11.3)
12b		6.24 (ov)	6.36 br s	6.37 d(2.0)
14b	6.33 br s	6.24 (ov)	6.35 br s	6.36 d(2.0)
3c	6.29 d(2.4)	6.35 d(2.4)	6.12 d(2.4)	6.15 d(1.8)
5c	6.18 dd(8.4, 2.4)	5.98 dd(8.3, 2.4)	6.17 d(8.4, 2.4)	6.21 dd(1.8, 8.5)
6c	7.00 d(8.4)	6.16 d(8.3)	6.47 d(8.4)	6.74 d(8.5)
7c	4.95 br s	5.15 br s	4.91 t(3.9)	4.92 t(3.9)
8c	3.45 dd(17.5, 2.5)	3.17 dd(13.8, 5.9)	3.30 br d(17.4)	2.92 dd(3.9, 14.2)
	3.35 dd(17.5, 3.2)	2.58 br d(13.8)	2.90 br d(17.4)	3.05 dd(3.9, 14.2)
12c	6.10 br s	5.92 br s	6.28 br s	6.26 br s
14c	6.31 br s			

Note: Signals of hydroxyls of **7-4-154** were resonated at δ 8.42 br s, 8.37 br s, 8.15 br s, 8.04 br s, 7.98 br s, 7.85 br s, and 7.54 br s; Signals of hydroxyls of **7-4-155** were resonated at δ 8.62 br s, 8.41 br s, 8.23 br s, 8.14 br s, 8.05 br s, 7.97 br s, and 7.70 br s; Signals of hydroxyls of **7-4-156** were resonated at δ 8.76 br s, 8.50 br s, 8.42 br s, 8.17 br s, 8.14 br s, 8.13 br s(2×), and 7.94 br s; Signals of hydroxyls of **7-4-157** were resonated at δ 8.24-8.83(5H), 8.23 br s(2H), and 8.20 br s.

Table 7-4-46: ^{1}H NMR spectroscopic data of 1,2-diphenylethene trimers **7-4-158**~**7-4-161**.

H	7-4-158	7-4-159	7-4-160	7-4-161
2a,6a	7.64 d(8.4)	7.28 d(8.8)	7.08 d(8.5)	7.25 d(8.4)
3a,5a	6.95 d(8.4)	6.83 d(8.8)	6.75 d(8.5)	6.80 d(8.4)
7a	5.96 d(11.5)	6.18 br d(3.9)	5.77 d(11.3)	5.83 d(11.7)
8a	5.28 br d(11.5)	4.51 d(3.9)	4.29 d(11.3)	4.45 d(11.7)
12a	6.04 d(2.2)	6.09 d(2.4)	6.35 d(2.0)	6.33 d(2.0)
14a	6.29 d(2.2)	6.48 d(2.4)	6.25 br s	6.18 d(2.0)
2b,6b	7.07 d(8.4)	7.07 d(8.8)	7.16 d(8.8)	7.18 d(8.4)
3b,5b	6.57 d(8.4)	6.60 d(8.8)	6.59 d(8.8)	6.68 d(8.4)
7b	4.46 d(11.5)	5.17 br s	5.29 d(4.4)	5.26 d(2.9)
8b	4.10 dd(11.5,6.0)	4.52 br s	4.79 br s	3.62 dd(11.7, 2.9)
12b	6.26 s	6.22 s	6.26 s	6.17 s

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Table 7-4-46 (continued)

H	7-4-158	7-4-159	7-4-160	7-4-161
2c,6c	6.41 d(8.4)	6.55 d(8.8)	7.29 d(8.8)	7.01 d(8.4)
3c,5c	6.34 d(8.4)	6.37 d(8.8)	6.88 d(8.8)	6.72 d(8.4)
7c	3.95 d(6.0)	3.65 d(7.3)	5.32 d(5.4)	4.23 d(9.4)
8c	4.17 s	4.20 br s	5.12 d(5.4)	3.79 dd(11.7, 9.4)
10c	6.45 br s	6.27 d(2.0)	6.10 d(2.0)	6.24 d(2.0)
12c	6.42 br s	6.21 t(2.0)	6.18 t(2.0)	6.18 t(2.0)
14c	6.33 br s	6.27 d(2.0)	6.10 d(2.0)	6.24 d(2.0)
1′	4.92 d(7.5)			
2′	3.42 m			
3′	3.44 m			
4′	3.49 m			
5′	3.50 m			
6′	3.74 dd(1.7, 5.1)			
	3.89 br dd(11.7)			

Note: Signals of hydroxyls of **7-4-158** were resonated at δ 8.56 br s, 8.28 br s, 8.12 br s, 8.09 br s, 8.06 br s, 7.86 br s, and 6.80 br s; Signals of hydroxyls of **7-4-159** were resonated at δ 8.42, 8.09(2H), 8.00, 7.97, 7.95, 7.89, and 7.31; Signals of hydroxyls of **7-4-160** were resonated at δ 8.22 br s, 4.40 br s.

Table 7-4-47: ^{1}H NMR spectroscopic data of 1,2-diphenylethene trimers **7-4-162**~**7-4-165**.

