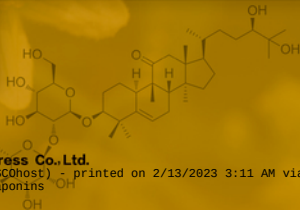


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VOLUME 2: SAPONINS

Edited by Hailin Qin, Dequan Yu



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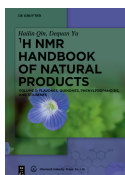
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^1H NMR Handbook of Natural Products

Volume 2: Saponins

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Contents

List of Participants — VII

3 Saponins — 1

- 3.1 Dammarane-type Saponins — 1
- 3.2 Tirucallane-type Saponins — 47
- 3.3 Lupane-type Saponins — 56
- 3.4 Hopane-type Saponins — 69
- 3.5 Oleanane-type Saponins — 86
- 3.6 Taraxastane-type Saponins — 266
- 3.7 Ursane-type Saponins — 268
- 3.8 Cycloartane-type Saponins — 294
- 3.9 Lanostane-type Saponins — 310
- 3.10 Cucurbitane-type Saponins — 327
- 3.11 Steroidal Saponins — 349

Index of compound names — 487

Index of molecular formula of compounds — 507

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3 Saponins

3.1 Dammarane-type Saponins

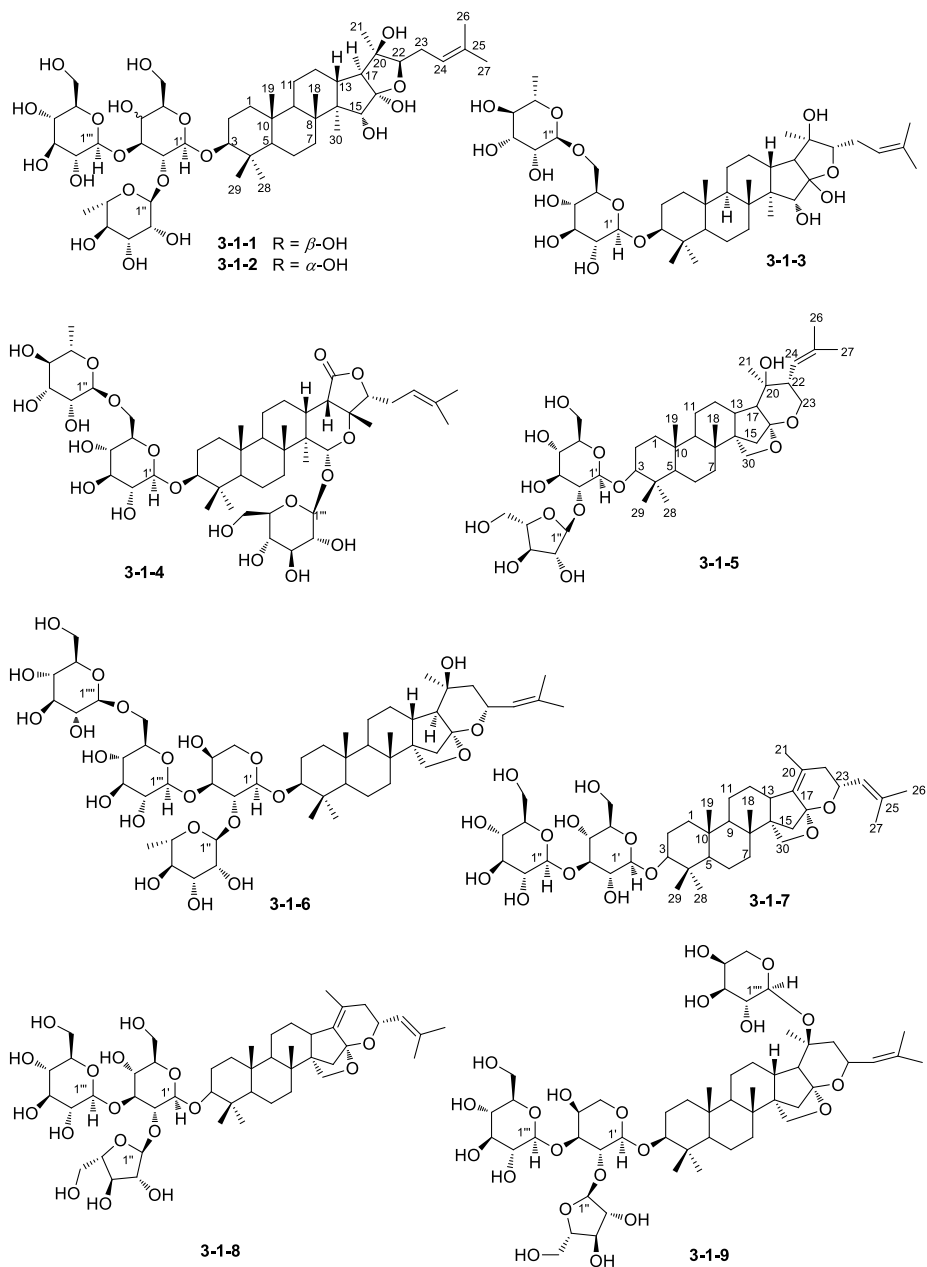
Table 3-1-1: Cos, MFs, and TSs of dammarane-type saponins **3-1-1~3-1-21**.

No.	Compounds	MFs	Test solvents	References
3-1-1	lotoside I	C ₄₈ H ₈₀ O ₁₉	CD ₃ OD	[1]
3-1-2	lotoside II	C ₄₈ H ₈₀ O ₁₉	CD ₃ OD	[1]
3-1-3	mabioside D	C ₄₂ H ₇₀ O ₁₄	CD ₃ OD	[2]
3-1-4	mabioside A	C ₄₇ H ₇₆ O ₁₉	CD ₃ OD	[3]
3-1-5	bacopasaponin D	C ₄₁ H ₆₆ O ₁₃	C ₅ D ₅ N	[4]
3-1-6	jujuboside C	C ₅₃ H ₈₆ O ₂₂	CD ₃ OD	[1]
3-1-7	bacopasaponin G ^①	C ₄₂ H ₆₆ O ₁₃	C ₅ D ₅ N	[5]
3-1-8	bacoside A ₆	C ₄₇ H ₇₄ O ₁₇	C ₅ D ₅ N	[5]
3-1-9	bacopasaponin E	C ₅₁ H ₈₂ O ₂₁	C ₅ D ₅ N	[6]
3-1-10	3β,12β,23S,24R-tetrahydroxy-20S,25-epoxydammarane	C ₄₁ H ₇₀ O ₁₄	C ₅ D ₅ N	[7]
3-1-11	3-O-[β-D-glucopyranosyl(1→2)]-β-D-xylopyranoside 3β,12β,23S,24R-tetrahydroxy-20S,25-epoxydammarane	C ₄₁ H ₇₀ O ₁₄	C ₅ D ₅ N	[7]
3-1-12	3-O-[β-D-xylopyranosyl(1→2)]-β-D-glucopyranoside 23-O-acetyl-3β,12β,23S,24R-tetrahydroxy-20S,25-epoxydammarane	C ₄₂ H ₇₀ O ₁₄	C ₅ D ₅ N	[7]
3-1-13	3-O-[β-D-xylopyranosyl(1→2)]-β-D-xylopyranoside 23-O-acetyl-3β,12β,23S,24R-tetrahydroxy-20S,25-epoxydammarane	C ₄₃ H ₇₂ O ₁₅	C ₅ D ₅ N	[7]
3-1-14	3-O-[β-D-xylopyranosyl(1→2)]-β-D-glucopyranoside 3β,12β,23S,24R-tetrahydroxy-20S,25-epoxydammarane	C ₄₆ H ₇₈ O ₁₈	C ₅ D ₅ N	[7]
3-1-15	3-O-[β-D-xylopyranosyl(1→2)][β-D-xylopyranosyl-(1→6)]-β-D-glucopyranoside 3β,12β,23S,24R-tetrahydroxy-20S,25-epoxydammarane	C ₄₇ H ₈₀ O ₁₉	C ₅ D ₅ N	[7]
3-1-16	3-O-[β-D-glucopyranosyl(1→2)][β-D-xylopyranosyl-(1→6)]-β-D-glucopyranoside 23-O-acetyl-3β,12β,23S,24R-tetrahydroxy-20S,25-epoxydammarane	C ₄₈ H ₈₀ O ₁₉	C ₅ D ₅ N	[7]
3-1-17	3-O-[β-D-xylopyranosyl(1→2)][β-D-xylopyranosyl-(1→6)]-β-D-glucopyranoside 3β,12β,23S,25-tetrahydroxy-20S,24S-epoxydammarane	C ₄₁ H ₇₀ O ₁₄	C ₅ D ₅ N	[8]
3-1-18	3-O-[β-D-xylopyranosyl(1→2)]-β-D-glucopyranoside cyclocarioside B	C ₄₂ H ₇₂ O ₁₂	C ₅ D ₅ N	[9]
3-1-19	cyclocarioside C	C ₄₂ H ₇₀ O ₁₃	C ₅ D ₅ N	[9]
3-1-20	pterocaryoside A	C ₃₆ H ₆₀ O ₉	CD ₃ OD	[10]
3-1-21	pterocaryoside B	C ₃₅ H ₅₈ O ₉	CD ₃ OD	[10]

^① The inconsistency of nomenclature for compounds in the literature occurred, bacopasaponin G and bacopasaponin H were used for the same compound.

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2 — 3 Saponins



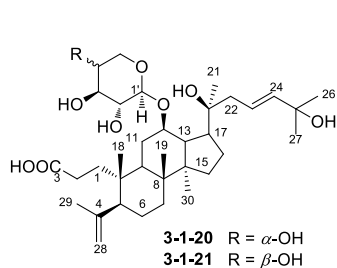
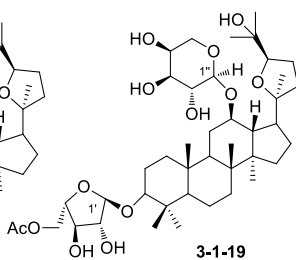
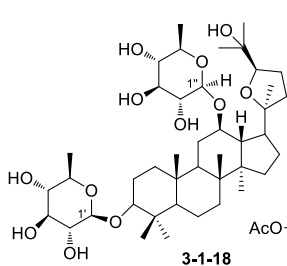
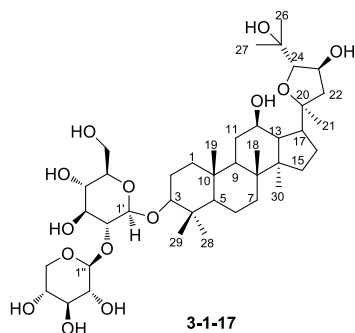
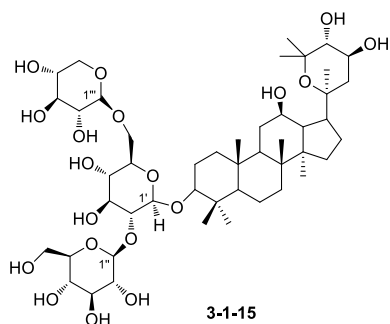
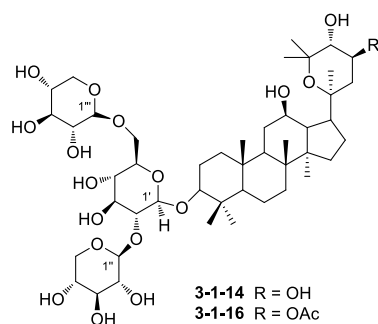
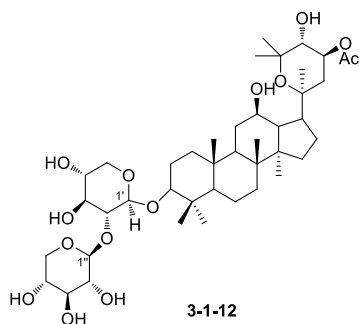
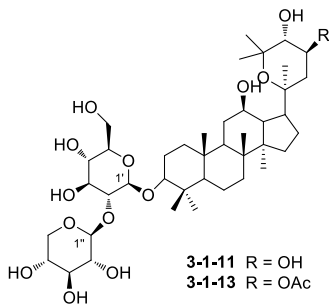
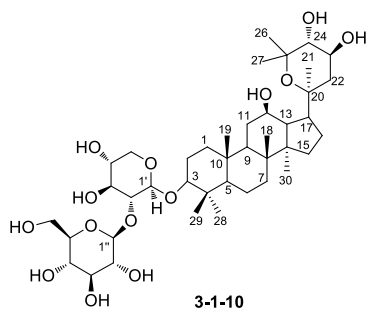


Table 3-1-2: ¹H NMR spectroscopic data of dammarane-type saponins **3-1-1~3-1-5**.

H	3-1-1	3-1-2	3-1-3	3-1-4	3-1-5
1	1.00 m	0.97 m	—	1.95, 0.98	—
2	1.66 m, 1.93 m	1.68 m, 1.94 m	—	1.92, 1.68	—
3	3.10 dd(11.5, 4)	3.19 dd(11.5, 3.5)	—	3.14	3.30 dd(11.7, 4.4)
5	0.74 brd(10)	0.76 brd(11)	—	0.75	—
6	1.20 m, 1.51 m	1.20 m, 1.50 m	—	1.50, 1.40	—
7	1.50 m, 1.52 m	1.50 m	—	2.13, 1.51	—
9	1.30 m	1.31 m	—	1.24	—
11	—	—	—	1.65, 1.36	—
12	—	1.68 m, 1.96 m	—	2.36, 1.55	—
13	2.10 m	2.05 m	—	2.38	2.81 dddd (1.4, 4.4, 5.4, 13.2)
15	3.92 s	3.92 s	—	5.06	—
17	1.86 d(11.5)	1.88 d(11)	—	2.38	—
18	1.13 s	1.13 s	0.84 s	1.21	1.05 s
19	0.89 s	0.89 s	0.94 s	0.90	0.71 s
21	1.24 s	1.24 s	—	1.41	1.37 s
22	3.81 brt(8)	3.79 dt(7, 1.5)	4.01 t(6.7)	4.07	2.59 ddd (2.2, 2.2, 10.5)
23	2.24 m	2.25 m	—	2.59	α 3.85 dd(2.2, 10.7)
				2.42	β 4.68 dd(2.2, 10.7)
24	5.21 brt(6.5)	5.21 brt(7)	5.31 m	5.24	5.82 dsept (10.7, 1.2)
26	1.66 brs	1.65 d(1)	1.13 s	1.72	1.69 d(1.2)
27	1.62 brs	1.61 d(1)	1.0 s	1.69	1.61 d(1.2)
28	1.03 s	1.02 s	1.35 s	0.82	1.27 s
29	0.84 s	0.85 s	1.74 s	1.02	1.01 s
30	0.94 s	0.94 s	1.78 s	0.96	—
1'	4.40 d(7.5)	4.44 d(7.5)	4.50 d(7.7)	4.31	4.95 d(8)
2'	3.83 dd(9, 7.5)	3.57 dd(8, 7.5)	3.36 dd(7.8, 9.4)	3.19	—
3'	3.75 dd(9, 2.5)	3.71 dd(9, 8)	3.55 t(7.4)	3.34	—
4'	4.11 brd(3)	3.47 dd(10, 9)	3.48 t(7.6)	3.27	—
5'	3.51 brt(6)	3.29 m	3.6 m	3.39	—
6'	3.72 m	3.68 dd(11.5, 5.5)	3.78 dd(6.0, 12.0)	3.95	—
		3.85 dd(11.5, 2.5)	4.15 dd(1.7, 13.0)	3.59	—
1''	5.38 d(1.5)	5.44 d(1.5)	4.92 d(1.8)	4.74	6.31 d(1.2)
2''	3.95 dd(3.5, 1.5)	3.97 dd(3.5, 1.5)	3.99 m	3.82	—
3''	3.75 dd(9.5, 3.5)	3.73 dd(9.5, 3.5)	3.78 dd(6.1, 9.9)	3.67	—
4''	3.38 t(9.5)	3.39 t(9.5)	3.56 t(9.5)	3.37	—
5''	4.00 dq(9.5, 6.5)	4.00 dq(9.5, 6)	3.87 dq(3.5, 6.4)	3.67	—
6''	1.21 d(6.5)	1.22 d(6)	1.45 d(6.1)	1.25	—
1'''	4.50 d(7.3)	4.52 d(8)	—	4.43	—
2'''	3.28 t(8)	3.25 dd(9.5, 8)	—	3.23	—
3'''	3.34 m	3.38 t(9.5)	—	3.34	—
4'''	3.31 m	3.30 m	—	3.39	—
5'''	3.30 m	3.35 m	—	3.23	—
6'''	3.67 dd(12, 4.5)	3.62 dd(11.5, 6)	—	3.78	—
	3.84 dd(12, 2)	3.90 dd(11.5, 2)	—	3.70	—

Table 3-1-3: ^1H NMR spectroscopic data of dammarane-type saponins **3-1-6~3-1-10**.

H	3-1-6	3-1-7	3-1-8	3-1-9	3-1-10
1	0.98 m	0.68, 1.43	0.58, 1.36	—	1.72 m, 0.96 m
2	1.65 m, 1.82 m	1.80, 2.17	1.73, 2.18	—	2.19 m, 1.96 m
3	3.10 dd(10, 4)	3.35 dd(11.2, 4.0)	3.25 dd(12, 4)	—	3.34 dd(11.7, 4.3)
5	0.73 dm(9)	0.68	0.58	—	0.80 d(11.0)
6	1.54 m	1.38, 1.53	1.44, 1.54	—	1.58 m, 1.46 m
7	1.54 m, 1.44 m	1.40, 1.54	1.26, 1.44	—	1.48 m, 1.29 m
9	—	0.82	0.78	—	1.53 m
11	—	1.53	1.47	—	2.13 m, 1.45 m
12	—	1.78, 2.20	1.80, 2.18	—	3.83 m
13	2.48 m	2.85 br d(11.6)	2.76 br d(10)	—	2.02 t(10.0)
15	1.19 m	1.54	1.66	—	1.52 m
	2.05 d(8.5)	2.05	1.84		1.03 m
16					1.91 m, 1.43 m
17	1.00 d(7)			—	2.31 m
18	1.13 s	1.03 s	0.92 s	1.03 s	0.96 s
19	0.87 s	0.77 s	0.68 s	0.64 s	0.91 s
21	1.13 s	1.65 s	1.67 s	1.48 s	1.52 s
22	1.46 m, 1.33 m	3.27	1.45, 2.01	—	2.31 m, 2.23 m
23	4.67 ddd(10, 8, 2)	3.94, 4.02	5.06	5.33 t-like	4.52 m
24	5.15 dt(8, 1)	4.78 br d(9.2)	5.43 d(8.0)	5.48 m	3.91 d(9.3)
26	1.71 br s	1.65 s	1.65 s	1.68 s	1.67 s
27	1.67 d(1)	1.65 s	1.64 s	1.80 s	1.80 s
28	1.00 s	1.30 s	1.25 s	1.25 s	1.31 s
29	0.84 s	0.99 s	1.04 s	0.94 s	1.17 s
30	3.87 d(9)	4.28	4.25	—	1.00 s
	4.02 d(8)				
1'	4.45 d(5)	4.88 d(7.6)	4.88 d(7.6)	4.75 d(7)	4.91 d(6.6)
2'	3.87 m	4.04	4.09	—	4.27 m
3'	3.83 m	4.19	4.17	—	4.30 m
4'	4.08 dd(4, 2)	4.04, 4.19	3.94, 4.01	—	4.23 m
5'	3.52 d(10)	3.92	3.86	—	4.38 m
	3.85 dd(10, 3)				3.77 t(10.4)
6'		4.32, 4.53	4.16, 4.45		
1''	5.20 d(1.5)	5.25 d(8.0)	6.26 br s	6.05 br s	5.42 d(7.6)
2''	3.92 dd(3.5, 1.5)	4.06	5.03	—	4.30 m
3''	3.71 dd(9.5, 3.5)	4.21	4.88	—	4.18 m
4''	3.38 t(9.5)	4.19	4.82	—	4.40 m
5''	3.85 m	4.10	4.20, 4.35	—	4.00 m
6''	1.20 d(6)	4.28, 4.48			4.53 m
1'''	4.49 d(7.5)		5.19 d(7.6)	5.05 d(8)	
2'''	3.28 dd(9, 7)		3.96	—	
3'''	3.38 m		4.03	—	
4'''	3.30 t(nd)		4.07	—	
5'''	3.52 m		4.21	—	

Table 3-1-3 (continued)

H	3-1-6	3-1-7	3-1-8	3-1-9	3-1-10
6'''	3.73 dd(11, 7) 4.14 dd(11, 1.5)		4.20 4.56	—	
1''''	4.34 d(8)			4.84 d(7)	
2''''	3.19 dd(9, 8)			—	
3''''	3.35 m			—	
4''''	3.27 m			—	
5''''	3.65 dd(11, 5)			—	
6''''	3.85 d(11)				

Table 3-1-4: ¹H NMR spectroscopic data of dammarane-type saponins 3-1-11~3-1-15.

H	3-1-11	3-1-12	3-1-13	3-1-14	3-1-15
1	1.53 m, 0.86 m	1.72 m, 0.99 m	1.53 m, 0.81 m	1.72 m, 1.00 m	1.70 m, 0.96 m
2	2.30 m, 1.80 m	2.40 m, 1.95 m	2.40 m, 1.83 m	2.40 m, 1.90 m	2.30 m, 1.90 m
3	3.30 dd(11.4, 4.0)	3.35 dd(11.6, 4.0)	3.31 dd(11.6, 4.2)	3.34 dd(11.6, 4.3)	3.20 br d(11.5)
5	0.74 d(10.0)	0.84 d(10.6) 1.61 m	0.73 d(10.5) 1.55 m	0.73 d(9.4)	0.77 d(10.3)
6	1.58 m, 1.45 m	1.49 m	1.40 m	1.60 m, 1.45 m	1.57 m, 1.42 m
7	1.41 m 1.20 m	1.50 m 1.30 m	1.41 m 1.20 br d(10.4)	1.46 m 1.25 m	1.34 m 1.18 m
9	1.41 m	1.53 m	1.40 m	1.50 m	1.40 m
11	2.02 m, 1.45 m	2.16 m, 1.50 m	2.02 m, 1.43 m	2.14 m, 1.40 m	2.10 m, 1.30 m
12	3.78 m	3.83 m	3.79 m	3.82 m	3.72 m
13	1.99 t(10.0)	2.00 m	1.91 t(10.1)	2.01 t(10.2)	1.95 t(10.0)
15	1.45 m, 0.98 m	1.50 m, 1.04 m	1.42 m, 0.97 m	1.52 m, 1.04 m	1.43 m, 0.95 m
16	1.90 m, 1.43 m	1.90 m, 1.38 m	1.81 m, 1.48 m	1.90 m, 1.43 m	1.90 m, 1.41 m
17	2.24 m	2.31 m	2.24 m	2.30 m	2.21 m
18	0.89 s	1.01 s	0.96 s	0.96 s	0.85 s
19	0.83 s	0.94 s	0.83 s	0.92 s	0.79 s
21	1.46 s	1.57 s	1.31 s	1.52 s	1.43 s
22	2.27 m, 2.18 m	2.38 m, 2.20 m	2.29 m, 2.10 m	2.32 m, 2.23 m	2.24 m, 2.18 m
23	4.45 m	5.80 dt(10.5, 4.0)	5.70 dt(10.5, 4.0)	4.52 m	4.50 m
24	3.85 d(9.3)	4.10 d(9.9)	4.00 d(9.8)	3.92 d(9.3)	3.85 d(9.2)
26	1.61 s	1.64 s	1.62 s	1.69 s	1.60 s
27	1.74 s	1.80 s	1.74 s	1.81 s	1.74 s
28	1.32 s	1.37 s	1.32 s	1.32 s	1.26 s
29	1.12 s	1.18 s	1.11 s	1.20 s	1.09 s
30	0.97 s	1.02 s	0.97 s	0.99 s	0.89 s
OAc		2.08 s(23-OAc)	2.01 s(23-OAc)		
1'	4.93 d(7.6)	4.90 d(7.3)	4.93 d(7.7)	4.94 d(7.7)	4.88 d(7.4)
2'	4.14 m	4.18 m	4.12 m	4.12 m	4.12 m
3'	4.30 m	4.25 m	4.30 m	4.21 m	4.21 m
4'	4.17 m	4.30 m	4.15 m	4.20 m	4.20 m

Table 3-1-4 (continued)

H	3-1-11	3-1-12	3-1-13	3-1-14	3-1-15
5'	4.25 m	4.39 dd(11.2, 4.7) 3.78 m	4.12 m	4.31 m	4.21 m
6'	4.56 d(11.3) 4.37 m		4.56 d(10.2) 4.33 m	4.86 d(10.4) 4.38 m	4.80 d(10.9) 4.28 m
1''	5.25 d(7.0)	5.30 d(7.2)	5.25 d(6.9)	5.27 d(7.2)	5.03 d(7.6)
2''	4.12 m	4.19 m	4.10 m	4.14 m	4.15 m
3''	4.15 m	4.21 m	3.90 m	4.21 m	3.90 m
4''	4.22 m	4.22 m	4.20 m	4.30 m	4.29 m
5''	4.40 m 3.70 t(10.6)	4.46 dd(11.2, 5.1) 3.78 m	4.40 m 3.72 t(10.6)	4.44 m	4.21 m
6''					4.45 m
1'''				5.02 d(7.4)	4.95 d(7.3)
2'''				4.10 m	4.03 m
3'''				4.11 m	4.12 m
4'''				4.30 m	4.07 m
5'''				4.40 m 3.75 t(11.5)	4.33 m 3.69 t(11.0)

Table 3-1-5: ¹H NMR spectroscopic data of dammarane-type saponins **3-1-16~3-1-18**.