H	7-4-162	7-4-163	7-4-164	7-4-165
2a,6a	7.21 d(8.8)	7.10 d(8.8)	7.11 d(8.6)	7.21 d(8.6)
3a,5a	6.78 d(8.8)	6.69 d(8.8)	6.69 d(8.6)	6.76 d(8.6)
7a	6.08 d(2.9)	6.02 d(2.9)	5.68 d(11.5)	5.79 d(11.5)
8a	4.40 m	4.27 d(2.9)	4.35 br d(11.5)	4.48 br d(11.5)
12a	6.44 br s	6.25 d(2.2)	6.25 d(2.2)	6.37 d(2.2)
14a	6.55 br s	6.41 d(2.2)	5.92 br s	6.13 d(2.2)
2b,6b	7.04 d(8.8)	6.94 d(8.8)	6.48 d(8.6)	6.56 d(8.5)
3b,5b	6.60 d(8.8)	6.52 d(8.8)	6.12 d(8.6)	6.14 d(8.5)
7b	5.27 br s	5.12 br s	5.42 d(3.3)	5.51 br d(3.3)
8b	4.23 d(11.7)	4.18 d(11.7)	3.92 m	3.97 m
12b	6.02 s	5.99 s	6.20 s	6.26 s
2c,6c	6.76 d(8.3)	6.69 d(8.8)	6.94 d(8.4)	6.97 d(8.5)
3c,5c	6.61 d(8.3)	6.54 d(8.8)	6.38 d(8.4)	6.40 d(8.5)
7c	4.38 d(9.8)	4.30 d(9.9)	3.66 br d(7.7)	3.74 d(7.7)
8c	2.97 dd(11.7, 9.8)	2.87 dd(11.7, 9.9)	4.73 br s	4.78 s
10c	6.42 d(2.9)	6.30 d(2.2)	6.05 br s	6.00 d(2.0)
12c	6.19 t(2.9)	6.11 t(2.2)		6.15 t(2.0)
14c	6.42 d(2.9)	6.30 d(2.2)	6.05 br s	6.00 d(2.0)
1′			4.83 d(9.2)	
2′			3.97 dd(9.2)①	
3′			3.43 dd(9.2)①	

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Table 7-4-47 (continued)

H	7-4-162	7-4-163	7-4-164	7-4-165
4′			3.45 dd(9.2)①	
5′			3.35 m	
6′			3.72 dd(12.1, 4.5)	
			3.82 dd(12.1, 2.3)	

① The peaktype was following those in the original literature.
Note: Signals of hydroxyls of **7-4-162** were resonated at δ 8.31 br s, 8.30 br s, 8.07 br s, 7.99 br s, 7.96 br s, 7.93 br s, and 6.56 br s; Signals of hydroxyls of **7-4-165** were resonated at δ 8.46 br s, 8.44 br s, 8.19 br s, 8.05 br s, 8.00 br s, 7.80 br s, and 7.63 br s.

Table 7-4-48: ^{1}H NMR spectroscopic data of 1,2-diphenylethene trimers **7-4-166**~**7-4-169**.

H	7-4-166	7-4-167	7-4-168	7-4-169
2a,6a	7.26 d(8.6)	7.12 d(8.7)	7.58 d(8.6)	7.20 d(8.3)
3a,5a	6.81 d(8.6)	6.73 d(8.7)	6.91 d(8.6)	6.81 d(8.5)
7a	5.84 d(11.7)	5.71 d(11.7)	5.86 d(7.6)	5.38 d(6.3)
8a	4.47 br d(11.7)	4.34 d(11.7)	5.09 br d(11.4)	4.93 d(6.3)
10a				6.37 d(1.8)
12a	6.35 d(2.2)	6.29 d(2.4)	6.19 d(2.2)	6.31 t(1.8)
14a	6.17 br d(2.2)	5.95 d(1.7)	5.96 d(2.4)	6.37 d(1.8)
2b,6b	7.19 d(8.5)	6.47 d(8.5)	6.92 br d	6.56 d(8.6)
3b,5b	6.69 d(8.5)	6.14 d(8.5)	6.52 d(8.6)	6.45 d(8.6)
7b	5.28 d(3.3)	5.40 d(3.2)	4.23 d(11.7)	3.51 s
8b	3.66 m	3.90 m	4.12 m	4.01 s
12b	6.15 s	6.24 s	6.20 s	6.15 s
2c,6c	7.02 d(8.5)	6.96 d(8.6)	6.28 d(8.6)	7.10 d(8.2)
3c,5c	6.74 d(8.5)	6.39 d(8.6)	6.30 d(8.6)	6.74 d(8.2)
7c	3.76 dd(11.6, 9.3)	3.69 d(7.6)	3.82 d(6.0)	4.20 br s
8c	4.25 d(9.3)	4.75 (ov)	4.11 s	3.37 br s
10c	6.20 s	6.00 d(2.2)	6.24 s	
12c	6.19 s	6.10 t(2.2)	6.16 t(2.2)	6.09 d(1.4)
14c	6.20 s	6.00 d(2.2)	6.23 s	6.56 d(1.4)

Note: Signals of hydroxyls of **7-4-166** were resonated at δ 8.50 br s, 8.29 br s, 8.15 br s, 8.11 br s, 8.09 br s, 8.05 br s(2H), and 6.75 br s.

Table 7-4-49: ^{1}H NMR spectroscopic data of 1,2-diphenylethene trimers **7-4-170** and **7-4-171**.

H	7-4-170	7-4-171	H	7-4-170	7-4-171
2a,6a	6.42 br s	6.45 br s	5c	6.68 br s	6.71 br s
3a,5a	6.45 br d	6.45 br s	6c	7.12 br s	7.12 br s
7a	4.55 d(3.4)	4.56 d(3.9)	7c	3.52 d(7.0)	3.59 d(7.3)
8a	4.63 d(3.4)	4.65 d(3.9)	8c	4.11 s	4.14 s
12a	6.20 d(2.4)	6.20 d(2.4)	10c	5.97 d(2.4)	6.23 d(2.2)

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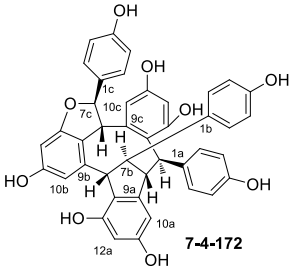
Table 7-4-49 (continued)

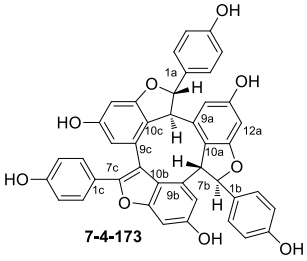
H	7-4-170	7-4-171	H	7-4-170	7-4-171
14a	5.67 d(2.4)	5.67 d(2.4)	12c	6.12 t(2.4)	6.36 t(2.2)
3b	6.08 d(2.4)	6.08 d(2.4)	14c	5.97 d(2.4)	6.12 d(2.2)
5b	5.76 dd(8.3, 2.4)	5.76 dd(8.8, 2.4)	1′		4.85 d(7.3)
6b	6.02 d(8.3)	6.02 d(8.8)	2′		3.38 m
7b	4.89 d(2.0)	4.90 d(2.9)	3′		3.40 m
8b	3.86 dd(7.0, 2.0)	3.81 dd(7.3, 2.9)	4′		3.47 m
12b	6.47 s	6.49 s	5′		3.47 m
2c	5.92 br s	5.96 br s	6′		3.68 m
					3.78 m
3c	5.98 br s	6.00 br s			

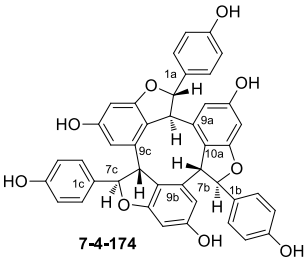
Note: Signals of hydroxyls of **7-4-170** were resonated at *δ* 8.54 br s, 8.08 br s, 8.04 br s(2H), 7.94 br s, 7.93 br s, 7.68 br s, 7.67 br s, and 7.49 br s; Signals of hydroxyls of **7-4-171** were resonated at *δ*7.45-8.53 br s(8H).

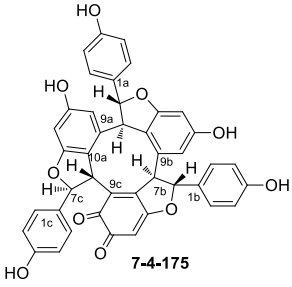
Table 7-4-50: Compounds, MFs, and test solvents of 1,2-diphenylethene trimers **7-4-172**~**7-4-176**.

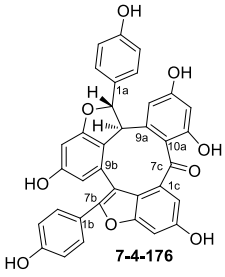
No.	Compounds	MFs	Test solvents	References
7-4-172	suffruticosol C	$C_{42}H_{32}O_9$	CD_3OD	[161]
7-4-173	caraphenol A	$C_{42}H_{28}O_9$	CD_3COCD_3	[121]
7-4-174	(+)-*α*-viniferin	$C_{42}H_{30}O_9$	CD_3COCD_3	[164]
7-4-175	hopeanolin	$C_{42}H_{28}O_{10}$	CD_3COCD_3	[165]
7-4-176	carasiphenol D	$C_{35}H_{22}O_9$	CD_3COCD_3	[152]











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Table 7-4-51: ^{1}H NMR spectroscopic data of of 1,2-diphenylethene trimers **7-4-172**~**7-4-176**.

H	7-4-172	7-4-173	7-4-174	7-4-175	7-4-176
2a,6a	6.93 d(8.4)	7.24 d(8.6)	7.03 d(8.5)	7.32 d(8.6)	7.11 d(8.2)
3a,5a	6.52 d(8.4)	6.80 d(8.6)	6.72 d(8.5)	6.75 d(8.6)	6.72 d(8.6)
7a	5.09 s	5.91 br s	6.08 br s	5.98 d(12.0)	5.98 s
8a	4.14 d(11.7)	4.31 br s	3.97 br s	4.75 d(12.0)	4.81 s
10a	5.87 s				
12a	6.00 s	6.25 d(1.8)	6.26 d(1.8)	6.29 d(1.8)	6.79 d(1.9)
14a		6.54 d(1.8)	6.72 d(1.8)	6.69 d(1.8)	6.85 d(1.9)
2b,6b	7.20 d(8.6)	7.05 d(8.6)	7.22 d(8.5)	7.19 d(8.5)	7.57 d(8.7)
3b,5b	6.69 d(8.6)	6.71 d(8.6)	6.77 d(8.5)	6.81 d(8.5)	6.83 d(8.7)
7b	3.00 dd(9.8, 11.7)	5.92 br s	5.95 d(9.5)	6.20 br s	
8b	4.26 d(9.8)	4.87 br s	4.71 d(9.5)	3.97 br s	
10b	5.87 s				
12b	6.00 s	6.81 d(1.8)	6.22 d(1.8)	6.32 d(1.8)	6.50 d(2.1)
14b		6.94 d(1.8)	6.60 d(1.8)	6.54 d(1.8)	6.25 d(2.1)
2c	7.09 d(8.6)	7.26 d(8.7)	7.05 d(8.5)	7.26 d(8.5)	
3c	6.70 d(8.6)	6.75 d(8.7)	6.79 d(8.5)	6.75 d(8.5)	
4c					6.44 d(2.1)
5c	6.70 d(8.6)	6.75 d(8.7)	6.79 d(8.5)	6.75 d(8.5)	
6c	7.09 d(8.6)	7.26 d(8.7)	7.05 d(8.5)	7.26 d(8.5)	6.66 d(2.1)
7c	6.00 s		4.90 d(6.5)	5.56 d(2.2)	
8c	4.24 d(2.5)		4.62 d(6.5)	4.68 d(2.2)	
10c	6.39 d(2.2)				
12c	6.24 d(2.4)	6.52 d(2.1)	6.22 d(1.8)	5.80 s	
14c		6.32 d(2.1)	5.99 d(1.8)		

Note: Signals of hydroxyls of **7-4-175** were resonated at δ 8.78 br s, 8.71 br s, 8.62 br s, 8.44 br s, 8.52 br s.