H	3-1-16	3-1-17	3-1-18
1	1.65 m 0.90 m	1.62 m 0.88 m	3.16 br d(13.6) 2.12 m
2	2.60 m, 1.86 m	2.27 m, 1.91 m	(ov)
3	3.28 dd(11.3, 3.5)	3.39 dd(11.6, 4.2)	3.59 m
5	0.67 d(9.0), 1.50 m	0.80 d(9.5)	1.66 m
6	1.37 m	1.59 m	1.54 m
7	1.39 m, 1.18 m	1.49 m, 1.27 m	1.50 m, 1.16 m
9	1.40 m	1.54 m	1.91 dd(10.8, 4.3)
11	2.07 m 1.42 m	2.12 m	2.87 br d(12.4) 1.48 m
12	3.73 m	3.89 m	4.39 ddd(10.4, 10.4, 4.7)
13	1.90 t(10.5)	2.09 m	1.83 br d(10.4)
15	0.95 m, 1.42 m	1.11 m, 1.62 m	0.94 m, 1.36~1.41 m
16	1.81 m, 1.42 m	1.96 m	2.02 m, 1.92 m
17	2.20 m	2.40 m	1.87~1.95 m
18	0.91 s	0.96 s	1.07 s
19	0.83 s	0.90 s	1.42 s
21	1.48 s	1.51 s	1.14 s
22	2.10 m, 2.28 m	2.48 m, 2.51 m	1.55 m, 1.71~1.75 m
23	5.73 dt(10.8, 4.0)	5.12 m	2.02 m
24	4.02 m	4.30 d(7.9)	3.94 t(7.2)
26	1.61 s	1.69 s	1.44 s

Table 3-1-5 (continued)

H	3-1-16	3-1-17	3-1-18
27	1.73 s	1.71 s	1.39 s
28	1.26 s	1.39 s	1.00 s
29	1.10 s	1.20 s	1.30 s
30	0.91 s	1.02 s	0.56 s
OAc	2.00 s(23-OAc)		
1'	4.86 d(7.6)	5.00 d(7.6)	4.74 d(7.8)
2'	4.02 m	4.20 m	4.01 t(8.5)
3'	4.22 m	4.37 m	3.72~3.76 m
4'	4.10 m	4.24 m	4.17 t(8.9)
5'	4.22 m	4.22 m	3.82 m
6'	4.27 m, 4.80 d(10.7)	4.42 m, 4.64 d(10.2)	1.60 d(5.6)
1''	5.23 d(7.2)	5.32 d(6.8)	5.02 d(7.8)
2''	4.08 m	4.20 m	3.98 t(9.0)
3''	4.12 m	4.01 m	3.72~3.76 m
4''	4.20 m	4.30 m	4.14 t(8.8)
5''	4.31 m	3.78 t(10.5), 4.46 m	3.72 m
6''			1.59 d(5.9)
1'''	4.98 d(7.2)		
2'''	4.02 m		
3'''	4.02 m		
4'''	4.20 m		
5'''	3.67 t(9.7), 4.35 m		

Table 3-1-6: ¹H NMR spectroscopic data of dammarane-type saponins 3-1-19~3-1-21.

H	3-1-19	3-1-20	3-1-21
1	1.78 m, 3.03 br d(13.5)	1.49 m, 2.45 ddd(5, 13, 13)	1.52 m, 2.50 m
2	(ov)	2.23 m, 2.66 ddd(5, 13, 13)	2.24 m, 2.62 m
3	3.47 m		
5	1.56 m	1.78 m	1.80 m
6	1.50 m	1.74 m, 1.63 m	1.77 m, 1.61 m
7	1.14 br d(12.6), 1.50 m	1.07 m, 1.42 m	1.08 m, 1.42 m
9	1.88 dd(10.1, 4.2)	1.80 m	1.82 m
11	1.56 m, 2.97 br d(12.3)	1.37 m, 2.35 m	1.33 m, 2.40 m
12	4.38 ddd(10.6, 10.6, 5.2)	4.07 ddd(4.5, 10.7, 10.7)	4.12 ddd(4.5, 10.5)
13	1.83 br d(10.7)	1.90 m	1.94 m
15	0.98 m, 1.36~1.39 m	1.19 m, 1.56 m	1.21 m, 1.55 m
16	(ov)	1.31 m, 1.87 m	1.31 m, 1.90 m
17	1.96 m	2.02 m	2.04 m
18	1.02 s	0.96 s	0.98 s
19	1.46 s	1.09 s	1.09 s
21	1.18 s	1.16 s	1.16 s

Table 3-1-6 (continued)

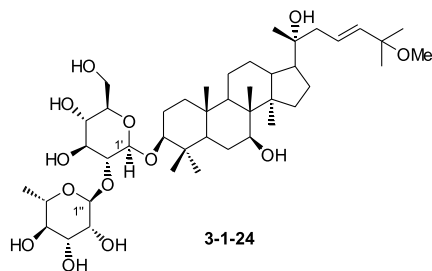
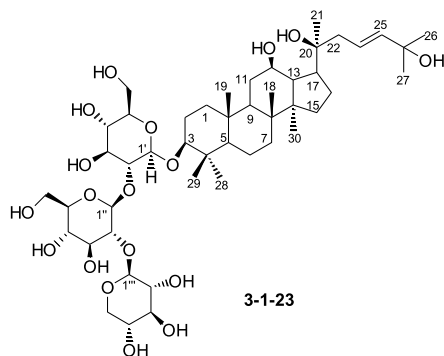
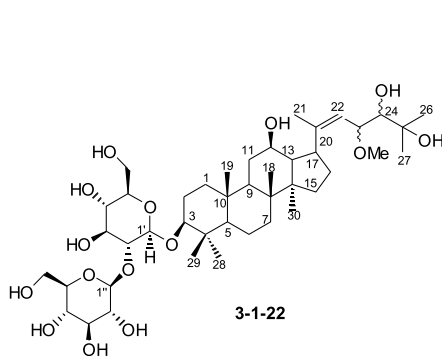
H	3-1-19	3-1-20	3-1-21
22	(ov)	2.19 m	2.20 m, 1.95 m
23	2.03 m	5.71 m	5.68 m
24	3.96 t(7.2)	5.63 d(15.5)	5.62 d(15.5)
26	1.50 s	1.27 s	1.28 s
27	1.30 s	1.27 s	1.28 s
28	0.88 s	4.69 br s, 4.84 br s	4.85 br s, 4.72 br s
29	1.20 s	1.76 s	1.77 s
30	0.68 s	1.04 s	1.07 s
1'	5.41 d(4.1)	4.35 d(7.5)	4.28 d(6.5)
2'	4.71 m	3.20 m	3.51 m
3'	4.56 br d(6.4)	2.99 t(9.1)	3.50 m
4'	4.82 m	3.29 m	3.79 m
5'	4.78 dd(3.0, 11.7)	3.24 m	3.52 (ov)
	4.59 dd(4.0, 11.4)		3.89 dd(1.5, 13)
6'		1.25 d(6.0)	
OAc	1.94 s(5'-OAc)		
1''	4.92 d(7.6)		
2''	4.37 m		
3''	4.15 dd(9.2, 3.5)		
4''	4.22 m		
5''	3.80 br d(11.7), 4.29 dd(11.7, 1.7)		

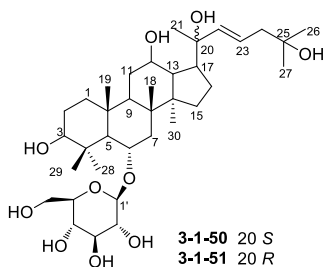
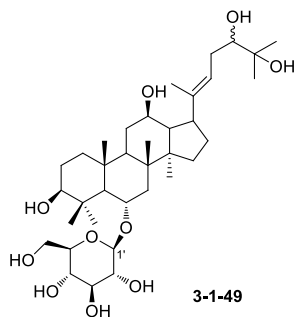
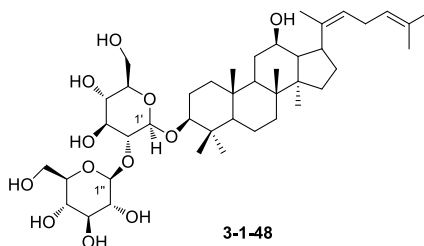
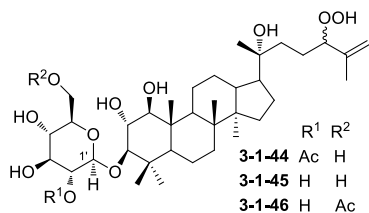
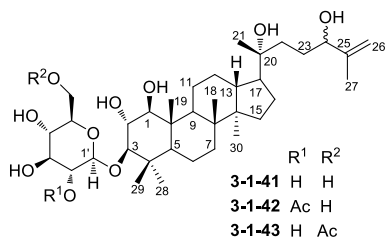
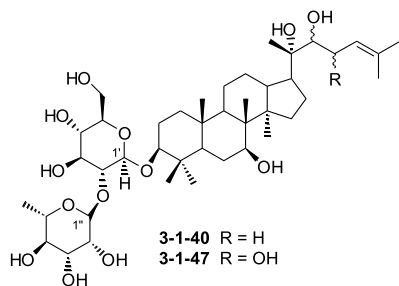
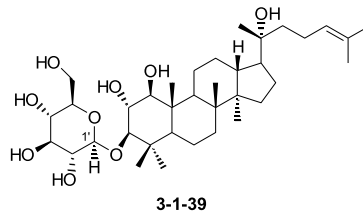
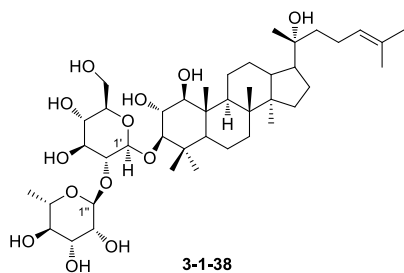
Table 3-1-7: Cos, MFs, and TSs of dammarane-type saponins 3-1-22~3-1-56.

No.	Compounds	MFs	Test solvents	References
3-1-22	notoginsenoside ST-3	C ₄₃ H ₇₄ O ₁₅	C ₅ D ₅ N	[11]
3-1-23	notoginsenoside ST-5	C ₄₇ H ₈₀ O ₁₈	C ₅ D ₅ N	[11]
3-1-24	sapinmusaponin E	C ₄₃ H ₇₄ O ₁₃	CD ₃ OD	[12]
3-1-25	floralginsenoside E	C ₄₂ H ₇₂ O ₁₅	C ₅ D ₅ N	[13]
3-1-26	chilioside K	C ₃₆ H ₆₂ O ₁₀	CD ₃ OD	[14]
3-1-27	chilioside L	C ₃₈ H ₆₄ O ₁₁	CD ₃ OD	[14]
3-1-28	chilioside E	C ₃₈ H ₆₄ O ₁₂	CD ₃ OD	[14]
3-1-29	chilioside F	C ₃₆ H ₆₂ O ₁₁	CD ₃ OD	[14]
3-1-30	chilioside G	C ₃₈ H ₆₄ O ₁₂	CD ₃ OD	[14]
3-1-31	sapinmusaponin C	C ₄₂ H ₇₂ O ₁₄	CD ₃ OD	[12]
3-1-32	sapinmusaponin D	C ₄₃ H ₇₄ O ₁₄	CD ₃ OD	[12]
3-1-33	notoginsenoside ST-2	C ₄₃ H ₇₄ O ₁₅	C ₅ D ₅ N	[11]
3-1-34	sapinmusaponin O	C ₄₂ H ₇₂ O ₁₂	CD ₃ OD	[15]
3-1-35	sapinmusaponin P	C ₄₂ H ₇₂ O ₁₂	CD ₃ OD	[15]
3-1-36	3-O-[β-D-glucopyranosyl-(1→2)-β-D-glucopyranosyl]- dammara-20S,24S-epoxy-3β,12β,25-triol	C ₄₂ H ₇₂ O ₁₄	C ₅ D ₅ N	[16]
3-1-37	polysciasoside A	C ₄₂ H ₇₀ O ₁₃	CD ₃ OD	[17]

Table 3-1-7 (continued)

No.	Compounds	MFs	Test solvents	References
3-1-38	1 β ,2 α ,3 β ,20(<i>R</i>)-tetrahydroxydammar-24-ene-3- <i>O</i> - α -L-rhamnopyranosyl-(1 $\rightarrow$ 2)- β -D-glucopyranoside	C ₄₂ H ₇₂ O ₁₃	CD ₃ OD	[18]
3-1-39	chilianoside A	C ₃₆ H ₆₂ O ₉	CD ₃ OD	[14]
3-1-40	sapinmusaponin A	C ₄₂ H ₇₂ O ₁₃	CD ₃ OD	[12]
3-1-41	chilianoside H	C ₃₆ H ₆₂ O ₁₀	CD ₃ OD	[14]
3-1-42	chilianoside I	C ₃₈ H ₆₄ O ₁₁	C ₅ D ₅ N	[14]
3-1-43	chilianoside J	C ₃₈ H ₆₄ O ₁₁	CD ₃ OD	[14]
3-1-44	chilianoside B	C ₃₈ H ₆₄ O ₁₂	CD ₃ OD	[14]
3-1-45	chilianoside C	C ₃₆ H ₆₂ O ₁₁	CD ₃ OD	[14]
3-1-46	chilianoside D	C ₃₈ H ₆₄ O ₁₂	CD ₃ OD	[14]
3-1-47	sapinmusaponin B	C ₄₂ H ₇₂ O ₁₄	CD ₃ OD	[12]
3-1-48	ginsenoside Rz ₁	C ₄₂ H ₇₀ O ₁₂	C ₅ D ₅ N	[19]
3-1-49	notoginsenoside ST-1	C ₃₆ H ₆₂ O ₁₀	C ₅ D ₅ N	[11]
3-1-50	notoginsenoside R ₈	C ₃₆ H ₆₂ O ₁₀	C ₅ D ₅ N	[20]
3-1-51	notoginsenoside R ₉	C ₃₆ H ₆₂ O ₁₀	C ₅ D ₅ N	[20]
3-1-52	notoginsenoside Rw2	C ₄₁ H ₇₀ O ₁₄	C ₅ D ₅ N	[21]
3-1-53	floralquinquenoside A	C ₃₆ H ₆₂ O ₁₁	C ₅ D ₅ N	[22]
3-1-54	floralquinquenoside C	C ₄₂ H ₇₂ O ₁₅	C ₅ D ₅ N	[22]
3-1-55	floralquinquenoside B	C ₄₂ H ₇₂ O ₁₅	C ₅ D ₅ N	[22]
3-1-56	ginsenoside Rh ₄	C ₃₆ H ₆₀ O ₈	C ₅ D ₅ N	[23]





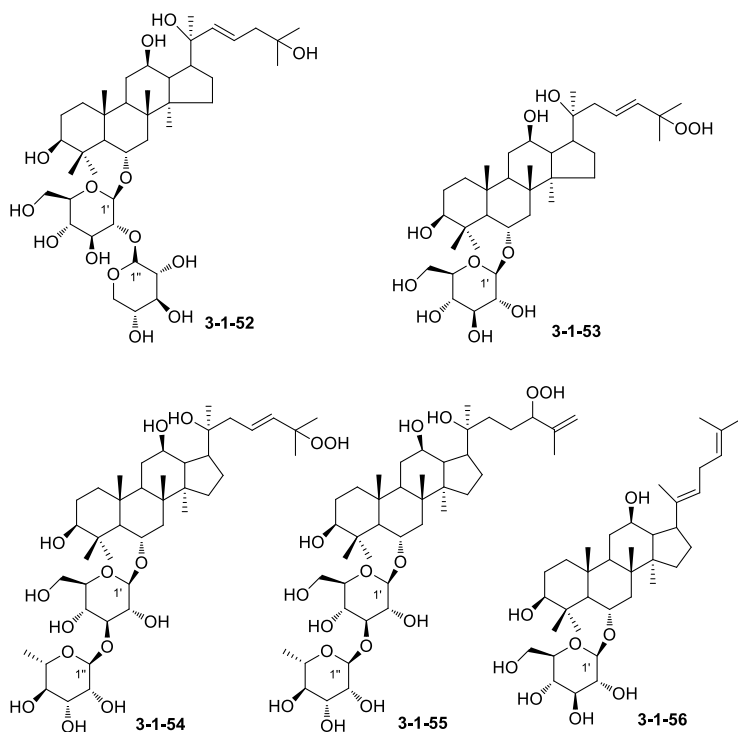


Table 3-1-8: ^1H NMR spectroscopic data of dammarane-type saponins 3-1-22~3-1-24, 3-1-28, and 3-1-31.

H	3-1-22	3-1-23	3-1-24	3-1-28	3-1-31
1	1.45 m, 0.72 m	1.48 m, 0.78 m	1.63 m, 0.96 m	3.14 d(9)	1.63 m, 0.94 m
2	2.17 m, 1.80 m	2.19 m, 1.86 m	1.90 m, 1.65 m	3.46 t(9)	1.98 m, 1.66 m
3	3.28 dd(4, 11.5)	3.30 m	3.17 dd(11.0, 4.0)	3.04 d(9)	3.17 dd(11.2, 4.0)
5	0.66 m	0.69 m	0.81 m	0.81 m	0.81 m
6	1.47 m, 1.34 m	1.49 m, 1.38 m	1.62 m, 1.55 m	1.59 m, 1.27 m	1.63 m, 1.55 m
7	1.45 m, 1.21 m	1.48 m, 1.25 m	3.69 dd(11.2, 4.4)	1.58 m, 1.25 m	3.70 m
9	1.35 m	1.40 m	1.24 m	1.56 m	1.22 m
11	1.91 m, 1.36 m	2.03 m, 1.49 m	1.52 m, 1.30 m	2.48 dd(13), 1.36 m	1.53 m, 1.32 m
12	3.87 m	3.90 m	1.68 m, 1.33 m	1.91 d(13), 1.26 m	1.71 m, 1.33 m
13	2.09 m	2.06 m	1.70 m	1.72 m	1.73 m
15	1.69 m, 1.08 m	1.60 m, 1.04 m	1.67 m, 1.35 m	1.49 m, 1.05 m	1.69 m, 1.36 m
16	2.01 m, 1.52 m	1.91 m, 1.47 m	1.96 m, 1.26 m	1.68 m, 1.36 m	1.98 m, 1.26 m
17	2.77 m	2.36 m	1.98 m	1.69 m	2.01 m
18	0.75 s	0.80 s	0.97 s	1.00 s	0.97 s
19	0.97 s	1.02 s	0.85 s	0.97 s	0.85 s
21	2.08 s	1.43 s	1.11 s	1.08 s	0.98 s

Table 3-1-8 (continued)

H	3-1-22	3-1-23	3-1-24	3-1-28	3-1-31
22	5.80 d(9.7)	2.78 m, 2.49 m	2.23 m, 2.22 m	2.18 m(2H)	4.28 d(7.2) ^① , 3.82 m
23	4.48 m	6.31 m	5.68 dt(16.0, 7.2)	5.75 dt(16, 7)	5.57 m
					6.48 dd(15.6, 7.2) ^①
24	3.77 d(4.9)	6.02 d(15.5)	5.45 d(16.0)	5.59 d(16)	6.29 d(15.6) ^① , 5.74 m
26	1.56 s	1.55 s	1.25 s	1.30 s(6H)	1.28 s
27	1.52 s	1.54 s	1.25 s		1.28 s
28	1.27 s	1.28 s	1.04 s	0.98 s	1.04 s
29	1.08 s	1.11 s	0.86 s	0.76 s	0.86 s
30	0.93 s	0.94 s	0.91 s	0.89 s	0.94 s
OMe	3.41 s(21-OMe)		3.14 s(25-OMe)		
1'	4.92 d(7.5)	4.93 d(7.5)	4.40 d(7.2)	4.53 d(8)	4.39 d(7.3)
2'	4.23 m	4.14 m	3.39 d(8.0, 7.2)	4.80 d(8.9)	3.39 m
3'	4.24 m	4.35 m	3.45 t(8.0)	3.52 t(9)	3.44 t(8.4)
4'	4.13 m	4.09 m	3.27 t(8.0)	3.40 t(9)	3.26 t(8.4)
5'	3.92 m	3.95 m	3.23 dd(5.2, 2.0)	3.35 m	3.23 m
6'	4.56 m	4.57 br d(10)	3.84 dd(12.0, 2.0)	3.89 dd(2, 12)	3.83 dd(11.0, 1.2)
	4.35 m	4.34 m	3.65 dd(12.0, 5.2)	3.68 dd(6, 12)	3.64 dd(11.0, 5.6)
OAc				2.09 s(2'-OAc)	
1''	5.37 d(7.6)	5.53 d(7.5)	5.36 d(1.6)		5.35 br s
2''	4.11 m	4.18 m	3.94 dd(3.2, 1.6)		3.94 m
3''	4.31 m	4.28 m	3.74 dd(9.6, 3.2)		3.72 dd(9.2, 3.2)
4''	4.31 m	4.18 m	3.35 t(9.6)		3.35 t(9.2)
5''	3.92 m	3.87 m	3.97 dd(6.4, 3.2)		3.97 m
6''	4.48 m, 4.45 m	4.50 m br d	1.21 d(6.4)		1.20 d(6.4)
1'''		5.39 d(6.5)			1.20 d(6.4)
2'''		4.09 m			
3'''		4.32 m			
4'''		4.14 m			
5'''		4.34 m, 3.68 m			

^①The data in the literature were recorded in C₅D₅N.