7.4.3 1,2-diphenylethene tetramers

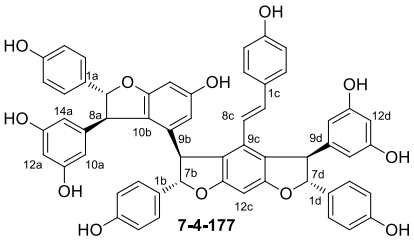
Table 7-4-52: Compounds, MFs, and test solvents of 1,2-diphenylethene tetramers **7-4-177**~**7-4-195**.

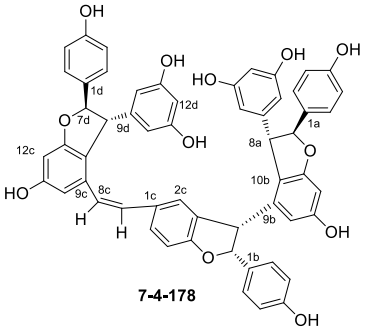
No.	Compounds	MFs	Test solvents	References
7-4-177	flexuosol A	$C_{56}H_{42}O_{12}$	CD_3COCD_3	[166]
7-4-178	halophilol B	$C_{56}H_{42}O_{12}$	CD_3COCD_3	[167]
7-4-179	(+)-vitisifuran A	$C_{56}H_{40}O_{12}$	CD_3OD	[91]
7-4-180	(+)-vitisin A	$C_{56}H_{42}O_{12}$	–	[91]
7-4-181	(–)-vitisifuran B	$C_{56}H_{40}O_{12}$	CD_3OD	[91]
7-4-182	(–)-vitisin B	$C_{56}H_{42}O_{12}$	–	[91]
7-4-183	gnemonol B	$C_{56}H_{42}O_{12}$	CD_3COCD_3	[100]
7-4-184	gnemonol C	$C_{56}H_{42}O_{13}$	CD_3COCD_3	[100]
7-4-185	pauciflorol C	$C_{56}H_{42}O_{12}$	CD_3COCD_3	[160]
7-4-186	dibalanocarpol	$C_{56}H_{42}O_{14}$	CD_3OD	[131]
7-4-187	isovaticanol B	$C_{56}H_{42}O_{12}$	CD_3COCD_3	[160]

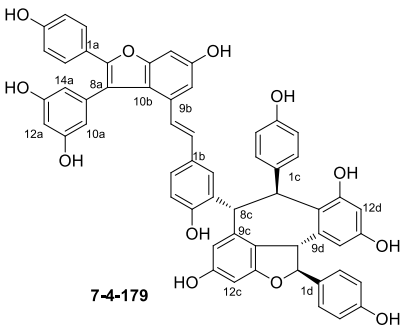
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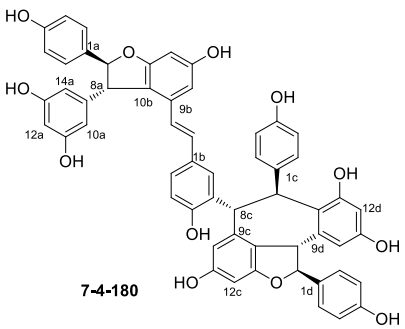
Table 7-4-52 (continued)

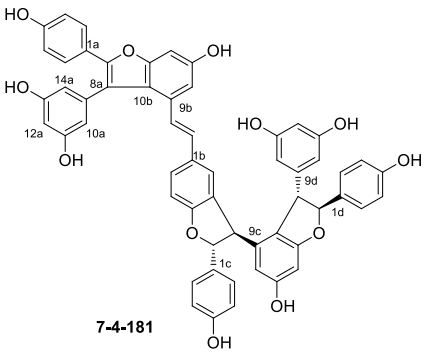
No.	Compounds	MFs	Test solvents	References
7-4-188	vaticanol B	$C_{56}H_{42}O_{12}$	CD_3COCD_3	[157]
7-4-189	hopeaphenol A	$C_{56}H_{42}O_{12}$	CD_3COCD_3	[168]
7-4-190	isohopeaphenol A	$C_{56}H_{42}O_{12}$	CD_3COCD_3	[168]
7-4-191	(+)-viniferol B	$C_{56}H_{42}O_{12}$	CD_3OD	[169]
7-4-192	(+)-viniferol C	$C_{56}H_{42}O_{12}$	CD_3OD	[169]
7-4-193	(−)-vaticanol B	$C_{56}H_{42}O_{12}$	CD_3COCD_3	[169]
7-4-194	(−)-vaticaphenol A	$C_{56}H_{42}O_{12}$	CD_3COCD_3	[169]
7-4-195	(+)-viniferol A	$C_{56}H_{42}O_{12}$	CD_3COCD_3	[170]

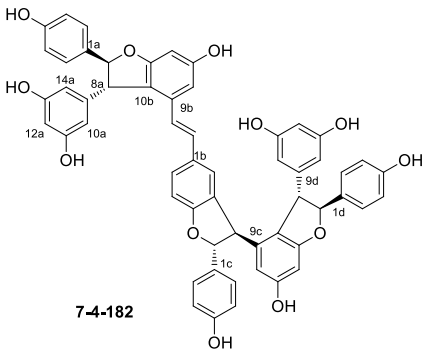




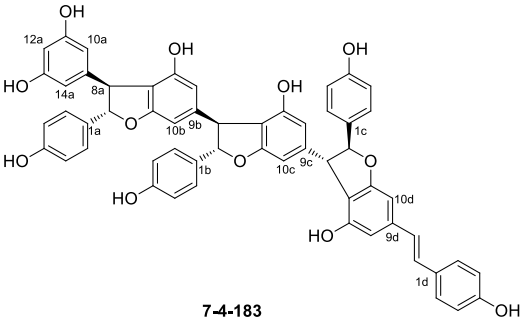




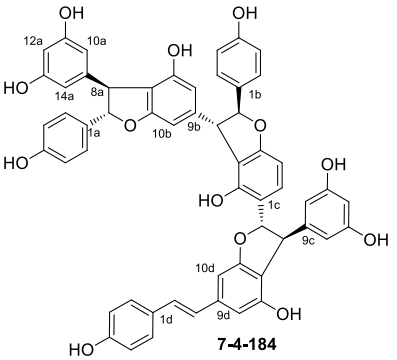




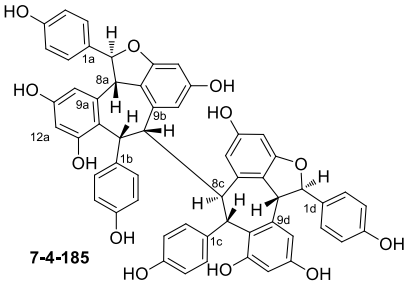
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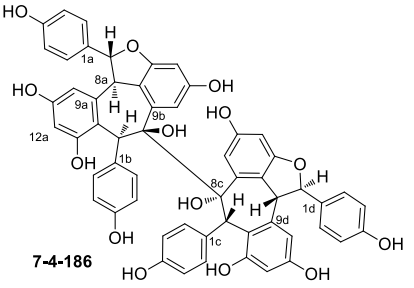
7-4-183



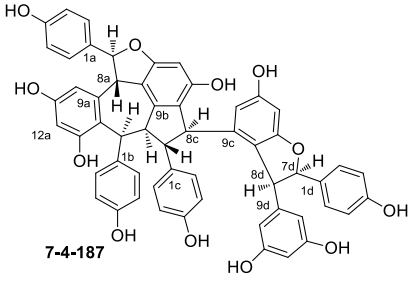
7-4-184



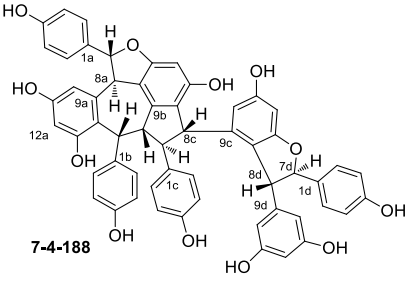
7-4-185



7-4-186

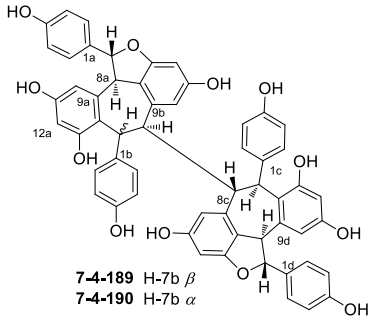


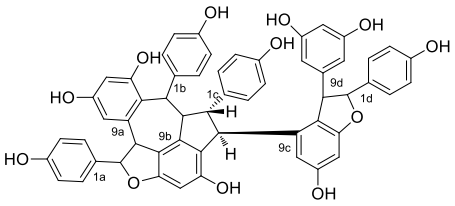
7-4-187



7-4-188

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	H-7a	H-8a	H-7b	H-8b	H-7d	H-8d
7-4-191	β	α	β	β	α	β
7-4-192	β	α	α	β	α	β
7-4-193	α	β	α	α	β	α
7-4-194	α	β	α	α	α	β

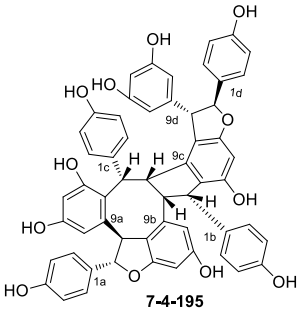


Table 7-4-53: ^{1}H NMR spectroscopic data of 1,2-diphenylethene tetramers **7-4-177**~**7-4-180**.

H	7-4-177	7-4-178	7-4-179	7-4-180
2a,6a	7.04 d(8.6)	6.98 d(8.1)	7.38 d(8.8)	7.07 d(8.5)
3a,5a	6.76 d(8.6)	6.82 d(8.1)	6.68 d(8.8)	6.77 d(8.5)
7a	5.32 d(5)	5.19 d(4.9)		5.31 d(6.3)
8a	4.49 d(5)	3.63 d(4.9)		4.26 d(6.3)
10a,14a	6.11 d(2)	5.93 d(1.8)	6.36 d(2.2)	6.10 d(2.2)
12a	6.18 t(2)	6.15 t(1.8)	6.46 t(2.2)	6.19 t(2.2)
2b	6.52 d(8.6)	7.08 d(8.6)	5.85 d(1.8)	5.92 d(2.0)
3b	6.55 d(8.6)	6.77 d(8.6)		
5b	6.55 d(8.6)	6.77 d(8.6)	6.62 d(8.8)	6.60 d(8.8)
6b	6.52 d(8.6)	7.08 d(8.6)	6.66 dd(8.8, 1.8)	6.73 dd(8.8, 2.0)
7b	5.13 br s	5.24 d(10.0)	6.75 d(16.1)	6.32 d(16.3)
8b	4.42 br s	4.33 d(10.0)	6.30 d(16.1)	6.27 d(16.3)
12b	6.30 d(2)	6.32 d(1.9)	6.73 d(2.2)	6.19 d(2.2)
14b	6.08 d(2)	6.19 d(1.9)	6.81 d(2.2)	6.44 d(2.2)
2c	6.72 d(8.6)	6.56 s	7.00 d(7.7)	7.00 d(8.8)
3c	6.57 d(8.6)		6.62 d(7.7)	6.62 d(8.8)
5c	6.57 d(8.6)	6.50 d(8.3)	6.62 d(7.7)	6.62 d(8.8)
6c	6.72 d(8.6)	6.95 d(8.3)	7.00 d(7.7)	7.00 d(8.8)
7c	6.50 br s	6.18 d(12.2)	5.26 d(3.7)	5.25 d(3.2)