Table 3-1-9: ¹H NMR spectroscopic data of dammarane-type saponins 3-1-25~3-1-27, 3-1-29, and 3-1-30.

H	3-1-25	3-1-26	3-1-27	3-1-29	3-1-30
1	—	3.16 d(9)	3.14 d(9)	3.16 d(9)	3.15 d(9)
2	—	3.51 t(9)	3.48 t(9)	3.50 t(9)	3.48 t(9)
3	3.31 dd(4.5, 11.9)	3.05 d(9)	3.02 d(9)	3.05 d(9)	3.02 d(9)
12	3.92 m	—	—	—	—
18	1.06 s	1.08 s	1.08 s	1.08 s	1.08 s
19	0.87 s	1.08 s	1.08 s	1.08 s	1.08 s

Table 3-1-9 (continued)

H	3-1-25	3-1-26	3-1-27	3-1-29	3-1-30
21	1.43 s	1.00 s	1.00 s	1.00 s	1.00 s
23	6.25 ddd(5.7, 8.9, 16.0)	5.71 dt(16, 7)	5.71 dt(16, 7)	5.76 dt(16, 7)	5.76 dt(16, 7)
24	6.04 d(16.0)	5.59 d(16)	5.60 d(16)	5.59 d(16)	5.59 d(16)
26	1.56 s	1.27 s	1.27 s	1.29 s(6H)	1.27 s(6H)
27	1.57 s	1.27 s	1.27 s		
28	1.31 s	0.98 s	0.98 s	0.98 s	0.98 s
29	1.13 s	0.90 s	0.90 s	0.89 s	0.89 s
30	0.97 s	0.89 s	0.89 s	0.89 s	0.89 s
1'	4.92 d(7.7)	4.33 d(8)	4.33 d(8)	4.33 d(8)	4.34 d(8)
6'	–	3.88 dd(2, 12)	4.43 dd(2, 12)	3.88 dd(2, 12)	4.43 dd(2, 12)
		3.66 dd(5, 12)	4.17 dd(6, 12)	3.66 dd(5, 12)	4.17 dd(6, 12)
OAc			2.09 s(6'-OAc)		2.09 s(2'-OAc)
1''	5.35 d(7.7)				

Table 3-1-10: ^1H NMR spectroscopic data of dammarane-type saponins 3-1-32~3-1-36.

H	3-1-32	3-1-33	3-1-34	3-1-35	3-1-36
1	1.61 m, 0.93 m	1.50 m, 0.74 m	1.63 (ov), 0.95 m	1.63 (ov), 0.95 m	eq 1.52, ax 0.79
2	1.98 m, 1.66 m	2.18 m, 1.81 m	1.95 m, 1.64 (ov)	1.95 m, 1.64 (ov)	eq 2.18, ax 1.82
3	3.16 m	3.26 m	3.17 dd(10.8, 4.0)	3.17 dd(11.6, 4.0)	3.27 dd(4.5, 4.5)
5	0.81 m	0.66 m	0.81 m	0.81 m	0.66 d(10.0)
6	1.63 m, 1.55 m	1.49 m, 1.36 m	1.63 (ov), 1.55 m	1.63 (ov), 1.55 m	eq 1.51, ax 1.39
7	3.70 m	1.46 m, 1.22 m	3.68 dd(10.8, 4.8)	3.70 dd(10.4, 4.4)	eq 1.37, ax 1.23
9	1.22 m	1.36 m	1.25 m	1.24 m	1.42
11	1.52 m, 1.31 m	1.91 m, 1.41 m	1.31 m, 1.52 (ov)	1.34 m, 1.52 m	eq 2.03, ax 1.39
12	1.70 m, 1.33 m	3.83 m	1.53 (ov), 1.33 (ov)	1.69 (ov), 1.35 (ov)	3.75 m
13	1.73 m	1.97 m	1.63 (ov)	1.70 (ov)	1.86 m
15	1.69 m, 1.34 m	1.67 m, 1.10 m	1.68 (ov), 1.35 (ov)	1.69 (ov), 1.33 (ov)	eq 1.51, ax 1.09
16	1.99 m, 1.26 m	1.94 m, 1.57 m	1.85 m, 1.22 m	1.94 m, 1.24 m	eq 1.94, ax 1.49
17	2.01 m	2.83 m	1.70 m	1.70 (ov)	2.30 m
18	0.97 s	0.79 s	0.96 s	0.96 s	1.00 s
19	0.85 s	1.01 s	0.85 s	0.85 s	0.83 s
21	0.99 s	1.91 s	1.11 s	1.08 s	1.30 s
22	3.87 d(7.2)	5.68 d(9.8)	1.44 m, 1.42 m	–	eq 1.97, ax 1.70
23	5.76 dd(16.0, 7.2)	4.31 m	2.03 m, 2.01 m	1.44 m, 1.39 m	eq 2.16, ax 1.84
24	5.64 d(16.0)	3.85 d(6.5)	5.09 t(6.8)	5.08 t(7.2)	4.16 dd(7.0, 7.0)
26	1.27 s	1.60 s	1.66 s	1.66 s	1.30 s
27	1.27 s	1.45 s	1.60 s	1.58 s	1.45 s
28	1.04 s	1.26 s	1.04 s	1.04 s	1.28 s
29	0.86 s	1.08 s	0.85 s	0.85 s	1.11 s
30	0.94 s	0.91 s	0.93 s	0.93 s	0.91 s

Table 3-1-10 (continued)

H	3-1-32	3-1-33	3-1-34	3-1-35	3-1-36
OMe	3.16 s(25-OMe)	3.32 s(23-OMe)			
1'	4.40 d(7.6)	4.90 d(7.5)	4.38 d(7.2)	4.40 d(7.2)	4.93 d(8.0)
2'	3.39 m	4.20 m	3.39 (ov)	3.39 (ov)	4.26
3'	3.45 t(8.4)	4.21 m	3.45 t(8.8)	3.45 t(8.8)	4.26
4'	3.27 t(8.4)	4.11 m	3.28 t(8.4)	3.28 t(8.4)	4.17
5'	3.23 dd(5.2, 2.0)	3.90 m	3.23 (ov)	3.23 (ov)	3.93
6'	3.84 dd(12.0, 2.0)	4.53 m	3.84 dd(11.6, 1.2)	3.82 dd(10.4, 1.2)	4.56
	3.65 dd(12.0, 5.2)	4.32 m	3.64 dd(11.6, 5.2)	3.64 dd(11.6, 5.2)	4.39
1''	5.35 d(1.6)	5.35 d(7.7)	5.35 br s	5.34 br s	5.37 d(7.5)
2''	3.94 dd(2.8, 1.6)	4.08 m	3.94 (ov)	3.95 (ov)	4.16
3''	3.72 dd(9.2, 3.2)	4.28 m	3.74 dd(9.2, 2.4)	3.75 dd(9.6, 2.4)	4.32
4''	3.35 t(9.2)	4.30 m	3.35 t(9.6)	3.35 t(9.6)	4.35
5''	3.96 dd(6.0, 3.2)	3.90 m	3.97 (ov)	3.98 (ov)	3.94
6''	1.20 d(6.0)	4.46 m, 4.44 m	1.21 d(6.0)	1.21 d(6.0)	4.50, 4.49

Table 3-1-11: ¹H NMR spectroscopic data of dammarane-type saponins 3-1-37~3-1-40 and 3-1-44.

H	3-1-37	3-1-38	3-1-39	3-1-40	3-1-44
1	1.06 m, 1.56 m	3.16 d(9.1)	3.49 d(9)	1.66 m, 0.93 m	3.13 d(9)
2	1.70 m, 2.02 m	3.481 m	3.94 t(9)	1.98 m, 1.66 m	3.46 t(9)
3	3.19 dd(11.0, 4.5)	3.14 d(9.9)	3.37 d(9)	3.17 dd(11.2, 4.0)	3.04 d(9)
5	0.84 br d(8.9)	0.82 m	0.89 m	0.81 m	0.81 m
6	1.57 m	1.55~1.60 (ov)	1.62 m	1.63 m	1.60 m
	1.70 m	1.24~1.35 (ov)	1.55 m	1.55 m	1.26 m
7	1.38 dd(2.4, 9.4)	1.55~1.60 (ov)	1.55 m	3.70 dd(10.0, 4.8)	1.58 m
	1.58 m	1.24~1.35 (ov)	1.27 m		1.26 m
9	1.79 dd(3.4, 12.4)	1.55~1.60 (ov)	1.73 m	1.24 m	1.54 m
11	2.18 dd(3.6, 13.2)	2.47 br d(4.4)	3.04 dd(3, 15)	1.52 m	2.48 dd(13)
	2.37 t(13.3)	1.39 (ov)	1.60 m	1.32 m	1.36 m
12		1.90 br d(9.4)	2.32 m	1.71 m	1.90 m
		1.24~1.35 (ov)	1.53 m	1.35 m	1.28 m
13	3.14 d(10.5)	1.70~1.78 (ov)	2.05 m	1.75 m	1.70 m
15	1.28 d(13.3)	1.49 m	1.14 d(12)	1.66 m	1.47 m
	2.12 m	1.06 (ov)	1.62 m	1.35 m	1.03 m
16	4.34 dd(4.0, 7.9)	1.70~1.78 (ov)	1.74 m	1.98 m	1.66 m
		1.39 (ov)	1.86 m	1.27 m	1.35 m
17	2.30 dd(4.2, 10.5)	1.70~1.78 (ov)	1.99 m	1.92 m	1.67 m
18	1.22 s	1.00 s	1.04 s	0.97 s	0.99 s
19	1.00 s	0.99 s	1.17 s	0.86 s	0.96 s
21	1.05 s	1.10 s	1.38 s	1.05 s	1.07 s
22	2.12 m	1.43 (ov)	1.78 m, 1.76 m	3.41 m	1.50 m, 1.36 m

Table 3-1-11 (continued)

H	3-1-37	3-1-38	3-1-39	3-1-40	3-1-44
23	1.54 m	2.04 br d(7.7)	2.52 m	2.25 dd(14.8, 6.8)	1.63 m
			2.34 m	2.05 m	1.50 m
24	5.14 t(7.0)	5.10 br s	5.31 t(7)	5.24 t(6.8)	4.16 t(6)
26	1.68 s	1.67 s	1.70 s	1.70 s	4.91 s
					4.92 dd(2, 3)
27	1.64 s	1.62 s	1.64 s	1.61 s	1.71 s
28	1.08 s	1.08 s	1.38 s	1.05 s	0.98 s
29	0.90 s	0.92 s	1.07 s	0.85 s	0.76 s
30	1.02 s	0.91 s	1.03 s	0.93 s	0.90 s
1'	4.43 d(7.5)	4.44 d(7.6)	4.96 d(8)	4.39 d(7.6)	4.53 d(8)
2'	3.43 dd(7.4, 9.3)	3.475 m	4.07 t(8)	3.39 m	4.80 dd(8, 9)
3'	3.46 t(8.7)	3.492 m	4.25 dd(8, 9)	3.45 t(8.8)	3.52 t(9)
4'	3.30 t(8.6)	3.33 m	4.16 t(9)	3.27 t(8.8)	3.40 t(9)
5'	3.26 m	3.34	4.12 m	3.23 m	3.36 m
6'	3.84 dd(11.8, 2.0)	3.89 d(12.0)	4.64 dd(2, 12)	3.83 dd(11.6, 1.8)	3.89 dd(2, 12)
	3.65 dd(11.8, 4.0)	3.66 dd(12.0, 5.3)	4.33 dd(6, 12)	3.65 dd(11.6, 5.2)	3.68 dd(6, 12)
OAc					2.09 s(2'-OAc)
1''	5.39 d(1.1)	5.37 br s		5.35 br s	
2''	3.97 dd(3.1, 1.5)	3.99 br s		3.95 m	
3''	3.76 dd(9.5, 3.3)	3.75 dd(9.7, 3.2)		3.74 dd(9.2, 3.6)	
4''	3.39 t(9.8)	3.39 t(9.4)		3.35 t(9.2)	
5''	3.99 m	3.93 m		3.98 m	
6''	1.24 d(6.2)	1.22 d(6.2)		1.19 d(6.4)	

Table 3-1-12: ¹H NMR spectroscopic data of dammarane-type saponins **3-1-41~3-1-43**, **3-1-45**, and **3-1-46**.

H	3-1-41	3-1-42	3-1-43	3-1-45	3-1-46
1	3.16 d(9)	3.45 d(9)	3.14 d(9)	3.16 d(9)	3.16 d(9)
2	3.50 t(9)	3.85 t(9)	3.48 t(9)	3.50 t(9)	3.50 t(9)
3	3.05 d(9)	3.27 d(9)	3.02 d(9)	3.05 d(9)	3.05 d(9)
18	1.08 s	1.40 s	1.09 s	1.08 s	1.08 s
19	1.08 s	1.12 s	1.08 s	1.08 s	1.08 s
21	1.00 s	1.11 s	1.00 s	0.99 s	0.99 s
24	3.95 t(6)	4.43 t(6)	3.94 t(6)	4.16 t(6)	4.16 t(6)
26	4.88 s, 4.80 s	5.27 s, 5.25 s	4.89 s, 4.79 s	5.00 s, 4.79 s	4.91 s, 4.78 s
27	1.71 s	1.92 s	1.71 s	1.71 s	1.71 s
28	0.98 s	1.02 s	0.98 s	0.98 s	0.98 s
29	0.91 s	0.99 s	0.91 s	0.90 s	0.90 s
30	0.89 s	0.97 s	0.89 s	0.89 s	0.89 s
1'	4.33 d(8)	5.02 d(8)	4.34 d(8)	4.34 d(8)	4.34 d(8)
2'	—	5.63 t(8)	—	—	—
6'	3.88 d(12)	4.63 d(11)	4.43 dd(2, 12)	3.88 d(12)	4.44 d(12)
	3.66 dd(5, 12)		4.17 dd(6, 12)	3.66 dd(5, 12)	4.17 dd(5, 12)
OAc		2.17 s(2'-OAc)	2.09 s(6'-OAc)		2.09 s(6'-OAc)

Table 3-1-13: ^1H NMR spectroscopic data of dammarane-type saponins **3-1-47~3-1-51**.

H	3-1-47	3-1-48	3-1-49	3-1-50	3-1-51
1	1.66 m, 0.94 m	1.53, 0.79	1.70 m, 1.03 m	1.71 m, 1.03 m	1.70 m, 0.98 m
2	1.98 m, 1.66 m	1.84, 2.22	1.93 m, 1.85 m	1.86 m, 1.42 br s	1.86 m, 1.42 br s
3	3.17 dd(11.8, 4.0)	3.31 dd (7.2, 4.2)	3.53 dd(4.5, 11.5)	3.53 dd(10.8, 5.0)	3.52 dd(10.8, 5.2)
5	0.81 m	0.72 d(11.4)	1.44 m	1.44 br s	1.43 br s
6	1.63 m, 1.52 m	1.38, 1.52	4.43 m	4.45 ddd (10.2, 10.2, 3.0)	4.43 ddd (10.2, 10.2, 3.0)
7	3.72 d(4.8)	1.25, 1.51	2.53 m, 1.97 m	2.54 dd(12.9, 2.7) 1.94 t(10.8)	2.53 dd(13.0, 2.9) 1.96 t(10.6)
9	1.25 m	1.45	1.57 m	1.59 m	1.61 m
11	1.49 m, 1.31 m	1.1~2.0	2.04 m, 1.46 m	2.14 dd(9.2, 3.6) 1.51 d(4.8)	2.13 dd(8.8, 3.4) 1.48 br s
12	1.68 m, 1.32 m	3.93	3.94 m	3.90 m	3.91 m
13	1.73 m	3.62	1.99 m	2.03 d(10.6)	2.01 m
15	1.66 m, 1.35 m	1.1~2.0	1.72 m, 1.16 m	1.66 m, 1.11 t(10.4)	1.66 m 1.15 t(10.2)
16	1.98 m, 1.25 m	1.70, 2.04	1.86 m, 1.42 m	1.77 ddd (12.2, 9.9, 3.0) 1.35 d(8.0)	1.86 (ov), 1.26 m
17	2.14 dd(4.0, 10.0)	2.10 t(10.8)	2.82 m	2.30 dd(10.8, 7.2)	2.36 dd(10.8, 7.0)
18	0.98 s	1.05 s	0.82 s	1.26 s	1.21 s
19	0.86 s	1.05 s	1.22 s	1.06 s	1.06 s
21	1.15 s	1.95 s	1.83 s	1.39 s	1.40 s
22	3.15 d(2.4)	5.29 t(7.2)	5.74 t(7.0)	6.06 d(15.9)	6.05 d(15.8)
23	4.67 dd(8.8, 2.0)	3.00	2.58 m	6.25 ddd (15.9, 8.4, 5.6)	6.27 ddd (15.8, 8.5, 5.6)
24	5.43 dt(8.8, 1.2)	5.31 t(9.0)	3.80 m	2.78 dd(13.9, 5.3) 2.39 dd(14.0, 9.6)	2.51 (ov) 2.43 (ov)
26	1.73 s	1.69 s	1.51 s	1.56 s	1.54 s
27	1.70 s	1.67 s	1.49 s	1.56 s	1.54 s
28	1.04 s	1.33 s	2.07 s	2.07 s	2.06 s
29	0.85 s	1.14 s	1.61 s	1.62 s	1.64 s
30	0.94 s	0.85 s	1.03 s	0.80 s	0.81 s
1'	4.39 d(7.6)	4.96 d(7.2)	5.03 d(8.0)	5.04 d(7.6)	5.03 d(7.8)
2'	3.39 dd(8.4, 7.6)	4.25 t(8.4)	4.10 t(8.5)	4.10 t(8.8)	4.10 t(8.8)
3'	3.43 t(8.4)	4.40	4.27 m	4.27 t(9.0)	4.30 t(9.4)
4'	3.28 t(8.4)	4.38	4.22 m	4.21 t(9.2)	4.23 t(9.4)
5'	3.23 dd(5.6, 2.0)	4.28 t(7.2)	3.96 m	3.95 m	3.96 m
6'	3.84 dd(12.0, 2.0) 3.65 dd(12.0, 5.6)	4.51 br s	4.53 dd(2.5, 11.5) 4.37 dd(5.5, 12.0)	4.57 dd(11.6, 3.2) 4.37 dd(11.6, 6.0)	4.54 dd(11.6, 3.2) 4.38 dd(11.6, 6.0)
1''	5.35 d(1.2)	5.41 d(7.2)			
2''	3.94 dd(3.2, 1.6)	4.17 t(8.4)			
3''	3.74 dd(9.6, 3.2)	3.96			
4''	3.37 t(9.6)	4.18 t(10.8)			
5''	3.96 m	4.33			
6''	1.19 d(6.0)	4.58 d(10.8)			

Table 3-1-14: ^1H NMR spectroscopic data of dammarane-type saponins **3-1-52~3-1-56**.

H	3-1-52	3-1-53	3-1-54	3-1-55	3-1-56
3	3.51 m	3.55 dd(4.5, 11.5)	3.50 dd(4.8, 11.9)	3.42 dd(4.8, 11.0)	3.42 dd(4.0, 10.8)
5	1.42 br s	—	—	—	—
6	4.40~4.42 m	4.48 ddd (2.8, 10.5, 13.5)	4.75 m	4.66 m	4.23 m
12	3.91 m	3.93 m	3.94 t(9.2)	3.85 m	4.26 m
18	1.25 s	1.29 s	1.30 s	1.13 s	0.93 s
19	1.02 s	1.10 s	1.02 s	0.90 s	0.71 s
21	1.41 s	1.41 s	1.41 s	1.30 s	1.70 s
22	6.10 d(15.8)	—	—	—	5.35 br t(7.4)
23	6.29 m	6.28 ddd (5.7, 9.0, 15.9)	6.29 ddd (5.5, 8.9, 15.7)	—	2.66 br dd(7.4, 7.4)
24	—	6.08 d(15.9)	6.09 d(15.7)	4.72 m	5.01 br t(7.4)
26	1.59 s	1.57 s	1.58 s	5.03 s	1.58 s
				5.20 s	
27	1.58 s	1.58 s	1.59 s	1.86 s	1.49 s
28	2.10 s	2.10 s	2.16 s	2.16 s	1.11 s
29	1.49 s	1.64 s	1.39 s	1.39 s	1.96 s
30	0.81 s	0.84 s	0.96 s	0.87 s	1.46 s
1'	4.98 d(7.2)	5.08 d(7.9)	5.30 d(7.0)	5.21 d(7.6)	4.91 d(7.7)
2'	—	—	—	—	3.97 dd(8.0, 8.0)
1''	5.79 d(6.8)		6.54 s like	6.46 s like	

Table 3-1-15: Cos, MFs, and TSs of dammarane-type saponins **3-1-57~3-1-95**.