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Table 7-4-53 (continued)

H	7-4-177	7-4-178	7-4-179	7-4-180
8c	6.50 br s	6.03 d(12.2)	5.42 d(3.7)	5.42 d(3.2)
12c	6.43 s	6.34 s	6.05 s	6.07 d(2.0)
14c		6.34 s	6.05 s	6.05 d(2.0)
2d,6d	7.19 d(8.6)	7.11 d(8.5)	7.06 d(8.8)	7.07 d(8.8)
3d,5d	6.80 d(8.6)	6.83 d(8.5)	6.70 d(8.8)	6.71 d(8.8)
7d	5.42 d(6)	5.30 d(5.0)	5.81 d(11.4)	5.81 d(11.5)
8d	4.50 d(6)	3.99 d(5.0)	4.13 d(11.4)	4.12 d(11.5)
10d	6.20 d(2)	6.08 d(2.2)		
12d	6.17 t(2)	6.21 t(2.2)	5.97 d(2.2)	5.96 d(2.2)
14d		6.08 d(2.2)	6.13 d(2.2)	6.13 d(2.2)

Table 7-4-54: ^{1}H NMR spectroscopic data of 1,2-diphenylethene tetramers **7-4-181**~**7-4-184**.

H	7-4-181	7-4-182	7-4-183	7-4-184
2a,6a	7.41 d(8.8)	7.18 d(8.4)	7.18 d(8.8)	7.20 d(8.4)
3a,5a	6.69 d(8.8)	6.82 d(8.4)	6.82 d(8.8)	6.84 d(8.4)
7a		5.33 d(4.8)	5.35 d(5.4)	5.57 d(4.2)
8a		4.36 d(4.8)	4.38 d(5.4)	4.49 d(4.2)
10a,14a	6.37 d(2.2)	5.98 d(2.2)	6.17 d(2.0)	6.19 d(1.8)
12a	6.42 t(2.2)	6.06 t(2.2)	6.22 t(2.0)	6.23 t(1.8)
2b	6.66 d(2.2)	6.65 d(1.8)	7.22 d(8.8)	7.21 d(8.4)
3b			6.83 d(8.8)	6.85 d(8.4)
5b	6.68 d(8.4)	6.68 d(8.4)	6.83 d(8.8)	6.85 d(8.4)
6b	6.91 dd(8.4, 2.2)	6.98 dd(8.4, 1.8)	7.22 d(8.8)	7.21 d(8.4)
7b	6.90 d(16.5)	6.50 d(16.5)	5.45 d(5.4)	5.38 d(5.4)
8b	6.71 d(16.5)	6.68 d(16.5)	4.47 d(5.4)	4.40 d(5.4)
10b			6.27 br s	6.36 br s
12b	6.80 d(2.2)	6.24 d(1.8)		
14b	6.95 d(2.2)	6.58 d(1.8)	6.28 br s	6.26 br s
2c	6.61 d(8.4)	6.58 d(8.8)	7.24 d(8.3)	
3c	6.54 d(8.4)	6.52 d(8.8)	6.84 d(8.3)	
5c	6.54 d(8.4)	6.52 d(8.8)	6.84 d(8.3)	6.43 d(8.4)
6c	6.61 d(8.4)	6.58 d(8.8)	7.24 d(8.3)	7.13 d(8.4)
7c	5.41 d(4.8)	5.42 d(5.1)	5.46 d(4.4)	5.69 d(4.8)
8c	4.29 d(4.8)	4.25 d(5.1)	4.48 d(4.4)	4.68 d(4.8)
10c			6.34 br s	6.25 d(1.8)
12c	6.27 d(2.2)	6.28 d(2.2)		6.23 t(1.8)
14c	6.09 d(2.2)	6.09 d(2.2)	6.25 br s	6.25 d(1.8)
2d,6d	7.19 d(8.4)	7.13 d(8.4)	7.42 d(8.8)	7.44 d(8.4)
3d,5d	6.82 d(8.4)	6.76 d(8.4)	6.83 d(8.8)	6.85 d(8.4)
7d	5.34 d(4.8)	5.36 d(6.2)	7.08 d(16.6)	7.10 d(16.2)
8d	4.41 d(4.8)	4.33 d(6.2)	6.94 d(16.6)	6.97 d(16.2)

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Table 7-4-54 (continued)

H	7-4-181	7-4-182	7-4-183	7-4-184
10d	6.00 d(2.2)	6.14 d(1.5)	6.71 br s	6.71 br s
12d	6.05 t(2.2)	6.13 t(1.5)		
14d	6.00 d(2.2)	6.14 d(1.5)	6.61 br s	6.59 br s
OH			8.07 br s, 8.20 br s(2H)	8.00~8.50 (10H)
			8.22 br s, 8.34 br s	
			8.53 br s(3H), 8.59 br s	

Table 7-4-55: ^{1}H NMR spectroscopic data of 1,2-diphenylethene tetramers **7-4-185**~**7-4-188**.