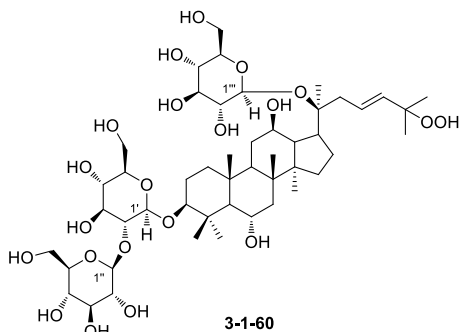
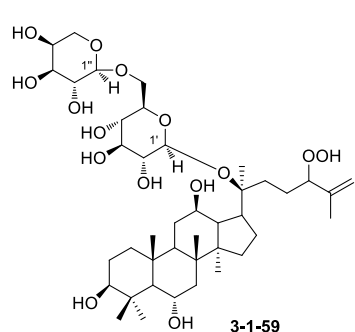
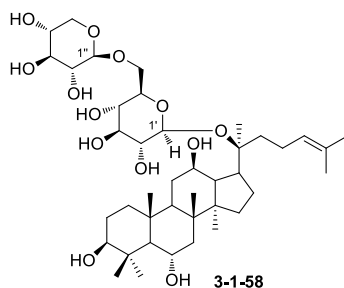
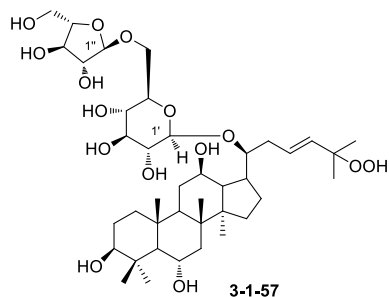
No.	Compounds	MFs	Test solvents	References
3-1-57	floralginsenoside D	$\text{C}_{41}\text{H}_{70}\text{O}_{15}$	$\text{C}_5\text{D}_5\text{N}$	[13]
3-1-58	20-O- β -D-xylopyranosyl(1 $\rightarrow$ 6)- β -D-glucopyranosyl-20(S)-protopanaxadiol	$\text{C}_{41}\text{H}_{70}\text{O}_{13}$	$\text{C}_5\text{D}_5\text{N}$	[24]
3-1-59	floralginsenoside C	$\text{C}_{41}\text{H}_{70}\text{O}_{15}$	$\text{C}_5\text{D}_5\text{N}$	[13]
3-1-60	floralginsenoside K	$\text{C}_{48}\text{H}_{82}\text{O}_{21}$	$\text{C}_5\text{D}_5\text{N}$	[25]
3-1-61	koryoginsenoside R_2	$\text{C}_{54}\text{H}_{92}\text{O}_{24}$	$\text{C}_5\text{D}_5\text{N}$	[26]
3-1-62	notoginsenoside E	$\text{C}_{48}\text{H}_{82}\text{O}_{20}$	$\text{C}_5\text{D}_5\text{N}$	[27]
3-1-63	notoginsenosides A	$\text{C}_{54}\text{H}_{92}\text{O}_{24}$	$\text{C}_5\text{D}_5\text{N}$	[28]
3-1-64	floralginsenoside F	$\text{C}_{42}\text{H}_{72}\text{O}_{15}$	$\text{C}_5\text{D}_5\text{N}$	[13]
3-1-65	3 β ,12,20S-trihydroxy-25-hydroperoxydammar-23-ene 3-O-[β -D-glucopyranosyl(1 $\rightarrow$ 2)]- β -D-glucopyranosyl]-20-O-[β -D-xylopyranosyl(1 $\rightarrow$ 6)]- β -D-glucopyranoside	$\text{C}_{53}\text{H}_{90}\text{O}_{24}$	$\text{C}_5\text{D}_5\text{N}$	[7]
3-1-66	floralginsenoside O	$\text{C}_{53}\text{H}_{90}\text{O}_{24}$	$\text{C}_5\text{D}_5\text{N}$	[29]
3-1-67	floralginsenoside G	$\text{C}_{50}\text{H}_{84}\text{O}_{21}$	$\text{C}_5\text{D}_5\text{N}$	[25]
3-1-68	3-O- β -D-glucopyranosyl-20-O-[α -L-arabinopyranosyl(1 $\rightarrow$ 2)- β -D-glucopyranosyl] 3 β ,12 β ,20(S)-trihydroxydammar-24-ene	$\text{C}_{47}\text{H}_{80}\text{O}_{17}$	$\text{C}_5\text{D}_5\text{N}$	[30]

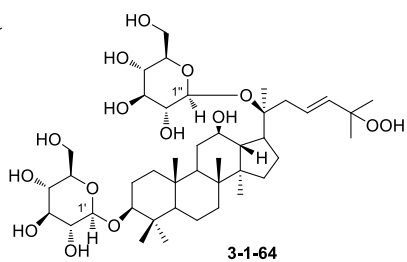
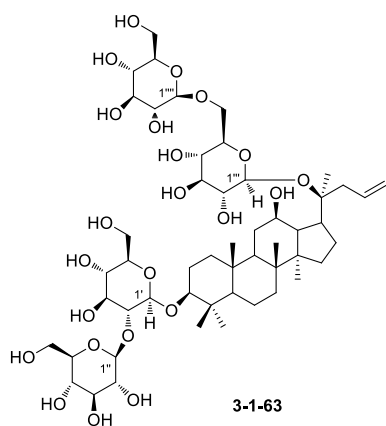
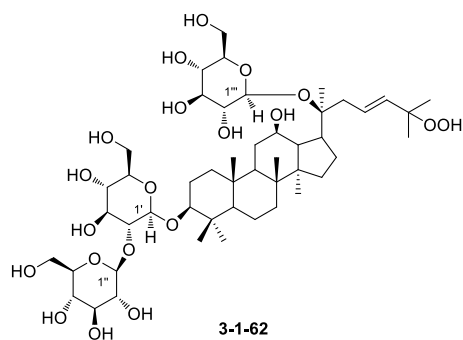
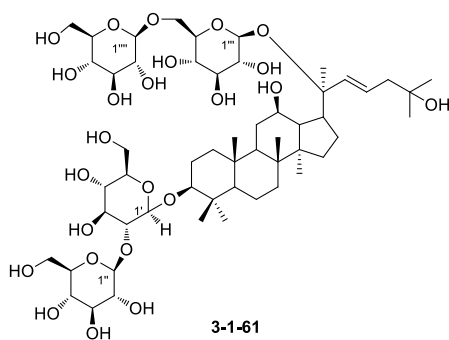
Table 3-1-15 (continued)

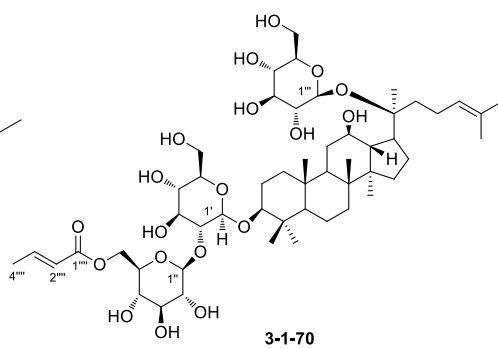
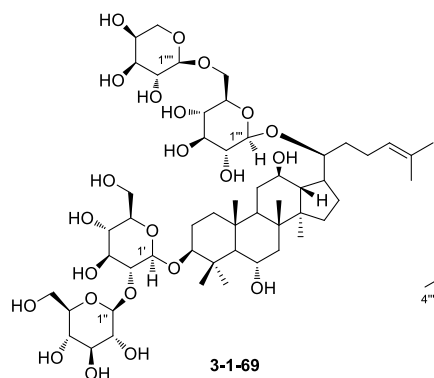
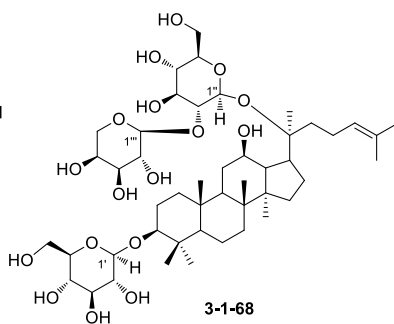
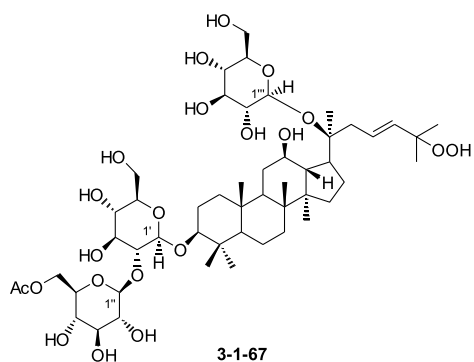
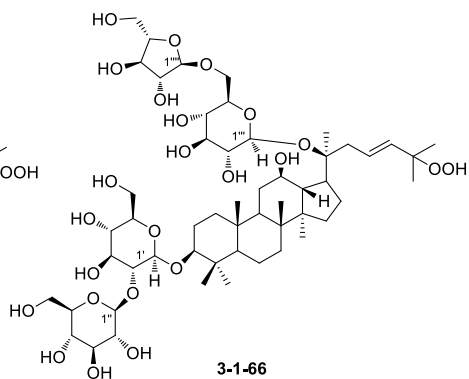
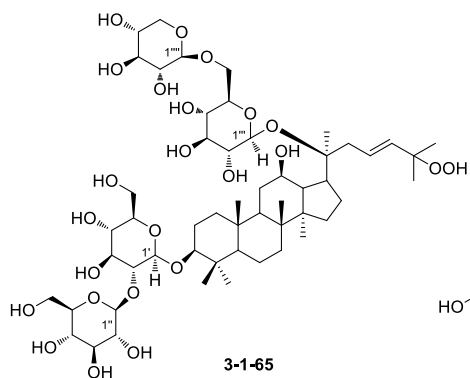
No.	Compounds	MFs	Test solvents	References
3-1-69	floralginsenoside P	C ₅₃ H ₉₀ O ₂₃	C ₅ D ₅ N	[29]
3-1-70	quinquenoside I	C ₅₂ H ₈₆ O ₁₉	C ₅ D ₅ N	[31]
3-1-71	quinquenoside II	C ₆₂ H ₁₀₄ O ₂₄	C ₅ D ₅ N	[31]
3-1-72	quinquenoside III	C ₅₀ H ₈₄ O ₁₉	C ₅ D ₅ N	[31]
3-1-73	quinquenoside IV	C ₅₄ H ₉₀ O ₂₄	C ₅ D ₅ N	[31]
3-1-74	3- <i>O</i> -[β -D-glucopyranosyl(1 $\rightarrow$ 6)- β -D-glucopyranosyl]-20- <i>O</i> - β -D-glucopyranosyl-3 β ,12 β ,20(<i>S</i>)-trihydroxydammar-24-ene	C ₄₈ H ₈₂ O ₁₈	C ₅ D ₅ N	[30]
3-1-75	notoginsenoside I	C ₅₄ H ₉₂ O ₂₂	C ₅ D ₅ N	[27]
3-1-76	3 β ,19,20(<i>S</i>)-dihydroxydammar-24-ene-3- <i>O</i> -[β -D-glucopyranosyl(2 $\rightarrow$ 1)- β -D-glucopyranosyl]-20- <i>O</i> -[α -L-rhamnopyranosyl(6 $\rightarrow$ 1)- β -D-glucopyranoside]	C ₅₄ H ₉₂ O ₂₂	C ₅ D ₅ N	[32]
3-1-77	19-oxo-3 β ,20(<i>S</i>)-dihydroxydammar-24-ene-3- <i>O</i> -[β -D-glucopyranosyl(2 $\rightarrow$ 1)- β -D-glucopyranosyl]-20- <i>O</i> -[α -L-rhamnopyranosyl(6 $\rightarrow$ 1)- β -D-glucopyranoside]	C ₅₄ H ₉₀ O ₂₂	C ₅ D ₅ N	[32]
3-1-78	19-oxo-3 β ,20(<i>S</i>)-dihydroxydammar-24-ene-3- <i>O</i> -[α -L-arabinopyranosyl(2 $\rightarrow$ 1)- β -D-glucopyranosyl]-20- <i>O</i> - β -D-glucopyranoside	C ₄₇ H ₇₈ O ₁₇	C ₅ D ₅ N	[32]
3-1-79	2 α ,3 β ,12 β ,20(<i>S</i>)-tetrahydroxydammar-24-ene-3- <i>O</i> -[β -D-glucopyranosyl(1 $\rightarrow$ 4)- β -D-glucopyranosyl]-20- <i>O</i> -[β -D-xylopyranosyl(1 $\rightarrow$ 6)- β -D-glucopyranoside]	C ₅₃ H ₉₀ O ₂₃	CD ₃ OD	[33]
3-1-80	2 α ,3 β ,12 β ,20(<i>S</i>)-tetrahydroxydammar-24-ene-3- <i>O</i> - β -D-glucopyranosyl-20- <i>O</i> -[β -D-6- <i>O</i> -acetylglucopyranosyl(1 $\rightarrow$ 2)- β -D-glucopyranoside]	C ₅₀ H ₈₄ O ₂₀	CD ₃ OD	[33]
3-1-81	notoginsenoside C	C ₅₄ H ₉₂ O ₂₅	C ₅ D ₅ N	[28]
3-1-82	floralquinquenoside D	C ₄₂ H ₇₂ O ₁₅	C ₅ D ₅ N	[22]
3-1-83	floralquinquenoside H	C ₅₀ H ₈₄ O ₂₁	C ₅ D ₅ N	[25]
3-1-84	notoginsenoside B	C ₅₄ H ₉₀ O ₂₄	C ₅ D ₅ N	[28]
3-1-85	quinquenoside IV	C ₅₄ H ₉₀ O ₂₄	C ₅ D ₅ N	[31]
3-1-86	notoginsenoside G	C ₄₈ H ₈₀ O ₁₉	C ₅ D ₅ N	[27]
3-1-87	19-oxo-3 β ,20(<i>S</i>),21-trihydroxy-25-hydroperoxydammar-23-ene-3- <i>O</i> -{[α -L-rhamnopyranosyl(1 $\rightarrow$ 2)][β -D-xylopyranosyl(1 $\rightarrow$ 3)]- α -L-arabinopyranosyl}-21- <i>O</i> - β -D-glucopyranoside	C ₅₂ H ₈₆ O ₂₃	C ₅ D ₅ N	[7]
3-1-88	3 β ,20(<i>S</i>),21-trihydroxy-25-methoxydammar-23-ene-3- <i>O</i> - α -L-rhamnopyranosyl(1 $\rightarrow$ 2)-[β -D-xylopyranosyl(1 $\rightarrow$ 3)]- β -D-glucopyranosyl-21- <i>O</i> - β -D-xylopyranoside	C ₅₃ H ₉₀ O ₂₁	C ₅ D ₅ N	[8]
3-1-89	3 β ,20(<i>S</i>),21-trihydroxydammar-24-ene-3- <i>O</i> -{[α -L-rhamnopyranosyl(1 $\rightarrow$ 2)][β -D-glucopyranosyl(1 $\rightarrow$ 3)]- α -L-arabinopyranosyl}-21- <i>O</i> - β -D-glucopyranoside	C ₅₃ H ₉₀ O ₂₁	C ₅ D ₅ N	[34]
3-1-90	3 β ,20(<i>S</i>),21-trihydroxydammar-24-ene-3- <i>O</i> -{[α -L-rhamnopyranosyl(1 $\rightarrow$ 2)][β -D-xylopyranosyl(1 $\rightarrow$ 3)]- β -D-[6- <i>O</i> -acetylglucopyranosyl]}-21- <i>O</i> - β -D-glucopyranoside	C ₅₅ H ₉₂ O ₂₂	C ₅ D ₅ N	[7]

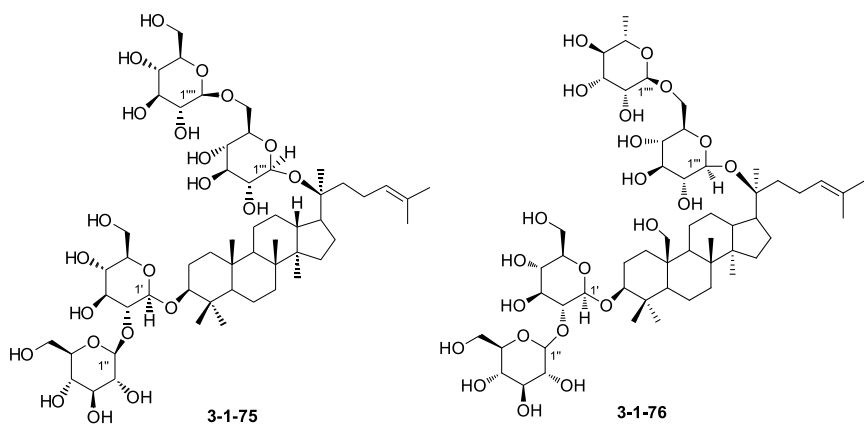
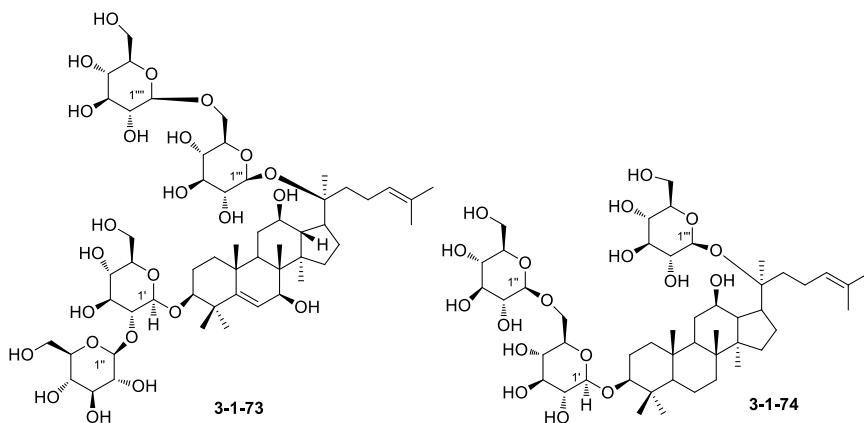
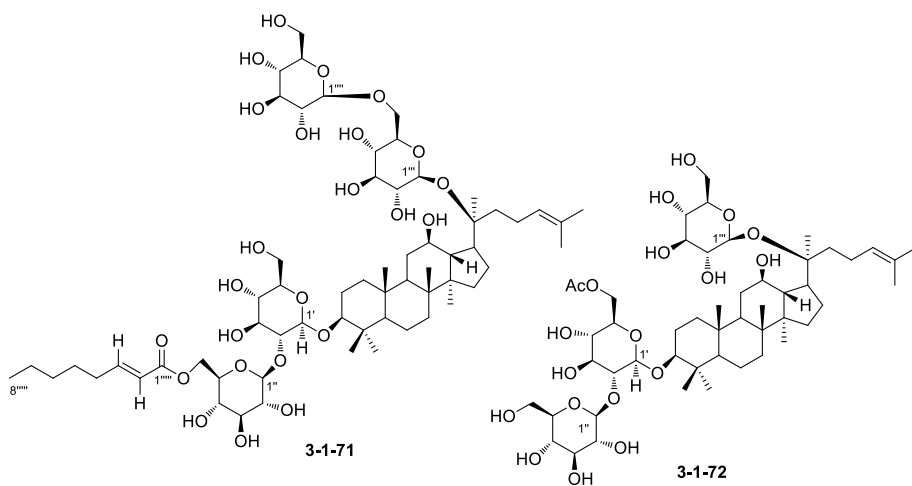
Table 3-1-15 (continued)

No.	Compounds	MFs	Test solvents	References
3-1-91	3 β ,20S,21-trihydroxydammar-24-ene-3-O-[[α -L-rhamnopyranosyl(1 $\rightarrow$ 2)][β -D-glucopyranosyl(1 $\rightarrow$ 3)]- β -D-glucopyranosyl}-21-O- β -D-glucopyranoside	C ₅₄ H ₉₂ O ₂₂	C ₅ D ₅ N	[7]
3-1-92	3 β ,20S,21-trihydroxydammar-24-ene-3-O-[[α -L-rhamnopyranosyl(1 $\rightarrow$ 2)][β -D-xylopyranosyl(1 $\rightarrow$ 3)]- β -D-glucopyranosyl}-21-O- β -D-glucopyranoside	C ₅₃ H ₉₀ O ₂₁	C ₅ D ₅ N	[7]
3-1-93	3 β ,19,20S,21-tetrahydroxydammar-24-ene-3-O-[[α -L-rhamnopyranosyl(1 $\rightarrow$ 2)][β -D-xylopyranosyl(1 $\rightarrow$ 3)]- β -D-glucopyranosyl}-21-O- β -D-glucopyranoside	C ₅₃ H ₉₀ O ₂₂	C ₅ D ₅ N	[7]
3-1-94	3 β ,19,20S,21-tetrahydroxydammar-24-ene-3-O-[[α -L-rhamnopyranosyl(1 $\rightarrow$ 2)][β -D-xylopyranosyl(1 $\rightarrow$ 3)]- α -L-arabinopyranosyl}-21-O- β -D-glucopyranoside	C ₅₂ H ₈₈ O ₂₁	C ₅ D ₅ N	[7]
3-1-95	19-oxo-3 β ,20S,21,24S-tetrahydroxydammar-25-ene-3-O-[[α -L-rhamnopyranosyl(1 $\rightarrow$ 2)][β -D-xylopyranosyl(1 $\rightarrow$ 3)]- α -L-arabinopyranosyl}-21-O- β -D-glucopyranoside	C ₅₂ H ₈₆ O ₂₂	C ₅ D ₅ N	[7]

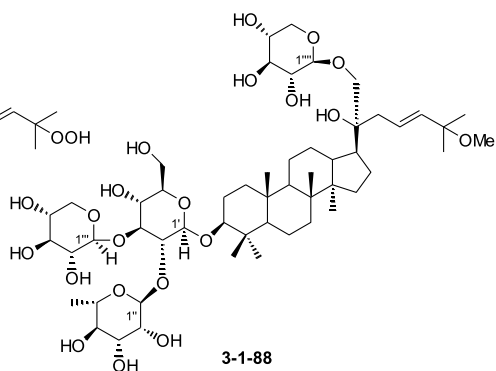
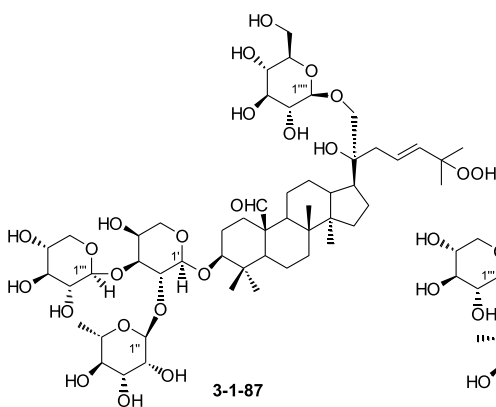
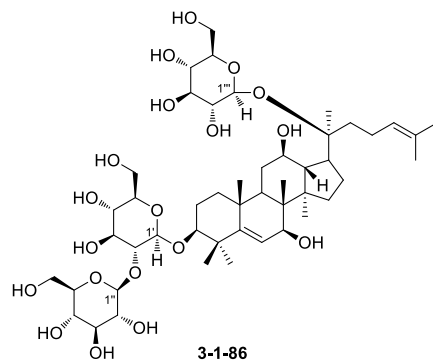
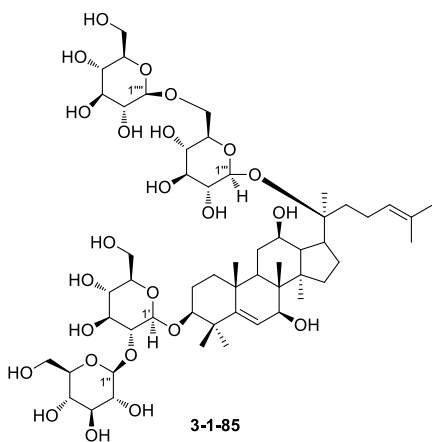
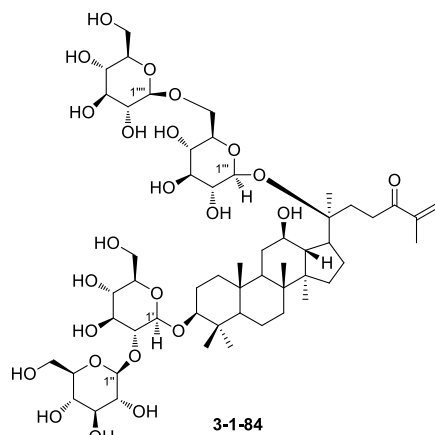
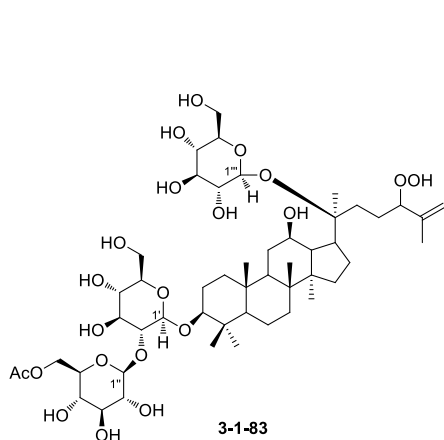












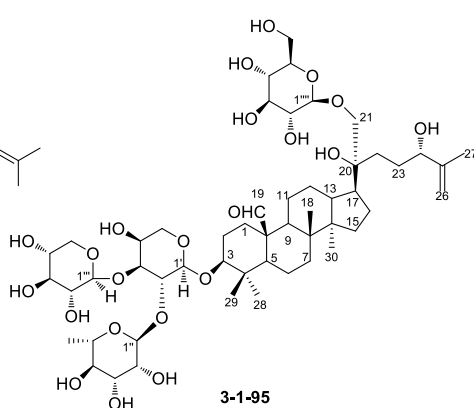
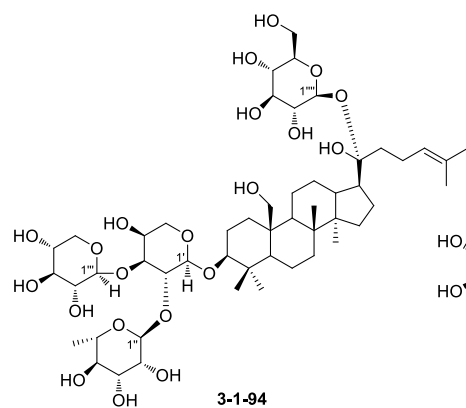
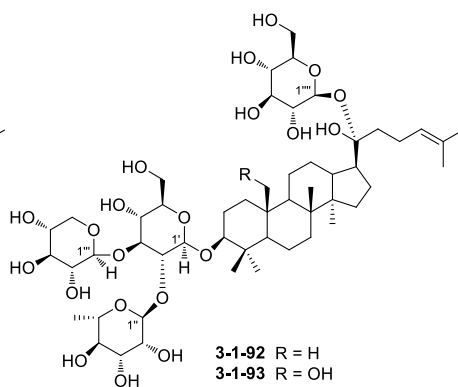
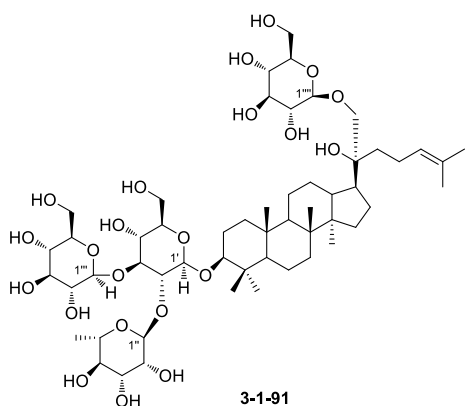
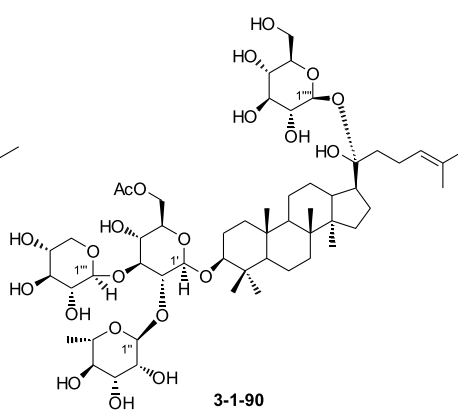
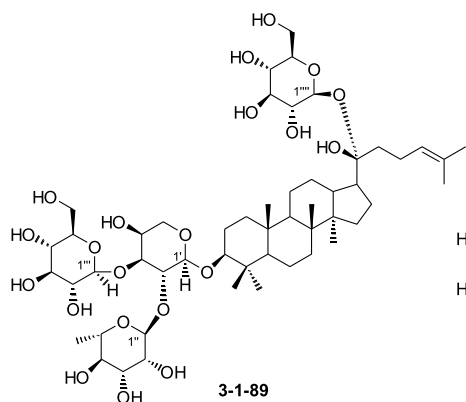


Table 3-1-16: ¹H NMR spectroscopic data of dammarane-type saponins **3-1-57~3-1-61**.

H	3-1-57	3-1-58	3-1-59	3-1-60	3-1-61
3	3.50 dd(4.8, 11.7)	3.39 t(5.1, 10.5)	3.49 dd(4.3, 11.5)	3.45 dd(4.9, 11.5)	3.25 dd(11.5, 4.2)
5	—	0.80 d(11.0)	—	—	—
6	4.39 dd(3.4, 10.3)	—	4.36 m	4.32 m	—
12	4.00 m	3.93 ddd-like	4.13 m	4.08 m	4.02 d(10.7, 8.2)
18	1.17 s	0.92 s	1.07 s	1.13 s	1.02 s
19	1.04 s	0.89 s	1.01 s	0.94 s	0.88 s
21	1.59 s	1.69 s	1.53 s	1.59 s	1.63 s
22	—	—	—	—	α 2.87 dd (13.2, 5.8) β 3.09 dd (12.5, 4.7) 6.15 ddd(15.6, 8.5)
23	6.18 dd-like (ca. 10, 16)	—	—	—	6.12 d(15.6)
24	6.11 d(15.8)	5.32 t(7.1)	4.74 br s	4.69 dd-like (ca. 5, 8)	6.12 d(15.6)
26	1.60 s	1.67 s	5.04 s, 5.23 s	1.58 s	1.62 s
27	1.60 s	1.67 s	1.94 s	1.57 s	1.58 s
28	1.96 s	1.21 s	1.95 s	2.00 s	1.27 s
29	1.43 s	1.01 s	1.42 s	1.52 s	1.09 s
30	0.91 s	0.99 s	0.96 s	0.99 s	0.83 s
1'	5.15 d(7.6)	5.10 d(7.8)	5.05 d(7.5)	4.96 d(7.4)	5.37 d(7.8)
1''	5.62 br s	5.61 d(1.7)	4.87 d(6.3)	5.38 d(7.6)	4.90 d(7.6)
1'''	—	—	—	5.20 d(7.7)	5.09 d(7.5)
1''''	—	—	—	—	5.17 d(7.8)

Table 3-1-17: ¹H NMR spectroscopic data of dammarane-type saponins **3-1-62~3-1-64, 3-1-66, and 3-1-67**.

H	3-1-62	3-1-63	3-1-64	3-1-66	3-1-67
3	3.26 dd-like	3.28 dd(3.4, 11.2)	3.38 dd(4.3, 11.8)	3.27 dd(11.7, 4.5)	3.29 dd(4.3, 11.7)
12	4.01 m	4.34 m	3.95 m	3.96 m	4.00 m
18	1.00 s	1.03 s	1.01 s	1.03 s	1.03 s
19	0.83 s	0.85 s	0.87 s	0.85 s	0.91 s
21	1.61 s	1.61 s	1.60 s	1.59 s	1.60 s
23	6.16 m	6.19 ddd-like	6.18 ddd (6.0, 8.3, 16.0)	6.21 ddd (15.5, 8.1, 6.5)	6.20 ddd (6.2, 8.6, 15.9)
24	6.07 d(15.0)	6.08 d(15.6)	6.03 d(16.0)	6.03 d(16.0)	6.03 d(15.9)
26	1.58 s	1.55 s	1.57 s	1.60 s	1.58 s
27	1.59 s	1.55 s	1.58 s	1.60 s	1.59 s
28	1.30 s	1.29 s	1.32 s	1.29 s	1.34 s
29	1.12 s	1.11 s	1.02 s	1.10 s	1.15 s
30	0.89 s	0.89 s	0.92 s	0.89 s	0.90 s
1'	4.95 d(7.0)	4.92 d(7.6)	4.92 d(7.7)	4.90 d(7.6)	4.90 d(7.6)
1''	5.39 d(6.7)	5.37 d(7.3)	5.19 d(7.8)	5.34 d(7.7)	5.30 d(7.6)
1'''	5.22 d(7.6)	5.18 d(7.6)	—	5.15 d(7.5)	5.20 d(7.6)
1''''	—	5.10 d(7.6)	—	5.62 d(1.4)	—

Table 3-1-18: ^1H NMR spectroscopic data of dammarane-type saponins **3-1-65**, **3-1-68**, **3-1-74**, **3-1-76**, and **3-1-77**.

H	3-1-65	3-1-68	3-1-74	3-1-76	3-1-77
1	1.61 m, 0.85 m	1.56 (ov), 0.88 (ov)	1.58 (ov), 0.78 (ov)	2.49 m, 0.79 t(12.6)	2.45 m, 0.57 t(12.6)
2	2.22 m, 1.90 m	2.10 (ov), 1.98 (ov)	2.21 (ov), 1.84 (ov)	2.37 m, 2.18 m	1.63 m, 2.18 m
3	3.40 dd (4.2, 11.6)	3.25 dd(10.4, 2.5)	3.38 dd(10.2, 3.4)	3.49 dd(11.3, 3.9)	3.32 dd(11.1, 4.1)
5	0.75 d(9.6)	0.79 d(12.3)	0.69 dd(11.3, 2.5)	0.88 m	1.03 m
6	1.53 m	1.50 (ov), 1.34 (ov)	1.60 (ov), 1.32 (ov)	1.52 m	1.89 m
7	1.51 m, 1.23 m	1.38 (ov), 1.12 (ov)	1.45 (ov), 1.17 (ov)	1.47 m, 1.20 m	1.49 m, 1.25 m
9	1.41 m	1.33 (ov)	1.36 (ov)	1.47 m	1.60 m
11	2.10 m	2.12 (ov), 1.51 (ov)	1.98 (ov), 1.54 (ov)	2.13 m, 1.89 m	1.65 m, 1.47 m
12	4.11 m	4.08 (ov)	4.02 (ov)	2.09 m, 1.87 m	2.03 m, 1.87 m
13	2.10 m	1.98 (ov)	1.94 (ov)	1.84 m	1.76 m
15	1.62 m, 1.08 m	1.61 (ov), 0.92 (ov)	1.59 (ov), 0.98 (ov)	1.58 m, 1.10 m	1.48 m, 1.10 m
16	1.89 m	1.78 (ov), 1.46 (ov)	1.82 (ov), 1.36 (ov)	1.99 m, 1.67 m	1.87 m, 1.63 m
17	2.52 m	2.23 dd(10.1, 7.3)	2.59 dd(12.1, 8.2)	2.23 m	2.14 m
18	1.09 s	0.95 s	0.96 s	1.42 s	0.87 s
19	0.92 s	0.79 s	0.92 s	4.41 m, 4.22 m	10.29 s
21	1.68 s	1.54 s	1.62 s	1.51 s	1.41 s
22	3.19 m, 2.90 m	3.04 dd(10.4, 8.8) 2.56 (ov)	3.14 dd(11.2, 7.8) 2.36 (ov)	1.84 m, 1.56 m	1.95 m, 1.82 m
23	6.25 m	2.41 (ov) 2.23 (ov)	2.61 (ov) 2.59 (ov)	2.43 m 2.10 m	2.43 m
24	6.20 m	5.25 t(8.2)	5.29 t(9.8)	5.48 m	5.39 t
26	1.72 s	1.61 s	1.59 s	1.81 s	1.73 s
27	1.65 s	1.61 s	1.60 s	1.80 s	1.70 s
28	1.33 s	1.26 s	1.24 s	1.46 s	1.32 s
29	1.20 s	1.10 s	0.94 s	1.32 s	1.07 s
30	0.99 s	0.96 s	0.96 s	1.14 s	0.99 s
1'	4.98 d(7.4)	4.89 d(8.4)	4.91 d(8.0)	5.08 d(7.4)	4.93 d(7.5)
2'	4.10 m	3.97 (ov)	4.02 (ov)	4.30 m	4.28 m
3'	4.10 m	3.92 (ov)	3.98 (ov)	4.13 m	4.00 m
4'	4.39 m	4.12 (ov)	3.98 (ov)	4.22 m	4.19 m
5'	4.20 m	4.22 (ov)	4.12 (ov)	4.41 m	4.38 m
6'	4.61 d(11.1) 4.41 m	4.51 d(12.2) 4.29 (ov)	4.74 d(10.3) 4.31 d(10.3)	4.62 m	4.61 m 4.29 m
1''	5.42 d(7.4)	5.08 d(8.4)	5.09 d(8.0)	5.47 d(7.3)	5.34 d(7.6)
2''	4.21 m	4.39 (ov)	4.03 (ov)	4.21 m	4.19 m
3''	4.32 m	4.13 (ov)	4.05 (ov)	4.32 m	4.31 m
4''	4.38 m	4.08 (ov)	4.25 (ov)	4.41 m	4.39 m
5''	4.00 m	4.12 (ov)	4.21 (ov)	3.98 m	3.98 m
6''	4.53 m, 4.12 m	4.51 d(12.2), 4.29 (ov)	4.50 d(11.2), 4.28 d(11.2)	4.543 m	4.52 m

Table 3-1-18 (continued)

H	3-1-65	3-1-68	3-1-74	3-1-76	3-1-77
1 ^{'''}	5.20 d(7.5)	5.38 d(5.6)	5.12 d(8.2)	5.13 d(7.6)	5.07 d(7.6)
2 ^{'''}	4.00 m	4.12 (ov)	3.91 (ov)	4.06 m	4.04 m
3 ^{'''}	4.24 m	3.95 (ov)	3.96 (ov)	4.28 m	4.28 m
4 ^{'''}	4.20 m	4.45 (ov)	4.13 (ov)	4.05 m	4.03 m
5 ^{'''}	4.19 m	3.91 (ov), 4.28 (ov)	4.22 (ov)	4.06 m	4.03 m
6 ^{'''}	4.78 m, 4.37 m		4.50 d(11.2) 4.28 d(11.2)	4.70 d(10.0), 4.03 m	4.59 d(18.9), 4.41 m
1 ^{''''}	5.02 d(7.3)			5.56 s	5.47 s
2 ^{''''}	4.10 m			4.70 m	4.54 m
3 ^{''''}	4.22 m			4.62 m	4.50 m
4 ^{''''}	4.38 m			4.36 m	4.36 m
5 ^{''''}	3.78 m			4.38 m	4.38 m
6 ^{''''}				1.73 d(6.0)	1.64 d(5.7)

Table 3-1-19: ¹H NMR spectroscopic data of dammarane-type saponins 3-1-69~3-1-73.

H	3-1-69	3-1-70	3-1-71	3-1-72	3-1-73
3	3.36 dd(4.6, 11.8)	3.27 dd(1.8, 11.0)	3.27 dd(4.3, 11.9)	3.26 dd(4.9, 11.6)	3.33 dd(4.2, 11.3)
6	4.32 m	—	—	—	5.82 d(1.9)
7	—	—	—	—	4.68 d-like
12	4.13 m	4.10 m	4.11 m	4.11 m	4.11 m
13	—	1.98 t-like	1.98 t-like	1.98 t-like	2.08 t-like
18	1.07 s	0.97 s	1.00 s	0.97 s	1.27 s
19	0.93 s	0.84 s	0.86 s	0.86 s	1.16 s
21	1.62 s	1.61 s	1.64 s	1.61 s	1.67 s
24	5.32 m	5.25 t-like	5.32 t-like	5.25 t-like	5.33 t-like
26	1.63 s	1.61 s(6H)	1.62 s		1.61 s
27	1.67 s		1.67 s	1.61 s(6H)	1.67 s
28	1.98 s	1.31 s	1.33 s	1.29 s	1.49 s
29	1.50 s	1.11 s	1.12 s	1.10 s	1.41 s
30	0.98 s	0.96 s	0.98 s	0.96 s	1.13 s
1'	4.94 d(7.6)	4.87 d(7.6)	4.87 d(6.6)	4.84 d(7.3)	4.85 d(7.4)
6'	—	—	—	4.71 dd(5.0, 11.3)	—
				4.91 br d	
OAc				2.02 s(6'-OAc)	
1''	5.38 d(7.7)	5.29 d(7.6)	5.30 d(7.2)	5.34 d(7.6)	5.30 d(7.6)
6''	—	4.97 dd(1.5, 11.4)	4.90 dd-like	—	—
		4.89 dd-like	4.86 dd-like		
1 ^{'''}	5.10 d(7.7)	5.16 d(7.7)	5.09 d(7.6)	5.16 d(7.6)	5.12 d(7.6)
1 ^{''''}	4.97 d(5.8)	5.98 br d	5.04 d(8.0)		5.06 d(7.6)
2 ^{''''}		7.05 dq(7.0, 15.6)	—		—
3 ^{''''}		1.67 dd(1.6, 7.0)	—		—
2 ^{'''''}			6.02 d(15.5)		
3 ^{'''''}			7.15 dq(8.2, 15.5)		

Table 3-1-20: ^1H NMR spectroscopic data of dammarane-type saponins **3-1-75** and **3-1-78~3-1-81**.

H	3-1-75	3-1-78	3-1-79	3-1-80	3-1-81
1	—	2.74 d(12.8) 0.82 t(12.8)	2.03 dd(4.4, 12.0) 1.10 m	2.32 m 1.10 m	—
2	—	1.66 m, 2.09 m	3.88 m	3.87 m	—
3	3.29 dd (4.0, 11.3)	3.37 dd(11.5, 3.8)	3.04 d(9.6)	2.96 d(9.5)	3.27 dd(2.9, 11.0)
5	—	1.10 m	0.75 m	0.80 m	—
6	—	1.88 m	1.45 m, 1.37 m	1.53 m, 1.31 m	—
7	—	1.56 m, 1.32 m	1.42 m, 1.28 m	1.25 m, 1.56 m	—
9	—	1.65 m	1.51 m	1.56 m	—
11	—	1.66 m, 1.47 m	1.93 m, 1.04 m	2.11 m, 1.12 m	—
12	—	2.01 m, 1.83 m	4.04 br d(10.0)	3.87 m	4.14 m
13	—	1.80 m	1.82 m	1.93 m	—
15	—	1.50 m, 1.08 m	1.90 m, 1.15 m	1.59 m, 0.95 m	—
16	—	1.90 m	2.24 m	1.78 m	—
17	—	2.11 m	2.35 m	2.29 m	—
18	0.99 s	0.99 s	1.16 s	0.93 s	0.99 s
19	0.81 s	10.38 s	1.03 s	0.87 s	0.83 s
21	1.53 s	1.56 s	1.39 s	1.34 s	1.63 s
22	—	1.97 m, 1.84 m	1.52 m, 1.83 m	2.09 m, 1.87 m	1.97 m, 2.55 m
23	—	2.46 m	2.01 m	2.06 m	—
24	5.40 brs	5.38 t	5.13 t(6.0)	5.11 t(6.0)	4.79 dd-like
26	1.72 s	1.76 s	1.72 s	1.68 s	5.10 m, 5.30 m
27	1.72 s	1.76 s	1.66 s	1.62 s	1.96 s
28	1.28 s	1.37 s	0.95 s	0.98 s	1.28 s
29	1.12 s	1.12 s	1.01 s	1.10 s	1.10 s
30	0.98 s	1.05 s	0.96 s	1.02 s	0.94 s
1'	4.93 d(7.6)	5.02 d(5.9)	4.79 d(8.0)	4.42 d(7.5)	4.91 d(7.3)
2'	—	4.67 t(6.5)	3.30 m	3.36 m	—
3'	—	4.41 m	3.41 m	3.45 m	—
4'	—	4.41 m	3.27 m	3.28 m	—
5'	—	4.29 m, 3.85 m	3.79 m	3.75 m	—
6'	—	—	3.66 m 3.92 br d(10.4)	3.75 m 4.32 dd(10.0, 1.6)	—
1''	5.37 d(7.6)	5.24 d(7.6)	4.49 d(8.0)	4.60 d(7.5)	5.36 d(7.6)
2''	—	4.18 t(7.6)	3.37 m	3.32 m	—
3''	—	4.28 m	3.65 m	3.60 m	—
4''	—	4.39 m	3.39 m	3.71 m	—
5''	—	3.89 m 4.49 d(3.6)	3.64 m	3.43 m	—
6''	—	—	3.79 dd(5.4, 11.2) 3.90 m	3.87 dd(2.0, 10.5) 3.71 m	—
1'''	5.05 d(7.6)	5.11 d(7.6)	4.33 d(8.0)	4.71 d(7.5)	5.09 d-like
2'''	—	4.15 m	3.88 m	3.45 m	—
3'''	—	4.30 m	3.52 m	3.63 m	—
4'''	—	4.28 m	3.35 m	3.42 m	—
5'''	—	3.99 m	3.65 m	3.69 m	—
6'''	—	4.53 dd(11.2, 5.9)	4.04 br d(10) 3.85 m	4.16 dd(4.4, 11.0) 3.75 m	—

Table 3-1-20 (continued)

H	3-1-75	3-1-78	3-1-79	3-1-80	3-1-81
1 ^{'''}	5.09 d(7.6)		4.60 d(8.0)		5.10 d-like
2 ^{'''}	—		3.75 m		—
3 ^{'''}	—		3.67 m		—
4 ^{'''}	—		3.65 m		—
5 ^{'''}	—		3.87 dd(5.2, 11.6)		—
			3.21 m		

Table 3-1-21: ¹H NMR spectroscopic data of dammarane-type saponins 3-1-82~3-1-86.

H	3-1-82	3-1-83	3-1-84	3-1-85	3-1-86
3	3.38 dd(4.3, 11.6)	3.28 dd(4.3, 11.7)	3.26 dd-like	3.33 dd(4.2, 11.3)	3.33 dd(4.6, 11.9)
6	—	—	—	5.82 d(1.9)	5.83 d(2.1)
7	—	—	—	4.68 t-like	4.70 d(2.1)
9	—	—	—	—	1.77 m
12	4.05 m	4.10 m	4.18 m	4.11 m	4.09 m
13	—	—	—	2.08 t-like	—
18	0.95 s	0.99 s	0.92 s	1.27 s	1.26 s
19	0.82 s	0.87 s	0.82 s	1.16 s	1.13 s
21	1.54 s	1.61 s	1.59 s	1.67 s	1.65 s
24	4.96 dd(4.8, 7.9)	4.74 dd-like (ca. 5, 8)		5.33 t-like	5.27 dd-like
26	5.03 s	5.07 brs	5.77 s	1.61 s	1.59 s
	5.21 s	5.23 brs	6.37 s		
27	1.90 s	1.92 s	1.83 s	1.67 s	1.60 s
28	1.30 s	1.35 s	1.28 s	1.49 s	1.49 s
29	0.99 s	1.13 s	1.11 s	1.41 s	1.42 s
30	0.94 s	0.94 s	0.97 s	1.13 s	1.13 s
1 [']	4.93 d(7.7)	4.89 d(7.8)	4.93 d(7.6)	4.85 d(7.4)	4.88 d(7.6)
1 ^{''}	5.15 d(7.9)	5.29 d(7.8)	5.38 d(7.6)	5.30 d(7.6)	5.34 d(7.6)
1 ^{'''}		5.15 d(8.1)	5.11 d(7.3)	5.12 d(7.6)	5.22 d(7.6)
1 ^{'''}			5.03 d(7.2)	5.06 d(7.6)	

Table 3-1-22: ¹H NMR spectroscopic data of dammarane-type saponins 3-1-87~3-1-91.