H	7-4-185	7-4-186	7-4-187	7-4-188
2a,6a	7.18 d(8.6)	6.76 dd(8.5, 2.5)	7.23 d(8.6)	7.23 d(8.8)
3a,5a	6.82 d(8.6)	6.71 dd(8.5, 2.5)	6.78 d(8.6)	6.79 d(8.8)
		6.70 dd(8.5, 2.5)		
7a	5.63 d(8.5)	4.44 d(2.5)	5.78 d(11.3)	5.77 d(11.7)
8a	4.65 d(8.5)	3.67 d(3.0)	4.44 br d(11.3)	4.44 d(11.7)
12a	6.30 d(2.3)	6.48 d(2.5)	6.27 d(2.3)	6.29 d(2.0)
14a	6.07 d(2.3)	6.10 d(2.5)	6.12 br d(2.3)	6.12 d(2.0)
2b,6b	6.65 d(8.6)	6.86 dd(8.5, 2.5)	7.16 d(8.6)	7.17 d(8.8)
3b,5b	6.42 d(8.6)	6.38 dd(8.5, 2.5)	6.70 d(8.6)	6.70 d(8.8)
7b	4.91 s	4.46 d(2.5)	5.26 d(3.7)	5.21 d(3.9)
8b	4.46 d(12.0)		3.13 br d(11.0)	3.13 dd(11.3, 3.9)
12b	5.92 d(1.8)	6.20 d(2.5)	6.14 d(0.9)	6.05 s
14b	6.19 d(1.8)	6.24 d(2.5)		
2c,6c	6.74 d(8.6)	6.51 dd(8.5, 2.5)	6.37 d(8.6)	6.42 d(8.8)
3c,5c	6.49 d(8.6)	6.40 dd(8.5, 2.5)	6.40 d(8.6)	6.52 d(8.8)
7c	5.28 d(4.7)	4.46 d(2.5)	4.11 t(11.0)	4.10 dd(11.3, 10.7)
8c	3.54 dd(12.0, 4.7)		4.56 d(11.0)	4.55 d(10.7)
12c	5.98 d(2.1)	6.19 d(2.5)	6.29 d(2.1)	6.21 d(2.0)
14c	6.02 d(2.1)	6.10 d(2.5)	6.48 d(2.1)	6.49 d(2.0)
2d,6d	7.08 d(8.6)	6.88 dd(8.5, 2.5)	7.05 d(8.7)	7.19 d(8.8)
3d,5d	6.75 d(8.6)	6.64 dd(8.5, 2.5)	6.60 d(8.7)	6.78 d(8.8)
		6.62 dd(8.5, 2.5)		
7d	5.62 d(9.5)	5.10 d(2.5)	5.82 d(7.9)	5.38 d(4.7)
8d	5.01 d(9.5)	3.67 d(3.0)	4.75 d(7.9)	4.68 d(4.7)
10d			5.74 br s	6.10 d(2.4)
12d	6.16 d(2.3)	5.78 d(2.5)	6.01 t(2.1)	6.30 t(2.4)
14d	5.96 d(2.3)	6.12 d(2.5)	5.74 br s	6.10 d(2.4)
OH	7.59 br s, 7.68 br s		7.19 s, 7.66 br s(2H)	7.45, 7.90, 8.01(2H)
	7.74 br s(2H)		7.80 br s, 8.01 br s	8.06, 8.16, 8.17
	7.92 br s, 7.94 br s		8.07 br s, 8.14 s	8.19, 8.37, 8.48
	7.96 br s, 8.01 br s		8.24 br s	
	8.40 br s(2H)			

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Table 7-4-56: ^{1}H NMR spectroscopic data of 1,2-diphenylethene tetramers **7-4-189**~**7-4-192**.

H	7-4-189	7-4-190	7-4-191	7-4-192
2a,6a	7.23 dm(8.6)	7.16 dm(8.6)	7.06 d(8.8)	7.54 d(8.8)
3a,5a	6.81 dm(8.6)	6.81 dm(8.6)	6.64 d(8.8)	6.88 d(8.8)
7a	5.81 d(12.8)	5.61 d(8.5)	5.65 d(12.1)	5.84 d(11.4)
8a	4.38 d(12.8)	4.63 d(8.5)	4.25 dd(12.1, 2.2)	5.01 dd(11.4, 2.2)
12a	6.30 d(2.1)	6.30 d(2.1)	6.23 d(2.2)	5.94 d(2.2)
14a	6.18 dd(0.6, 2.1)	6.05 dd(0.6, 2.1)	5.90 d(2.2)	6.16 d(2.2)
2b,6b	6.90 dm(8.6)	6.64 dm(8.6)	6.41 d(8.8)	6.81 br s
3b,5b	6.53 dm(8.6)	6.41 dm(8.6)	6.06 d(8.8)	6.44 br d(8.4)
7b	5.04 d(5.0)	4.90 s	5.34 d(3.3)	4.11 d(11.7)
8b	4.29 dd(5.0, 10.8)	4.44 d(12.1)	3.81 ddd(8.1, 3.3, 2.2)	3.95 ddd(11.7, 6.6, 2.2)
12b	6.01 d(2.1)	5.91 d(2.1)	6.12 s	6.13 s
14b	5.88 d(2.1)	6.18 d(2.1)		
2c,6c	6.31 m	6.73 dm(8.6)	6.69 d(8.8)	6.03 d(8.8)
3c,5c	6.31 m	6.48 dm(8.6)	6.27 d(8.8)	6.19 d(8.8)
7c	4.71 d(4.4)	5.27 d(4.8)	3.54 d(8.1)	3.63 d(6.6)
8c	2.62 dd(4.4, 10.8)	3.53 dd(4.8, 12.1)	4.57 s	3.92 s
12c	5.86 d(2.1)	5.97 d(2.1)	6.16 d(2.2)	6.28 d(2.2)
14c	4.98 d(2.1)	6.00 d(2.1)	5.69 d(2.2)	6.05 d(2.2)
2d,6d	7.50 dm(8.6)	7.06 dm(8.6)	7.07 d(8.4)	7.27 d(8.8)
3d,5d	6.90 dm(8.6)	6.76 dm(8.6)	6.74 d(8.4)	6.94 d(8.8)
7d	5.71 d(8.6)	5.61 d(9.3)	5.19 d(5.1)	5.31 d(3.3)
8d	5.41 d(8.6)	4.99 d(9.3)	4.06 d(5.1)	4.38 d(3.3)
10d			5.80 d(2.2)	5.90 d(2.2)
12d	6.34 d(2.1)	6.16 d(2.1)	6.07 t(2.2)	5.99 t(2.2)
14d	6.38 dd(0.6, 2.1)	5.94 dd(0.6, 2.1)	5.80 d(2.2)	5.90 d(2.2)
OH	7.49 s. 7.51 s, 7.59 s 7.67 s, 7.80 s, 7.88 s 7.98 s, 8.07 s, 8.46 s 8.52 s	7.62 s, 7.72 s, 7.76 s 7.77 s, 7.95 s, 7.98 s(2H) 8.08 s, 8.45 s, 8.49 s		