H	3-1-87	3-1-88	3-1-89	3-1-90	3-1-91
1	2.60 m, 0.67 m	1.47 m, 0.83 m	1.60 m, 0.90 m	1.60 m, 0.92 m	1.51 m, 0.92 m
2	2.09 m	2.27 m	2.10 m, 1.91 m	2.20 m	2.20 m
3	3.31 br d(10.0)	3.38 br d(11.3)	3.35 br d(11.6)	3.30 dd(11.6, 3.8)	3.40 m
5	1.15 m	0.74 d(11.5)	0.81 m	0.74 m	0.74 m
6	1.55 m	1.52 m	1.61 m, 1.52 m	1.50 m	1.50 m
7	1.62 m, 1.32 m	1.53 m, 1.27 m	1.61 m, 1.31 m	1.50 m, 1.22 m	1.50 m, 1.30 m
9	1.63 m	1.30 m	1.38 m	1.34 m	1.32 m

Table 3-1-22 (continued)

H	3-1-87	3-1-88	3-1-89	3-1-90	3-1-91
11	1.67 m	1.49 m	1.72 m, 1.40 m	1.41 m	1.41 m
12	1.91 m	1.95 m	2.12 m, 2.01 m	1.93 m	2.00 m
13	2.00 m	2.10 m	2.11 m	2.10 m	2.10 m
15	1.60 m, 1.11 m	1.65 m, 1.12 m	1.70 m, 1.18 m	1.61 m, 1.11 m	1.71 m, 1.19 m
16	2.09 m	1.88 m	1.90 m, 1.43 m	1.87 m	1.85 m
17	2.21 m	2.22 m	2.31 m	2.21 m	2.20 m
18	0.90 s	0.97 s	1.02 s	0.96 s	1.02 s
19	10.3 s	0.78 s	0.86 s	0.79 s	0.86 s
21	4.36 m, 3.97 m	4.38 m, 4.03 m	4.43 m, 4.08 m	4.38 m, 4.00 m	4.40 m, 4.10 m
22	2.86 m, 2.61 m	2.90 m, 2.60 m	2.18 m, 1.99 m	2.09 m, 1.90 m	2.08 m, 2.00 m
23	6.20 m	6.10 m	2.53 m, 2.41 m	2.45 m, 2.32 m	2.52 m, 2.40 m
24	6.08 d(14.8)	5.77 d(15.7)	5.38 t(6.2)	5.30 t(6.6)	5.28 t(6.0)
26	1.59 s	1.32 s	1.72 s	1.71 s	1.77 s
27	1.52 s	1.32 s	1.70 s	1.67 s	1.72 s
28	1.28 s	1.27 s	1.30 s	1.28 s	1.32 s
29	0.92 s	1.18 s	1.19 s	1.15 s	1.18 s
30	0.89 s	0.93 s	1.02 s	0.97 s	1.02 s
OMe		3.21 s(25-OMe)			
1'	4.90 d(5.4)	4.90 d(6.9)	5.18 d(4.9)	4.78 d(8.2)	4.91 d(6.6)
2'	3.91 m	4.22 m	4.72 m	4.15 m	4.15 m
3'	4.27 d(9.4)	4.18 m	4.40 m	4.12 m	4.28 m
4'	4.47 br s	4.00 m	4.61 m	3.80 t(9.0)	4.11 m
5'	4.28 m	3.96 m	4.33 m	3.93 m	4.02 m
	3.80 d(10.2)		3.85 m		
6'		4.52 m, 4.37 m		4.80 m, 4.70 m	4.53 m, 4.38 m
OAc				2.06 s(6'-OAc)	
1''	6.10 br s	6.41 br s	6.20 br s	6.42 br s	6.50 br s
2''	4.56 m	4.58 br s	4.65 m	4.55 m	4.64 m
3''	4.72 br s	4.79 m	4.79 m	4.66 m	4.88 m
4''	4.26 m	4.28 m	4.34 m	4.18 m	4.35 m
5''	4.54 m	4.75 m	4.65 m	4.70 m	4.79 m
6''	1.60 d(5.8)	1.69 d(6.2)	1.69 d(6.3)	1.67 d(7.0)	1.60 d(6.3)
1'''	5.00 d(7.3)	5.00 d(7.7)	4.97 d(7.5)	4.96 d(7.6)	5.17 d(7.5)
2'''	3.92 m	3.96 m	4.02 m	3.93 m	4.05 m
3'''	4.09 m	4.08 m	4.24 m	4.07 m	4.12 m
4'''	4.11 m	4.11 m	4.23 m	4.11 m	4.16 m
5'''	4.30 m	4.26 m	4.06 m	4.28 m	3.96 m
	3.65 t(9.9)	3.70 m		3.70 t(10.5)	
6'''			4.57 m, 4.39 m		4.43 m, 4.30 m
1''''	5.03 d(7.4)	5.05 d(7.4)	5.14 d(7.7)	5.02 d(7.7)	5.08 d(8.1)
2''''	4.09 m	4.10 m	4.17 m	4.06 m	4.12 m
3''''	4.21 m	4.22 m	4.29 m	4.20 m	4.28 m
4''''	4.21 m	4.22 m	4.28 m	4.18 m	4.17 m
5''''	3.95 m	4.32 m, 3.70 m	4.00 m	3.96 m	3.98 m
6''''	4.52 m, 4.35 m		4.62 m, 4.45 m	4.54 m, 4.33 m	4.57 m, 4.38 m

Table 3-1-23: ^1H NMR spectroscopic data of dammarane-type saponins **3-1-92~3-1-95**.

H	3-1-92	3-1-93	3-1-94	3-1-95
1	1.69 m 0.95 m	2.49 m 0.79 t(11.5)	2.61 d(11.7) 0.95 m	2.58 m 0.68 m
2	2.26 m	2.35 m, 2.20 m	2.30 m, 2.22 m	2.11 m
3	3.30 dd(11.3, 3.9)	3.50 br d(10.0)	3.48 br d(11.3)	3.38 br d(10.0)
5	0.73 br d(11.5)	0.96 m	1.04 m	1.21 m
6	1.52 m	1.55 m	1.50 m	1.55 m
7	1.49 m, 1.22 m	1.60 m, 1.33 m	1.70 m, 1.42 m	1.70 m, 1.41 m
9	1.25 m	1.48 m	1.56 m	1.71 m
11	1.49 m	2.14 m, 1.96 m	2.20 m, 2.02 m	1.62 m
12	1.90 m	2.36 m, 2.20 m	2.30 m, 2.22 m	1.91 m
13	2.09 m	2.15 m	2.21 m	2.08 m
15	1.67 m, 1.11 m	1.71 m, 1.19 m	1.77 m, 1.23 m	1.65 m, 1.20 m
16	1.88 m	2.20 m	2.21 m	2.12 m
17	2.20 m	2.23 m	2.30 m	2.30 m
18	0.94 s	1.30 s	1.38 s	1.12 s
19	0.74 s	4.25 m, 4.15 m	4.31 m, 4.22 m	10.2 s
21	4.39 d(10.2) 4.05 d(10.2)	4.35 d(9.3) 4.00 d(9.3)	4.41 m 4.06 d(9.8)	4.40 m 4.02 m
22	2.10 m, 1.90 m	2.08 m, 1.90 m	2.15 m, 1.98 m	2.05 m, 1.90 m
23	2.47 m, 2.32 m	2.45 m, 2.32 m	2.49 m, 2.39 m	2.00 m
24	5.46 t(6.6)	5.49 m	5.30 t(6.3)	4.45 m
26	1.70 s	1.66 s	1.72 s	5.30 br s, 4.99 br s
27	1.65 s	1.59 s	1.70 s	1.97 s
28	1.27 s	1.30 s	1.31 s	1.31 s
29	1.18 s	1.30 s	1.29 s	1.00 s
30	0.94 s	1.00 s	1.12 s	0.92 s
1'	4.90 d(7.4)	4.00 d(7.0)	5.01 d(6.0)	4.94 d(5.7)
2'	4.22 m	4.20 m	4.70 t(6.0)	4.67 m
3'	4.18 m	4.18 d(8.5)	4.34 m	4.31 m
4'	4.00 m	3.99 m	4.52 m	4.51 m
5'	3.92 m	4.20 m	4.38 m 3.90 m	4.33 m 3.88 d(10.1)
6'	4.50 m 4.38 m	4.34 d(9.4) 4.30 t(9.2)		
1''	6.70 br s	6.40 br s	6.19 br s	6.16 br s
2''	4.58 m	4.59 d(9.0)	4.62 m	4.61 m
3''	4.78 m	4.80 m	4.77 br s	4.76 br s
4''	4.29 m	4.28 m	4.31 m	4.30 m
5''	4.66 m	4.72 m	4.62 m	4.60 m
6''	1.68 d(6.2)	1.62 d(6.2)	1.68 d(5.8)	1.66 d(5.4)
1'''	5.00 d(7.7)	4.72 d(7.0)	5.03 d(7.7)	5.03 d(6.9)
2'''	3.96 m	3.97 m	3.98 m	3.98 m
3'''	4.08 m	4.20 m	4.17 m	4.13 m

Table 3-1-23 (continued)

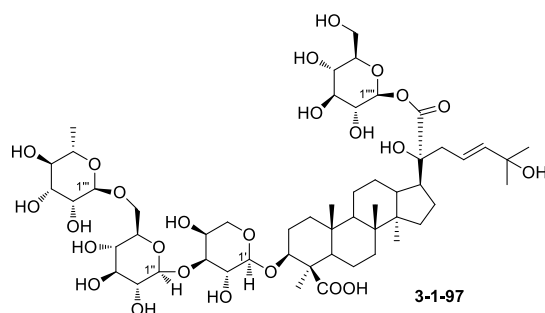
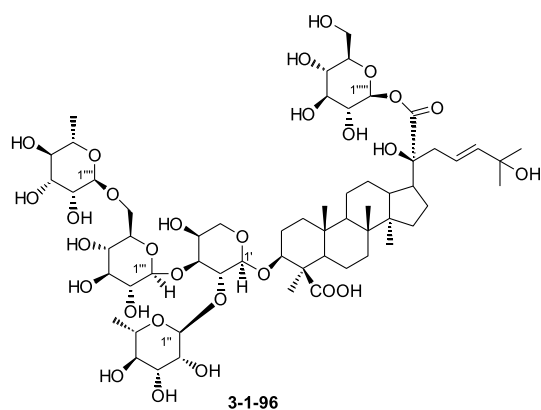
H	3-1-92	3-1-93	3-1-94	3-1-95
4'''	4.11 m	4.21 m	4.16 m	4.17 m
5'''	4.26 m	4.26 m	4.37 m	4.35 m
	3.70 t(10.0)	3.70 t(10.1)	3.72 t(10.0)	3.71 m
1'''	5.05 d(7.6)	5.00 d(7.3)	5.03 d(7.7)	5.03 d(6.9)
2'''	4.08 m	4.08 m	4.11 m	4.10 m
3'''	4.22 m	4.21 m	4.25 m	4.26 m
4'''	4.22 m	4.21 m	4.25 m	4.22 m
5'''	3.98 m	3.94 m	3.99 m	4.01 m
6'''	4.57 m	4.50 m	4.58 m	4.58 m
	4.39 m	4.33 d(9.4)	4.40 m	4.40 m

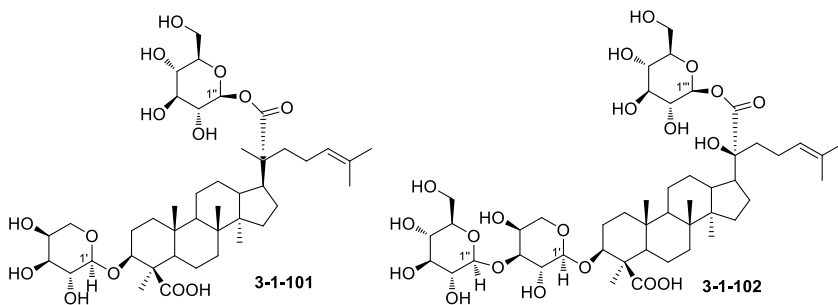
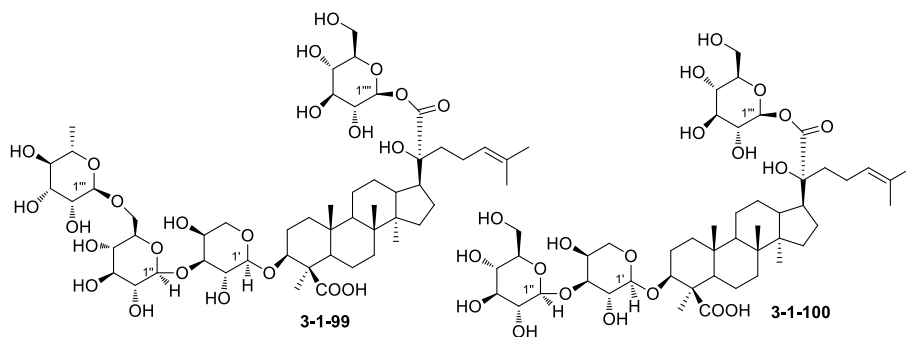
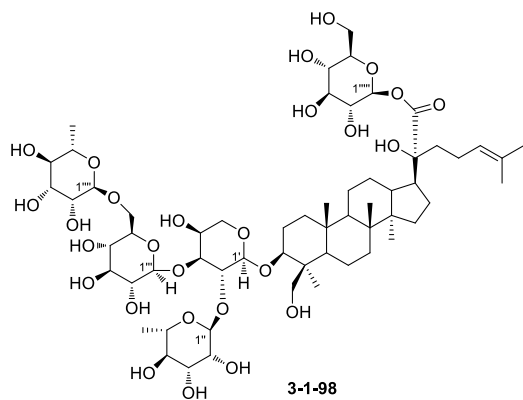
Table 3-1-24: Cos, MFs, and TSs of dammarane-type saponins 3-1-96~3-1-105.

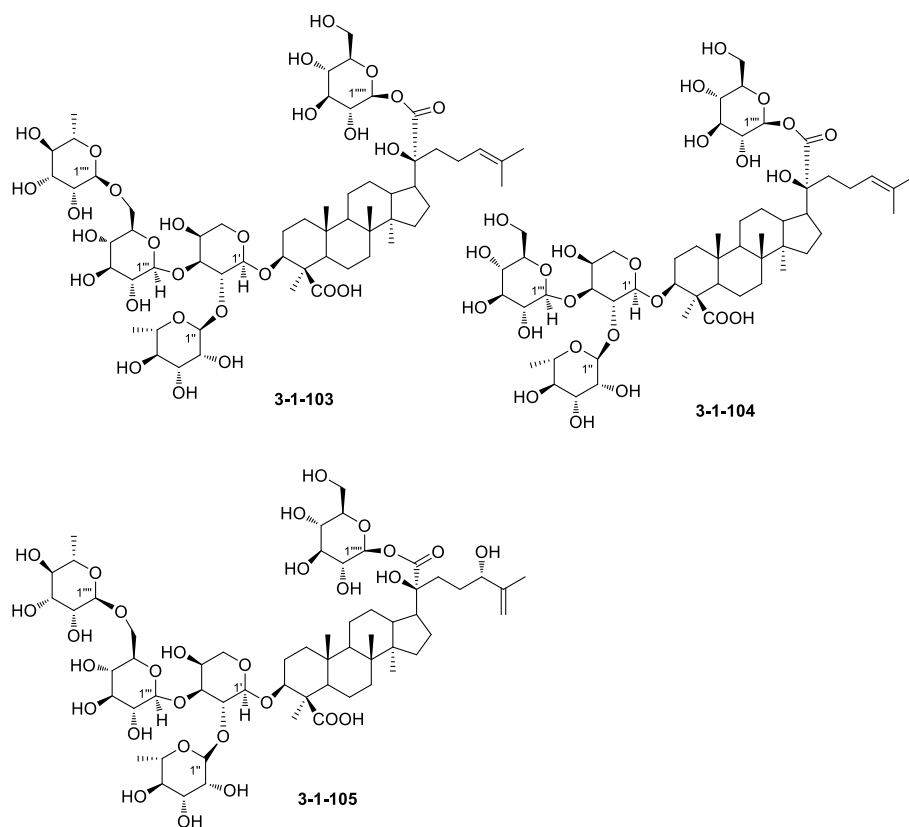
No.	Compounds	MFs	Test solvents	References
3-1-96	3 β ,20S,25-trihydroxydammar-23-ene-21,28-dioic acid 3-O-[[α -L-rhamnopyranosyl(1 $\rightarrow$ 2)]] [α -L-rhamnopyranosyl-(1 $\rightarrow$ 6)- β -D-glucopyranosyl(1 $\rightarrow$ 3)]- α -L-arabinopyranosyl]-21-O- β -D-glucopyranoside	C ₅₉ H ₉₆ O ₂₉	C ₅ D ₅ N	[34]
3-1-97	(20S)-3 β ,20,25-trihydroxydammar-23-ene-21,29-dioic acid 3-O-[[α -L-rhamnopyranosyl(1 $\rightarrow$ 6)- β -D-glucopyranosyl(1 $\rightarrow$ 3)]- α -L-arabinopyranosyl]-21-O- β -D-glucopyranoside	C ₅₃ H ₈₆ O ₂₅	C ₅ D ₅ N	[35]
3-1-98	(20S)-3 β ,20,29-trihydroxydammar-24-ene-21-carboxylic acid 3-O-[[α -L-rhamnopyranosyl(1 $\rightarrow$ 2)]] [α -L-rhamnopyranosyl(1 $\rightarrow$ 6)- β -D-glucopyranosyl(1 $\rightarrow$ 3)]- α -L-arabinopyranosyl]-21-O- β -D-glucopyranoside	C ₅₉ H ₉₈ O ₂₇	C ₅ D ₅ N	[35]
3-1-99	(20S)-3 β ,20-dihydroxydammar-24-ene-21,29-dioic acid 3-O-[[α -L-rhamnopyranosyl(1 $\rightarrow$ 6)- β -D-glucopyranosyl(1 $\rightarrow$ 3)]- α -L-arabinopyranosyl]-21-O- β -D-glucopyranoside	C ₅₃ H ₈₆ O ₂₄	C ₅ D ₅ N	[35]
3-1-100	(20S)-3 β ,20-dihydroxydammar-24-ene-21,29-dioic acid 3-O-[[β -D-glucopyranosyl(1 $\rightarrow$ 3)]- α -L-arabinopyranosyl]-21-O- β -D-glucopyranoside	C ₄₇ H ₇₆ O ₂₀	C ₅ D ₅ N	[35]
3-1-101	(20S)-3 β ,20-dihydroxydammar-24-ene-21,29-dioic acid 3-O-[α -L-arabinopyranosyl]-21-O- β -D-glucopyranoside	C ₄₁ H ₆₆ O ₁₅	C ₅ D ₅ N	[35]
3-1-102	3 β ,20S-dihydroxydammar-24-ene-21,28-dioic acid 3-O-[β -D-glucopyranosyl(1 $\rightarrow$ 3)]- α -L-arabinopyranosyl]-21-O- β -D-glucopyranoside	C ₄₇ H ₇₆ O ₂₀	C ₅ D ₅ N	[34]

Table 3-1-24 (continued)

No.	Compounds	MFs	Test solvents	References
3-1-103	3 β ,20S-dihydroxydammar-24-ene-21,28-dioic acid 3-O-[[α -L-rhamnopyranosyl(1 $\rightarrow$ 2)][α -L-rhamnopyranosyl-(1 $\rightarrow$ 6)- β -D-glucopyranosyl-(1 $\rightarrow$ 3)]- α -L-arabinopyranosyl]-21-O- β -D-glucopyranoside	C ₅₉ H ₉₆ O ₂₈	C ₅ D ₅ N	[34]
3-1-104	3 β ,20S-dihydroxydammar-24-ene-21,28-dioic acid 3-O-[[α -L-rhamnopyranosyl(1 $\rightarrow$ 2)][β -D-glucopyranosyl(1 $\rightarrow$ 3)]- α -L-arabinopyranosyl]-21-O- β -D-glucopyranoside	C ₅₃ H ₈₆ O ₂₄	C ₅ D ₅ N	[34]
3-1-105	3 β ,20S,24S-trihydroxydammar-25-ene-21,28-dioic acid 3-O-[[α -L-rhamnopyranosyl(1 $\rightarrow$ 2)][α -L-rhamnopyranosyl(1 $\rightarrow$ 6)- β -D-glucopyranosyl(1 $\rightarrow$ 3)]- α -L-arabinopyranosyl]-21-O- β -D-glucopyranoside	C ₅₉ H ₉₆ O ₂₉	C ₅ D ₅ N	[34]





**Table 3-1-25:** ^1H NMR spectroscopic data of dammarane-type saponins **3-1-96~3-1-100**.

H	3-1-96	3-1-97	3-1-98	3-1-99	3-1-100
1	1.88 m, 1.08 m	1.10 m, 1.90 m	0.90 m, 1.75 m	1.10 m, 1.90 m	0.90 m, 1.73 m
2	2.23 m, 1.53 m	1.52 m, 2.20 m	1.50 m, 2.20 m	1.54 m, 2.23 m	1.55 m, 2.23 m
3	3.41 brd(11.8)	3.50 brd(11.5)	3.50 brd(10.0)	3.50 dd(11.9, 4.5)	3.50 dd(12.3, 3.9)
5	1.09 m	1.15 m	0.88 m	1.10 m	1.23 m
6	2.13 m, 2.05 m	1.45 m, 1.75 m	1.75 m	2.05 m, 2.13 m	2.04 m, 2.10 m
7	1.61 m, 1.34 m	1.38 m, 1.63 m	1.30 m, 1.52 m	1.25 m, 1.63 m	1.35 m, 1.60 m
9	1.41 m	1.42 m	1.42 m	1.42 m	1.38 m
11	1.72 m, 1.42 m	1.42 m, 1.73 m	1.25 m, 1.70 m	1.50 m, 1.80 m	1.38 m, 1.60 m
12	2.12 m, 2.04 m	2.05 m, 2.13 m	2.00 m, 2.10 m	2.00 m, 2.15 m	2.05 m, 2.10 m
13	2.31 m	2.35 m	2.30 m	2.30 m	2.30 m
15	1.72 m, 1.17 m	1.20 m, 1.70 m	1.10 m, 1.75 m	1.15 m, 1.75 m	1.20 m, 1.70 m
16	2.95 m, 2.18 m	2.30 m, 2.95 m	1.75 m, 2.81 m	2.24 m, 3.00 m	2.23 m, 2.90 m

Table 3-1-25 (continued)

H	3-1-96	3-1-97	3-1-98	3-1-99	3-1-100
17	2.69 m	2.65 m	2.60 m	2.65 m	2.65 m
18	1.05 s	1.05 s	1.02 s	1.07 s	1.10 s
19	1.13 s	1.13 s	0.80 s	1.15 s	1.13 s
22	3.15 m, 2.91 m	2.90 dd(5.5, 12.1) 3.20 dd(8.5, 12.1)	2.08 m, 2.45 m	1.10 m, 1.90 m	1.73 m, 2.65 m
23	6.35 s	6.21 ddd(15.5, 8.5, 5.5)	1.75 m	2.45 m, 2.70 m	2.41 m, 2.65 m
24	6.35 s	6.11 d(15.5)	5.50 t(6.3)	5.45 t(6.2)	5.40 t(6.0)
26	1.56 s	1.60 s	1.77 s	1.70 s	1.70 s
27	1.56 s	1.60 s	1.63 s	1.65 s	1.63 s
28		1.85 s	1.40 s	1.85 s	1.83 s
29	1.69 s		4.46 m, 4.65 m		
30	1.04 s	1.05 s	0.80 s	1.05 s	1.08 s
1'	5.20 brs	5.05 d(4.8)	5.00 d(5.7)	5.05 d(5.0)	5.05 d(5.7)
2'	4.58 m	4.40 m	4.55 m	4.35 m	4.40 m
3'	4.27 m	4.10 m	4.28 m	4.35 m	4.42 m
4'	4.42 m	4.53 m	4.40 m	4.60 m	4.55 m
5'	4.43 m, 3.97 m	3.98 m, 4.45 m	4.02 m, 4.57 m	4.10 m, 4.37 m	4.00 m, 4.45 m
1''	5.88 brs	5.50 d(7.4)	5.75 brs	5.53 d(7.8)	5.52 d(7.7)
2''	4.58 m	4.05 m	4.20 m	4.13 m	4.13 m
3''	4.64 m	4.18 m	4.67 m	4.25 m	4.25 m
4''	4.28 m	4.06 m	4.30 m	4.07 m	4.35 m
5''	4.52 m	4.30 m	4.05 m	4.03 m	4.20 m
6''	1.63 d(5.4)	4.15 m, 4.58 m	1.77 d(6.2)	4.23 m, 4.35 m	4.42 m, 4.70 m
1'''	5.46 d(7.4)	5.55 brs	5.55 d(7.3)	5.50 brs	6.50 d(7.6)
2'''	4.19 m	4.18 m	4.10 m	4.17 m	4.35 m
3'''	4.03 m	4.56 m	4.30 m	4.55 m	4.42 m
4'''	4.42 m	4.28 m	4.53 m	4.30 m	4.15 m
5'''	4.15 m	4.38 m	4.16 m	4.35 m	4.10 m
6'''	4.62 m, 4.18 m	1.68 d(5.8)	4.18 m, 4.61 m	1.73 d(6.2)	4.45 m, 4.50 m
1''''	5.54 brs	6.20 d(7.7)	5.50 brs	6.30 d(8.1)	
2''''	4.64 m	4.05 m	4.63 m	4.25 m	
3''''	4.57 m	4.28 m	4.53 m	4.35 m	
4''''	4.32 m	4.18 m	4.25 m	4.07 m	
5''''	4.36 m	4.15 m	4.30 m	4.35 m	
6''''	1.68 d(5.4)	4.40 m, 4.60 m	1.73 d(7.0)	4.45 m, 4.65 m	
1'''''	6.20 d(7.7)		6.20 d(7.8)		
2'''''	4.06 m		4.60 m		
3'''''	4.27 m		4.16 m		
4'''''	4.19 m		4.26 m		
5'''''	4.33 m		4.16 m		
6'''''	4.62 m, 4.45 m		4.41 m, 4.65 m		

Table 3-1-26: ^1H NMR spectroscopic data of dammarane-type saponins **3-1-101**–**3-1-105**.

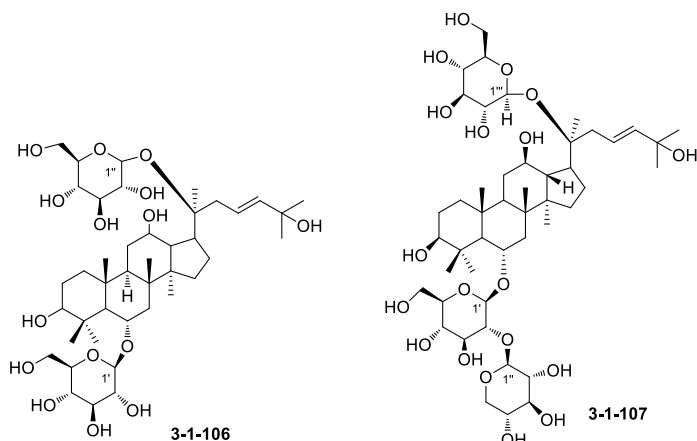
H	3-1-101	3-1-102	3-1-103	3-1-104	3-1-105
1	0.85 m, 1.75 m	1.70 m, 0.93 m	1.88 m, 1.06 m	1.67 m, 0.95 m	1.86 m, 1.06 m
2	1.60 m, 2.27 m	2.23 m, 1.54 m	2.22 m, 1.53 m	2.21 m, 1.53 m	2.23 m, 1.51 m
3	3.50 dd(11.4, 4.8)	3.49 dd(11.8, 3.9)	3.41 br d(11.8)	3.41 br d(11.8)	3.38 br d(9.5)
5	1.10 m	1.11 m	1.09 m	1.08 m	1.09 m
6	2.03 m, 2.10 m	2.13 m, 2.06 m	2.13 m, 2.04 m	2.12 m, 2.03 m	2.13 m, 2.04 m
7	1.38 m, 1.63 m	1.61 m, 1.33 m	1.60 m, 1.33 m	1.60 m, 1.33 m	1.61 m, 1.34 m
9	1.40 m	1.39 m	1.43 m	1.40 m	1.41 m
11	1.39 m, 1.63 m	1.61 m, 1.40 m	1.72 m, 1.42 m	1.70 m, 1.40 m	1.72 m, 1.42 m
12	2.05 m, 2.20 m	2.12 m, 2.03 m	2.12 m, 2.02 m	2.12 m, 2.04 m	2.12 m, 2.01 m
13	2.30 m	2.32 m	2.31 m	2.31 m	2.31 m
15	1.14 m, 1.75 m	1.15 m, 1.72 m	1.17 m, 1.71 m	1.18 m, 1.71 m	1.14 m, 1.71 m
16	2.25 m, 2.98 m	2.24 m, 2.96 m	2.18 m, 2.84 m	2.11 m, 2.81 m	2.16 m, 2.85 m
17	2.55 m	2.70 m	2.63 m	2.67 m	2.69 m
18	1.05 s	1.02 s	1.05 s	1.08 s	1.07 s
19	1.10 s	1.11 s	1.13 s	1.12 s	1.12 s
22	2.23 m, 2.30 m	2.47 m, 2.13 m	2.48 m, 2.13 m	2.48 m, 2.14 m	2.21 m, 1.57 m
23	2.55 m, 2.75 m	2.70 m, 2.41 m	2.71 m, 2.47 m	2.71 m, 2.47 m	2.41 m, 2.21 m
24	5.30 t(6.0)	5.44 m	5.50 t(9.0)	5.46 t(9.0)	4.55 m
26	1.75 s	1.70 s	1.71 s	1.70 s	5.31 br s, 4.99 br s
27	1.75 s	1.61 s	1.69 s	1.61 s	1.96 s
28	1.78 s				
29		1.85 s	1.70 s	1.71 s	1.70 s
30	1.10 s	1.09 s	1.04 s	1.02 s	1.03 s
1'	5.00 d(5.7)	5.06 d(5.5)	5.21 br s	5.23 br s	5.20 br s
2'	4.45 m	4.38 m	4.58 m	4.60 m	4.59 m
3'	4.10 m	4.38 m	4.36 m	4.37 m	4.29 m
4'	4.55 m	4.57 m	4.42 m	4.45 m	4.42 m
5'	4.08 m, 4.47 m	4.50 m, 4.03 m	4.43 m, 3.97 m	4.46 m, 4.02 m	4.45 m, 3.98 m
1''	6.50 d(7.9)	5.54 d(7.8)	5.89 br s	5.90 br s	5.88 br s
2''	4.20 m	4.15 m	4.58 m	4.59 m	4.58 m
3''	4.44 m	4.27 m	4.66 m	4.66 m	4.63 m
4''	4.50 m	4.57 m	4.28 m	4.31 m	4.29 m
5''	4.10 m	4.02 m	4.52 m	4.52 m	4.52 m
6''	4.48 m, 4.46 m	4.51 m, 4.46 m	1.68 d(5.4)	1.67 d(5.4)	1.67 d(5.4)
1'''		6.30 d(7.8)	5.55 d(7.7)	5.54 d(7.3)	5.49 d(7.4)
2'''		4.36 m	4.12 m	4.14 m	4.19 m
3'''		4.41 m	4.03 m	4.02 m	4.02 m
4'''		4.19 m	4.34 m	4.45 m	4.36 m
5'''		4.09 m	4.17 m	4.24 m	4.16 m
6'''		4.67 m, 4.48 m	4.62 m, 4.21 m	4.48 m, 4.45 m	4.60 m, 4.19 m
1''''			5.53 br s	6.37 d(7.7)	5.54 br s
2''''			4.60 m	4.35 m	4.64 m
3''''			4.57 m	4.40 m	4.57 m
4''''			4.29 m	4.18 m	4.34 m
5''''			4.35 m	4.08 m	4.36 m

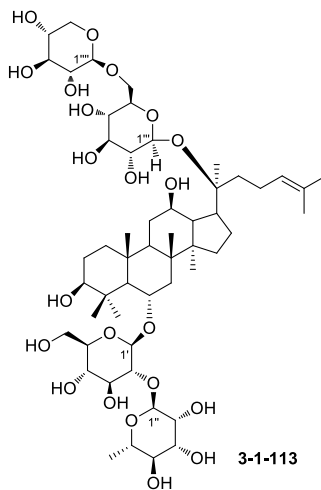
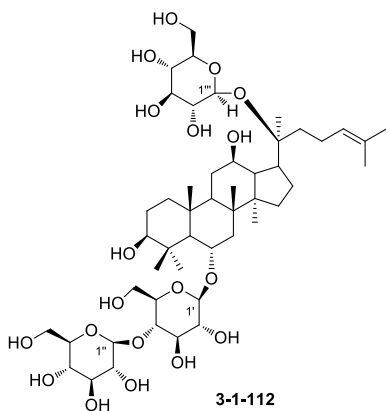
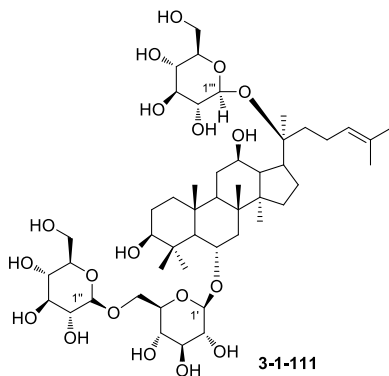
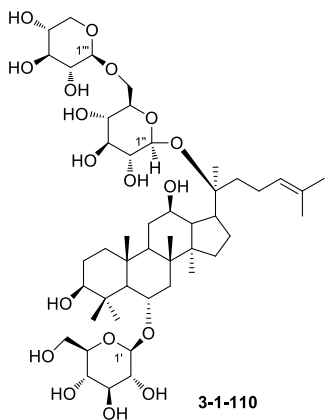
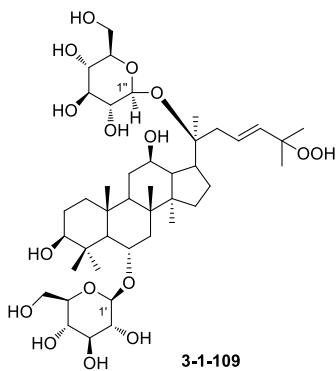
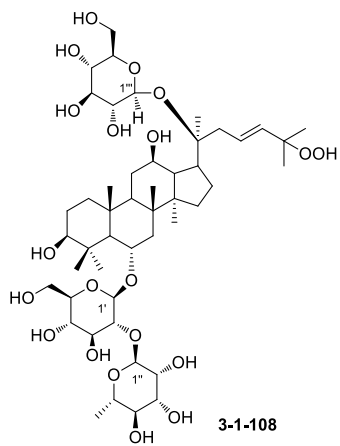
Table 3-1-26 (continued)

H	3-1-101	3-1-102	3-1-103	3-1-104	3-1-105
6 ^{''''}			1.69 d(5.4)	4.65 m, 4.46 m	1.69 d(5.4)
1 ^{''''}			6.22 d(7.3)		6.20 d(7.8)
2 ^{''''}			4.09 m		4.06 m
3 ^{''''}			4.27 m		4.28 m
4 ^{''''}			4.19 m		4.21 m
5 ^{''''}			4.34 m		4.35 m
6 ^{''''}			4.64 m, 4.47 m		4.63 m, 4.47 m

Table 3-1-27: Cos, MFs, and TSs of dammarane-type saponins 3-1-106~3-1-116.

No.	Compounds	MFs	Test solvents	References
3-1-106	6- <i>O</i> -β-D-glucopyranosyl-20- <i>O</i> -β-D-glucopyranosyl-3β,6α,12β,20(<i>S</i>),25-pentahydroxydammar-23-ene	C ₄₂ H ₇₂ O ₁₅	C ₅ D ₅ N	[30]
3-1-107	notoginsenoside H	C ₄₇ H ₈₀ O ₁₉	C ₅ D ₅ N	[27]
3-1-108	floralquinquenoside I	C ₄₈ H ₈₂ O ₂₀	C ₅ D ₅ N	[25]
3-1-109	floralginsenoside B	C ₄₂ H ₇₂ O ₁₆	C ₅ D ₅ N	[13]
3-1-110	notoginsenoside Rw1	C ₄₆ H ₇₈ O ₁₇	C ₅ D ₅ N	[21]
3-1-111	notoginsenoside M	C ₄₈ H ₈₂ O ₁₉	C ₅ D ₅ N	[36]
3-1-112	notoginsenoside N	C ₄₈ H ₈₂ O ₁₉	C ₅ D ₅ N	[36]
3-1-113	floralquinquenoside E	C ₅₃ H ₉₀ O ₂₂	C ₅ D ₅ N	[22]
3-1-114	floralquinquenoside La	C ₄₈ H ₈₂ O ₁₉	C ₅ D ₅ N	[25]
3-1-115	floralginsenoside A	C ₄₂ H ₇₂ O ₁₆	C ₅ D ₅ N	[13]
3-1-116	floralquinquenoside J	C ₄₈ H ₈₂ O ₂₀	C ₅ D ₅ N	[25]





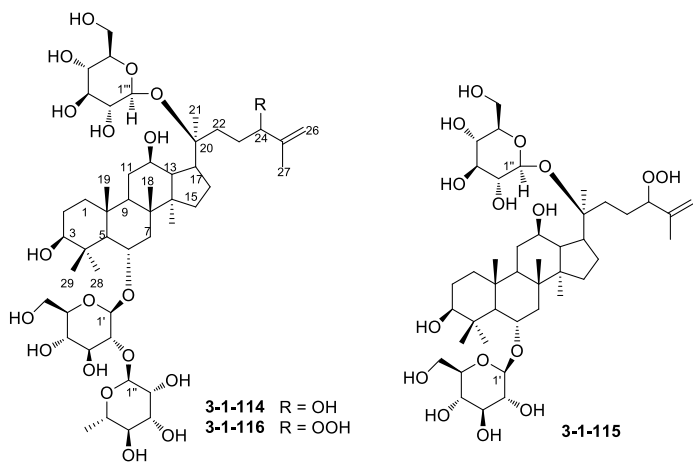


Table 3-1-28: ^1H NMR spectroscopic data of dammarane-type saponins **3-1-106**.

H	3-1-106	H	3-1-106	H	3-1-106
1	1.72 (ov) 0.94 (ov)	17	2.31 dd(12.1, 8.2)	1'	4.92 d(7.8)
2	1.92 (ov) 1.83 (ov)	18	1.18 s	2'	4.09 (ov)
3	3.49 dd(10.9, 4.2)	19	1.06 s	3'	4.11 (ov)
5	1.42 d(12.4)	21	1.54 s	4'	4.18 (ov)
6	4.41 dd(12.4, 3.4)	22	3.14 dd(11.2, 7.8) 2.71 dd(11.2, 7.6)	5'	4.21 (ov)
7	2.51 dd(12.4, 3.2) 1.86 dd(11.3, 3.4)	23	6.12 (ov)	6'	4.49 d(11.2) 4.31 d(11.2)
9	1.51 (ov)	24	6.14 dd(12.4, 0.5)	1''	5.21 d(7.6)
11	2.05 (ov) 1.52 (ov)	26	1.72 s	2''	3.98 (ov)
12	3.95 (ov)	27	1.72 s	3''	4.02 (ov)
13	2.02 dd(12.8, 10.4)	28	2.05 s	4''	4.12 (ov)
15	1.65 (ov) 1.04 (ov)	29	1.61 s	5''	4.24 (ov)
16	1.69 (ov) 1.34 (ov)	30	0.72 s	6''	4.49 d(11.2) 4.31 d(11.2)

Table 3-1-29: ^1H NMR spectroscopic data of dammarane-type saponins **3-1-107~3-1-110**.

H	3-1-107	3-1-108	3-1-109	3-1-110
3	3.50 dd(3.7, 10.4)	3.46 dd(4.9, 11.7)	3.50 dd(4.6, 11.8)	3.48 m
6	4.35 m	4.96 br dd (ca. 4, 11)	4.43 ddd (2.9, 10.3, 10.6)	4.38~4.40 m
12	5.76 br s	3.96 m	3.98 m	3.90 m
18	1.19 s	1.25 s	1.24 s	1.08 s
19	0.99 s	1.05 s	1.09 s	0.99 s
21	1.56 s	1.55 s	1.55 s	1.62 s
23	6.30 ddd-like	6.22 ddd (6.6, 8.1, 15.8)	6.20 ddd (6.3, 8.3, 15.7)	—
24	6.04 d(15.6)	6.07 d(15.8)	6.05 d(15.7)	5.30 m
26	1.55 s	1.58 s	1.56 s	1.64 s
27	1.56 s	1.59 s	1.58 s	1.60 s
28	2.08 s	2.08 s	2.04 s	2.10 s
29	1.48 s	1.38 s	1.59 s	1.44 s
30	0.73 s	0.91 s	0.79 s	0.97 s
1'	4.93 d(7.3)	5.25 d(6.9)	5.01 d(7.8)	4.90 d(6.6)
1''	5.77 d(7.9)	6.44 s	5.17 d(7.8)	5.09 d(7.6)
1'''	5.19 d(7.3)	5.18 d(7.8)		5.09 d(7.6)

Table 3-1-30: ^1H NMR spectroscopic data of dammarane-type saponins **3-1-111~3-1-113**.

H	3-1-111	3-1-112	3-1-113
3	3.49 dd(4.6, 11.3)	3.51 dd(4.6, 11.6)	3.47 dd(4.8, 11.4)
6	4.35 m	4.32 m	4.68 m
12	4.14 m	4.09 m	4.17 m
18	1.21 s	1.15 s	1.37 s
19	0.98 s	1.01 s	0.97 s
21	1.56 s	1.61 s	1.62 s
24	5.22 t-like	5.27 t-like	5.33 m
26	1.56 s	1.61 s	1.67 s
27	1.59 s	1.61 s	1.61 s
28	2.07 s	2.03 s	2.12 s
29	1.53 s	1.60 s	1.36 s
30	0.91 s	0.80 s	1.19 s
1'	5.03 d(7.6)	4.89 d(7.6)	5.28 d(6.8)
1''	5.50 d(3.7)	5.88 d(3.7)	6.51 br s
1'''	5.16 d(7.6)	5.17 d(7.6)	5.11 d(7.8)
1''''			4.99 d(7.3)

Table 3-1-31: ^1H NMR spectroscopic data of dammarane-type saponins **3-1-114**–**3-1-116**.

H	3-1-114	3-1-115	3-1-116
3	3.44 dd(4.6, 11.5)	3.49 dd(4.6, 11.8)	3.45 dd(4.9, 11.5)
6	4.66 dd(3.2, 10.4)	4.40 m	4.32 m
12	4.08 m	4.10 m	4.08 m
18	1.18 s	1.15 s	1.17 s
19	0.97 s	1.04 s	1.00 s
21	1.58 s	1.573 s	1.58 s
24	4.40 m	4.68 dd(5.2, 7.5)	4.69 dd-like(<i>ca.</i> 5, 8)
26	4.89 s	5.02 br s	5.01 br s
	5.25 s	5.20 br s	5.20 br s
27	1.88 s	1.85 s	1.86 s
28	2.06 s	2.03 s	2.07 s
29	1.35 s	1.568 s	1.35 s
30	0.94 s	0.82 s	0.79 s
1'	5.22 d(6.6)	4.99 d(7.7)	5.24 dd-like(<i>ca.</i> 7)
1''	6.41 s	5.12 d(8.0)	6.42 br s
1'''	5.16 d(7.8)		5.18 d(7.8)

Bibliography

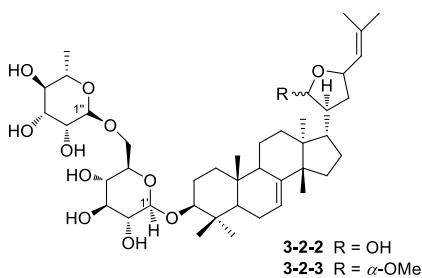
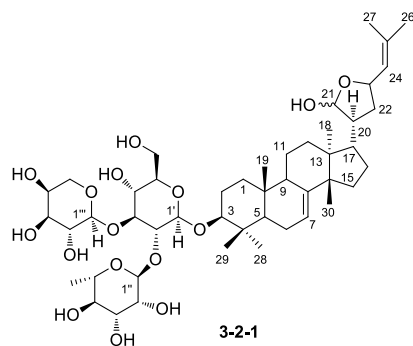
- [1] Renault JH, Ghedira K, Thepenier P et al. *Phytochemistry*. 1997;44(7):1321.
- [2] Qulad-Ali A, Guillaume D, Weniger B et al. *Phytochemistry*. 1994;36(2):445.
- [3] Seaforth CE, Mohammed S, Maxwell A et al. *Tetrahedron Lett*. 1992;33(29):4111.
- [4] Garai S, Mahato SB, Ohtani K et al. *Phytochemistry*. 1996;43(2):447.
- [5] Pawar RS, Khan SI, Khan IA. *Planta Med*. 2007;73:380.
- [6] Mahato SB, Garai S, Chakravarty AK. *Phytochemistry*. 2000;53:711.
- [7] Yin F, Hu LH, Lou FC et al. *J Nat Prod*. 2004;67(6):942.
- [8] Yin F, Hu LH, Pan RX. *Chem Pharm Bull*. 2004;52(12):1440.
- [9] Jiang ZY, Zhang XM, Zhou J et al. *J Asian Nat Prod Res*. 2006;8(1–2):93.
- [10] Kennelly EJ, Cai LN, Long LN et al. *J Agric Food Chem*. 1995;43(10):2602.
- [11] Liao PY, Wang D, Zhang YJ et al. *J Agric Food Chem*. 2008;56(5):1751.
- [12] Kuo YH, Huang HC, Kuo LMY et al. *J Agric Food Chem*. 2005;53(12):4722.
- [13] Yoshikawa M, Sugimoto S, Nakamura S et al. *Chem Pharm Bull*. 2007;55(4):571.
- [14] Jiang ZH, Fukuoka R, Aoki F et al. *Chem Pharm Bull*. 1999;47(2):257.
- [15] Huang HC, Wu MD, Tsai WJ et al. *Phytochemistry*. 2008;69:1609.
- [16] Liu JP, Lu D, Zhao Y et al. *J Asian Nat Prod Res*. 2007;9(2):103.
- [17] Bedir E, Toyang NJ, Khan IA et al. *J Nat Prod*. 2001;64(1):95.
- [18] Garo E, Huang CS, Williams RB et al. *Planta Med*. 2009;75:541.
- [19] Lee SM, Shon HJ, Choi C-S et al. *Chem Pharm Bull*. 2009;57(1):92.
- [20] Zhao P, Liu YQ, Yang CR. *Phytochemistry*. 1996;41(5):1419.
- [21] Cui XM, Jiang ZY, Zeng J et al. *J Asian Nat Prod Res*. 2008;10(9):845.
- [22] Nakamura S, Sugimoto S, Matsuda H et al. *Chem Pharm Bull*. 2007;55(9):1342.
- [23] Baek NI, Kim DS, Lee YH et al. *Planta Med*. 1996;62:86.
- [24] He KJ, Liu Y, Yang Y et al. *Chem Pharm Bull*. 2005;53(2):177.
- [25] Nakamura S, Sugimoto S, Matsuda H et al. *Heterocycles*. 2007;71(3):577.
- [26] Kim DS, Chang YJ, Zedk U et al. *Phytochemistry*. 1995;40(5):1493.