Table 7-4-57: ^{1}H NMR spectroscopic data of 1,2-diphenylethene tetramers **7-4-193**~**7-4-195**.

H	7-4-193	7-4-194	7-4-195
2a,6a	7.23 d(8.8)	7.22 d(8.5)	6.85 d(8.4)
3a,5a	6.79 d(8.8)	6.78 d(8.5)	6.64 d(8.4)
7a	5.77 d(11.7)	5.76 d(11.0)	5.66 d(12.8)
8a	4.44 d(11.7)	4.43 d(11.0)	4.30 d(12.8)
12a	6.29 d(2.0)	6.27 d(1.8)	6.06 d(2.2)
14a	6.12 d(2.0)	6.11 d(1.8)	6.49 d(2.2)
2b,6b	7.17 d(8.8)	7.16 d(8.3)	6.59 br s
3b,5b	6.70 d(8.8)	6.69 d(8.3)	6.49 br s

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Table 7-4-57 (continued)

H	7-4-193	7-4-194	7-4-195
7b	5.21 d(3.9)	5.20 d(3.0)	3.23 d(11.0)
8b	3.13 dd(11.3, 3.9)	3.10 br d(11.5)	3.18 dd(7.0, 11.0)
12b	6.05 s	6.04 s	5.95 d(2.2)
14b			5.52 d(2.2)
2c,6c	6.42 d(8.8)	6.40 d(8.5)	6.73 dd(8.4)
3c,5c	6.52 d(8.8)	6.50 d(8.5)	6.49 dd(8.4)
7c	4.10 dd(11.3, 10.7)	4.09 t(11.5)	5.39 br s
8c	4.55 d(10.7)	4.55 d(11.5)	3.99 br d(7.0)
12c	6.21 d(2.0)	6.19 d(2.0)	6.06 s
14c	6.49 d(2.0)	6.47 d(2.0)	
2d,6d	7.19 d(8.8)	7.19 d(8.8)	7.25 dd(8.4)
3d,5d	6.78 d(8.8)	6.77 d(8.8)	6.79 dd(8.4)
7d	5.38 d(4.7)	5.37 d(5.5)	5.37 d(8.8)
8d	4.68 d(4.7)	4.68 d(5.5)	4.63 d(8.8)
10d,14d	6.10 d(2.4)	6.10 br s	6.11 dd(2.2)
12d	6.30 t(2.4)	6.28 t(2.5)	6.15 t(2.2)

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3-methoxy-4-[(2*S*,3*R*)-3-methyl-7-[(*E*)-1-propenyl-2,3-dihydro-1,4-benzodioxin-2-yl]-1,2-benzenediol 518
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3-*O*-(2-methoxy-3-methylbut-3-enyl)-emodin 304
3-*O*-{2-*O*-(6-*O*-*E*-feruloyl-*β*-D-glucopyranosyl)-(6-*O*-*E*-feruloyl-*β*-D-glucopyranosyl)}-5-*O*-(6-*O*-malonyl-*β*-D-glucopyranosyl)delphinidin 238
3-*O*-{2-*O*-(6-*O*-*E*-feruloyl-*β*-D-glucopyranosyl)-(6-*O*-*E*-*p*-coumaroyl-*β*-D-glucopyranosyl)}-5-*O*-(6-*O*-malonyl-*β*-D-glucopyranosyl)delphinidin 238
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3-*O*-(3-hydroxymethyl-4-hydroxybut-2-enyl)-emodin 304
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3-*O*-(6-*O*-(*E*)-feruloyl-2-*O*-*β*-D-glucopyranosyl-*β*-D-glucopyranosyl)-5-*O*-(6-*O*-malonyl-*β*-D-glucopyranosyl)pelargonidin 237
3-*O*-(6-*O*-(*E*)-feruloyl-2-*O*-*β*-D-glucopyranosyl-*β*-D-glucopyranosyl)-5-*O*-(4-*O*-*β*-D-glucopyranosyl-6-*O*-malonyl-*β*-D-glucopyranosyl)pelargonidin 246
3-*O*-(6-*O*-(*E*)-*p*-coumaroyl-2-*O*-*β*-D-glucopyranosyl-*β*-D-glucopyranosyl)-5-*O*-(6-*O*-malonyl-*β*-D-glucopyranosyl) pelargonidin 237
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3-*O*-(*E*-3-hydroxymethylbut-2-enyl)-emodin 304

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3-*O*-methylcalopocarpin 127
(3*α*,3′*α*,4*β*,4*β*′)-3,3′-dimethoxy-*cis*-[4,4′-bis(3,4,5,10-tetra-hydro-1*H*-naphtho[2,3-*c*]pyran)]-5,5′,10,10′-tetraone 289
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7,8-*erythro*-dihydroxy-3,4,5-trimethoxy-phenyl-propane 8-*O*-*β*-glucopyranoside 352
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7-hydroxy-4,6-dimethoxy-3,5-dimethylcoumarin 413
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