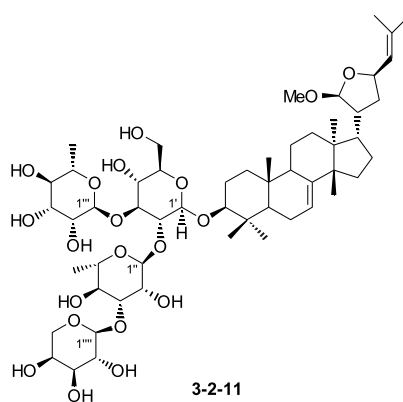
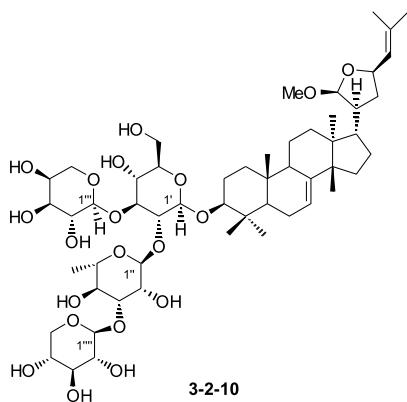
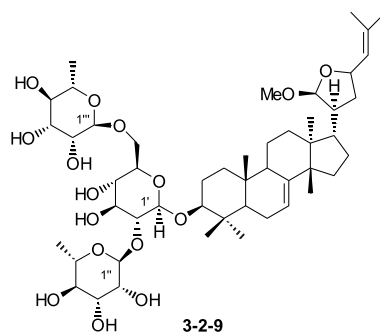
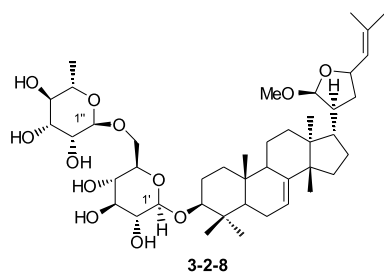
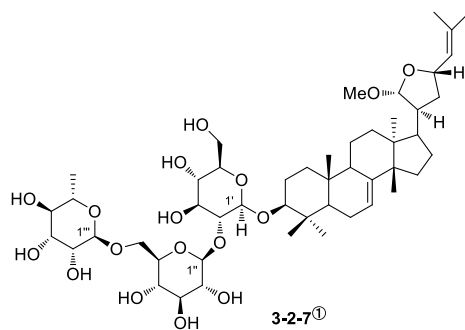
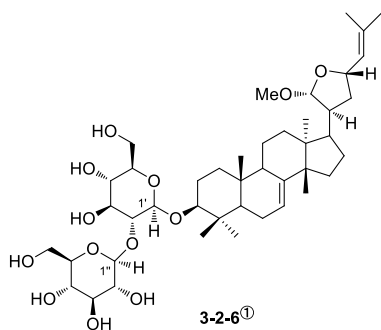
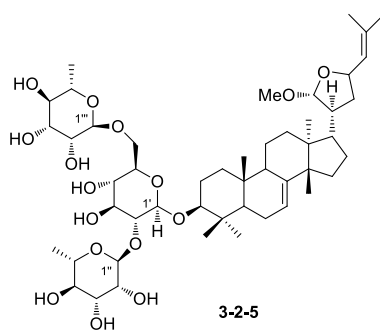
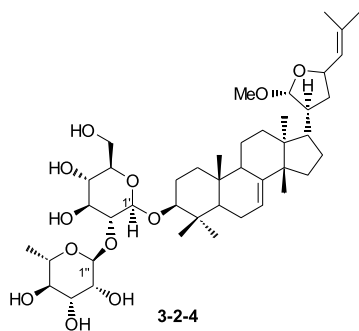
- [27] Yoshikawa M, Murakami T, Ueno T et al. *Chem Pharm Bull.* 1997;45(6):1056.
- [28] Yoshikawa M, Murakami T, Ueno T et al. *Chem Pharm Bull.* 1997;45(6):1039.
- [29] Yoshikawa M, Sugimoto S, Nakamura S et al. *Chem Pharm Bull.* 2007;55(7):1034.
- [30] Ma WG, Mizutani M, Malterud KE et al. *Phytochemistry.* 1999;52:1133.
- [31] Yoshikawa M, Murakami T, Yashiro K et al. *Chem Pharm Bull.* 1998;46(4):647.
- [32] Hu LH, Chen ZL, Xie YY. *Phytochemistry.* 1997;44(4):667.
- [33] Huang TM, Thu CV, Cuong TD et al. *J Nat Prod.* 2010;73:192.
- [34] Yin F, Zhang YN, Yang ZY et al. *J Nat Prod.* 2006;69(10):1394.
- [35] Yang ZY, Chen QQ, Hu LH. *Phytochemistry.* 2007;68:1752.
- [36] Yoshikawa M, Morikawa T, Yashiro K et al. *Chem Pharm Bull.* 2001;49(11):1452.

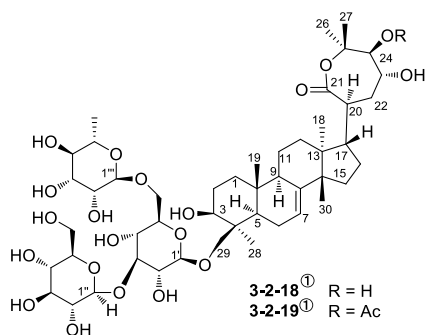
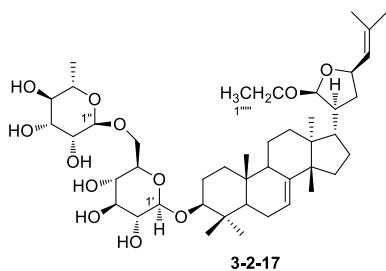
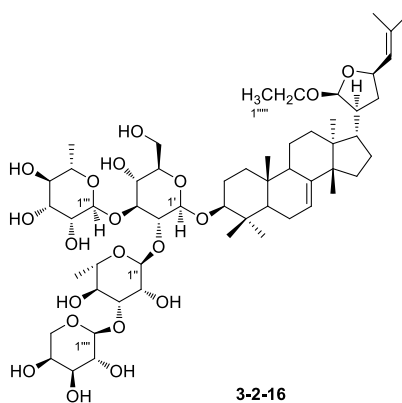
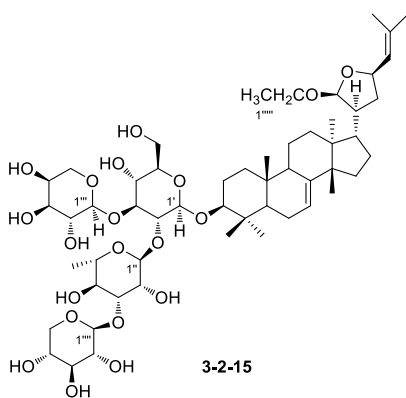
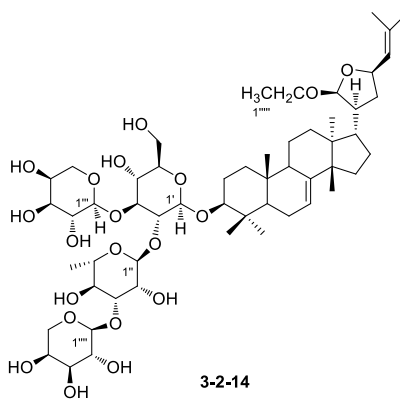
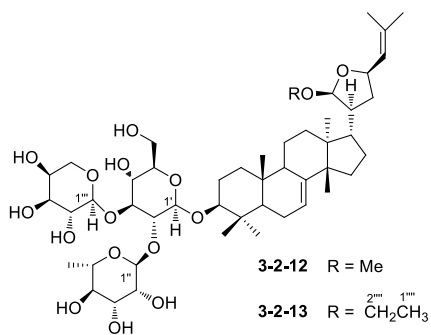
3.2 Tirucallane-type Saponins

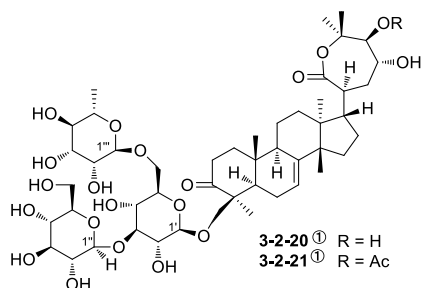
Table 3-2-1: Cos, MFs, and TSs of tirucallane-type saponins **3-2-1**~**3-2-21**.

No.	Compounds	MFs	Test solvents	References
3-2-1	sapimukoside A	C ₄₇ H ₇₆ O ₁₆	C ₅ D ₅ N	[37]
3-2-2	sapimukoside B	C ₄₂ H ₆₈ O ₁₂	C ₅ D ₅ N	[37]
3-2-3	sapinmusaponin G	C ₄₃ H ₇₀ O ₁₂	CD ₃ OD	[38]
3-2-4	sapinmusaponin H	C ₄₃ H ₇₀ O ₁₂	CD ₃ OD	[38]
3-2-5	sapinmusaponin J	C ₄₉ H ₈₀ O ₁₆	CD ₃ OD	[38]
3-2-6	sapinmusaponin Q	C ₄₃ H ₇₀ O ₁₃	CD ₃ OD	[39]
3-2-7	sapinmusaponin R	C ₄₉ H ₈₀ O ₁₇	CD ₃ OD	[39]
3-2-8	sapinmusaponin F	C ₄₃ H ₇₀ O ₁₂	CD ₃ OD	[38]
3-2-9	sapinmusaponin I	C ₄₉ H ₈₀ O ₁₆	CD ₃ OD	[38]
3-2-10	sapimukoside G	C ₅₃ H ₈₆ O ₂₀	C ₅ D ₅ N	[40]
3-2-11	sapimukoside I	C ₅₄ H ₈₈ O ₂₀	C ₅ D ₅ N	[40]
3-2-12	sapimukoside D	C ₄₈ H ₇₈ O ₁₆	C ₅ D ₅ N	[41]
3-2-13	sapimukoside C	C ₄₉ H ₈₀ O ₁₆	C ₅ D ₅ N	[41]
3-2-14	sapimukoside E	C ₅₄ H ₈₈ O ₂₀	C ₅ D ₅ N	[40]
3-2-15	sapimukoside F	C ₅₄ H ₈₈ O ₂₀	C ₅ D ₅ N	[40]
3-2-16	sapimukoside H	C ₅₅ H ₉₀ O ₂₀	C ₅ D ₅ N	[40]
3-2-17	sapimukoside J	C ₄₄ H ₇₂ O ₁₂	C ₅ D ₅ N	[40]
3-2-18	munronoside II	C ₄₈ H ₇₈ O ₂₀	CD ₃ OD	[42]
3-2-19	munronoside IV	C ₅₀ H ₈₀ O ₂₁	CD ₃ OD	[42]
3-2-20	munronoside I	C ₄₈ H ₇₆ O ₂₀	CD ₃ OD	[42]
3-2-21	munronoside III	C ₅₀ H ₇₈ O ₂₁	C ₅ D ₅ N	[42]









^① All the configurations of C-17 substituents were drawn according to the literature.

Table 3-2-2: ^1H NMR spectroscopic data of tirucallane-type saponins **3-2-1~3-2-5**.

H	3-2-1	3-2-2	3-2-3	3-2-4	3-2-5
1	1.04, 1.44	1.24, 1.67	1.18 m, 1.71 (ov)	1.19 m, 1.65 (ov)	1.17 m, 1.65 (ov)
2	1.83, 2.31	1.92, 2.45	1.71 (ov), 1.93 m	1.66 (ov), 2.02 m	1.65 (ov), 1.98 m
3	3.42 dd(4.2, 11.5)	3.43 dd(3.0, 7.9)	3.18 m	3.21 dd(12.5, 3.5)	3.13 dd(11.6, 3.6)
5	1.36	1.35	1.36 dd(11.5, 5.5)	1.35 dd(11.5, 5.5)	1.35 dd(12.0, 6.0)
6	1.96, 2.12	1.96, 2.16	1.96 (ov), 2.13 m	1.96 (ov), 2.14 m	1.96 (ov), 2.10 m
7	5.32	5.31	5.29 br s	5.29 d(2.5)	5.26 d(2.4)
9	2.24	2.35	2.26 (ov)	2.26 (ov)	2.25 m
11	1.45	1.56, 1.42	1.56 m	1.58 m	1.60 m
12	2.36, 1.88	2.35, 1.86	1.79 m, 1.63 m	1.78 m, 1.60 m	1.79 m, 1.62 m
15	1.67, 1.51	1.70, 1.52	1.62 m, 1.50 m	1.62 m, 1.52 m	1.54 m, 1.48 m
16	1.94, 1.40	1.93, 1.40	1.98 m, 1.31 m	1.98 m, 1.31 m	1.97 m, 1.32 m
17	2.42, 1.98	2.44, 1.99	1.84 m	1.82 m	1.80 m
18	0.74	0.73	0.89 s	0.88 s	0.87 s
19	1.07	1.07	0.79 s	0.79 s	0.77 s
20	2.28, 2.58	2.27, 2.57	2.24 (ov)	2.25 (ov)	2.24 m
21	5.82 br s	5.77 br s	4.82 (ov)	4.82 (ov)	4.84 d(6.4)
	5.75 br s	5.73 br s			
22	2.40, 2.18	2.40, 2.20	1.83 (ov)	1.83 (ov)	1.83 (ov)
	1.98, 1.79	1.98, 1.80			
23	5.26 br t(8.4)	5.26 dt(2.5, 8.7)	4.84 (ov)	4.84 (ov)	4.86 (ov)
	5.08 dd(7.6, 14.9)	5.10			
24	5.60 dq(1.1, 8.7)	5.60 dq(1.4, 9.0)	5.24 d(9.0)	5.23 d(9.0)	5.22 dt (8.8, 2.4, 1.2)
	5.78	5.79			
26	1.71	1.70	1.72 s	1.72 s	1.70 d(1.2)
27	1.66	1.66	1.69 s	1.69 s	1.67 d(1.2)
28	1.24 (ov)	1.30	1.04 s	1.04 s	1.05 s
29	1.24 (ov)	1.29	0.91 s	0.94 s	0.92 s
30	1.02	1.01	1.03 s	1.03 s	1.02 s

Table 3-2-2 (continued)

H	3-2-1	3-2-2	3-2-3	3-2-4	3-2-5
OMe			3.31 s(21-OMe)	3.29 s(21-OMe)	3.28 s(21-OMe)
1'	4.87 d(6.7)	4.91 d(7.3)	4.32 d(7.5)	4.43 d(7.5)	4.39 d(7.2)
2'	4.16	4.07	3.31 m	3.42 dd(7.6, 7.5)	3.40 dd(8.8, 7.2)
3'	4.18	4.21 t(8.4)	3.20 m	3.45 t(7.6)	3.45 t(8.8)
4'	3.96	4.03	3.28 m	3.29 m	3.28 m
5'	3.86	4.03	3.38 m	3.25 dd(5.5, 2.5)	3.36 m
6'	4.48 br d(12.3)	4.66 br d(11.2)	3.97 d(11.0)	3.85 dd(12.5, 2.0)	3.95 m
	4.25	4.18	3.61 dd(11.0, 6.0)	3.67 dd(12.5, 5.5)	3.58 dd(11.2, 5.6)
1''	6.40 br s	5.52 br s	4.75 br s	5.37 br s	5.37 d(1.6)
2''	4.80	4.59 br s	3.67 m	3.96 dd(3.5, 2.0)	3.94 m
3''	4.59 dd(3.1, 9.3)	4.53 dt(3.1, 9.3)	3.83 m	3.75 dd(9.5, 3.5)	3.72 dd(9.6, 3.2)
4''	4.27	4.24 dd(2.8, 9.0)	3.36 m	3.39 t(9.5)	3.37 dd(9.6, 3.2)
5''	4.73 dq(6.2, 8.7)	4.38 dq(6.2, 9.3)	3.69 m	3.99 dd(9.5, 6.5)	3.96 dd(9.2, 6.4)
6''	1.65 d(6.2)	1.65 d(6.2)	1.27 d(6.5)	1.23 d(6.0)	1.22 d(6.0)
1'''	4.93 d(7.6)				4.72 d(1.6)
2'''	4.45 t(7.9)				3.82 dd(3.6, 1.6)
3'''	4.04 dd(3.1, 9.0)				3.64 dd(9.6, 2.4)
4'''	4.23				3.35 dd(9.6, 2.4)
5'''	4.29				3.66 dd(9.6, 6.4)
	3.80 br d(12.1)				
6'''					1.25 d(6.0)

Table 3-2-3: ¹H NMR spectroscopic data of tirucallane-type saponins 3-2-6~3-2-10.

H	3-2-6	3-2-7	3-2-8	3-2-9	3-2-10
1	1.67 (ov) 1.13 m	1.67 (ov) 1.16 m	1.69 (ov) 1.18 m	1.65 (ov) 1.14 m	—
2	1.98 m 1.67 (ov)	1.97 m 1.67 (ov)	1.98 m 1.68 (ov)	1.99 m 1.68 (ov)	—
3	3.18 dd(4.0, 12.0)	3.18 dd(3.2, 12.4)	3.18 m	3.16 dd(11.2, 3.6)	3.47 dd(12.4, 4.4)
5	1.34 dd(12.0, 4.8)	1.35 dd(11.6, 6.0)	1.37 dd(11.5, 5.5)	1.35 dd(12.0, 6.0)	—
6	2.10 m 1.94 m	2.10 m 1.95 m	2.14 m 1.96 (ov)	2.14 m 1.95 (ov)	—
7	5.27 br s	5.28 d(2.4)	5.27 d(2.5)	5.25 d(2.8)	5.27 br s
9	2.24 m	2.25 m	2.28 m	2.27 (ov)	—
11	1.58 m	1.60 m	1.58 m	1.60 m	—
12	1.77 m, 1.61 m	1.78 m, 1.62 m	1.91 m, 1.40 m	1.89 m, 1.39 m	—
15	1.56 m, 1.49 m	1.56 m, 1.48 m	1.62 m, 1.50 m	1.56 m, 1.48 m	—
16	1.97 m, 1.32 m	1.97 m, 1.32 m	1.85 m, 1.31 m	1.86 m, 1.33 m	—

Table 3-2-3 (continued)

H	3-2-6	3-2-7	3-2-8	3-2-9	3-2-10
17	1.80 m	1.80 m	2.00 (ov)	2.00 m	1.91 m
18	0.87 s	0.87 s	0.88 s	0.86 s	1.03 s
19	0.76 s	0.77 s	0.79 s	0.77 s	0.74 s
20	2.23 m	2.22 m	2.02 (ov)	2.01 m	—
21	4.81 (ov)	4.81 (ov)	4.75 d(3.0)	4.73 d(3.2)	5.06 d
22	1.83 m	1.83 m	1.96 (ov)	1.96 (ov)	—
			1.58 (ov)	1.55 (ov)	
23	4.83 (ov)	4.83 (ov)	4.79 ddd (9.0, 3.0, 2.5)	4.74 (ov)	5.09 dd(6.9, 14.1)
24	5.23 d(8.8)	5.23 d(8.8)	5.23 d(9.0)	5.22 dt (8.8, 2.4, 1.2)	5.60 d(8.3)
26	1.70 s	1.70 s	1.72 s	1.70 s	1.68 s
27	1.67 s	1.67 s	1.69 s	1.68 s	1.67 s
28	1.05 s	1.05 s	1.01 s	1.02 s	1.37 s
29	0.92 s	0.92 s	0.94 s	0.92 s	1.30 s
30	1.01 s	1.01 s	1.01 s	0.98 s	0.98 s
OMe	3.31 s(21-OMe)	3.32 s(21-OMe)	3.28 s(21-OMe)	3.32 s(21-OMe)	3.50 s(21-OMe)
1'	4.45 d(7.2)	4.42 d(7.6)	4.32 d(8.0)	4.38 d(7.2)	4.86 d(7.5)
2'	3.57 dd(7.2, 8.8)	3.57 dd(7.6, 8.4)	3.32 m	3.42 dd(8.8, 7.2)	—
3'	3.55 t(8.8)	3.55 t(8.4)	3.19 m	3.45 t(8.8)	—
4'	3.24 m	3.23 t(8.4)	3.28 m	3.25 m	—
5'	3.34 m	3.34 m	3.39 m	3.35 m	—
6'	3.86 d(10.4)	3.83 d(11.6)	3.98 d(11.5)	3.96 m	—
	3.68 dd(10.4, 4.8)	3.60 dd(11.6, 5.6)	3.60 dd(11.0, 6.5)	3.59 dd(11.2, 6.0)	
1''	4.76 d(7.6)	4.65 d(8.0)	4.75 br s	5.36 br s	6.50 br s
2''	3.21 dd(8.8, 7.6)	3.18 t(8.0)	3.66 m	3.93 dd(3.2, 1.2)	—
3''	3.38 t(8.8)	3.24 t(8.0)	3.83 m	3.73 dd(9.2, 3.2)	—
4''	3.27 m	3.20 m	3.35 m	3.39 t(9.2)	—
5''	3.23 m	3.38 m	3.67 m	3.96 dd(9.6, 6.4)	—
6''	3.83 d(10.4)	3.96 dd(11.6, 1.2)	1.27 d(6.5)	1.22 d(6.0)	1.60 d(6.0)
	3.64 dd(10.4, 6.4)	3.58 dd(11.6, 5.6)			
1'''		4.73 d(1.2)		4.72 d(1.2)	4.85 d(7.5)
2'''		3.80 dd(3.2, 1.2)		3.82 dd(3.2, 1.6)	—
3'''		3.63 dd(9.6, 3.2)		3.68 dd(9.2, 3.2)	—
4'''		3.36 t(9.6)		3.37 t(9.6)	—
5'''		3.66 dd(9.6, 6.0)		3.67 dd(9.6, 6.4)	—
6'''		1.25 d(6.0)		1.25 d(6.4)	
1''''					5.44 d(7.2)

Table 3-2-4: ^1H NMR spectroscopic data of tirucallane-type saponins **3-2-11** and **3-2-14~3-2-17**.

H	3-2-11	3-2-14	3-2-15	3-2-16	3-2-17
3	3.43 dd(3.0, 11.6)	3.47 dd(11.6, 3.1)	3.46 dd(11.9, 3.6)	3.43 dd(11.9, 3.6)	3.46 dd(11.6, 3.5)
7	5.29 br s	5.30 br s	5.27 br s	5.30 br s	5.29 br s
17	1.92 m	1.91 m	1.91 m	1.92 m	1.89 m
18	1.02 s	1.05 s	1.06 s	1.01 s	1.01 s
19	0.74 s	0.75 s	0.74 s	0.75 s	0.73 s
21	5.05 br s	5.16 br s	5.06 d	5.16 br s	5.14 br s
23	5.09 dd(6.2, 12.7)	5.07 dd(6.9, 14.0)	5.08 dd(6.2, 14.5)	5.07 dd(6.5, 14.2)	5.08 dd(6.8, 13.3)
24	5.59 d(8.4)	5.62 br d(8.6)	5.63 dq(1.7, 7.5)	5.62 d(8.3)	5.61 br d(8.7)
26	1.67 s	1.69 s	1.68 s	1.69 s	1.68 s
27	1.66 s	1.68 s	1.67 s	1.68 s	1.66 s
28	1.37 s	1.37 s	1.37 s	1.41 s	1.43 s
29	1.32 s	1.29 s	1.30 s	1.30 s	1.30 s
30	0.98 s	0.99 s	0.99 s	0.98 s	0.99 s
OMe	3.49 s(21-OMe)				
1'	4.85 d(7.5)	4.87 d(7.7)	4.87 d(7.5)	4.83 d(7.6)	4.91 d(7.6)
1''	6.04 br s	6.46 br s	6.52 br s	6.00 br s	5.53 br s
6''	1.60 d(6.2)	1.59 d(5.9)	1.61 d(6.1)	1.60 d(5.9)	1.64 d(6.0)
1'''	5.67 br s	4.85 d(7.3)	4.86 d(7.5)	5.65 br s	
1''''	5.37 d(6.5)	5.38 d(6.9)	5.45 d(7.5)	5.35 d(7.6)	
1'''''		1.27 t(7.5)	1.27 t(6.9)	1.27 t(6.8)	1.23 t(7.0)
2'''''		3.97 dq(9.8, 7.5)	3.98 dq(9.7, 6.9)	3.98 dq(9.4, 6.8)	3.96 dq(9.5, 7.0)
		3.59 dq(9.8, 7.5)	3.58 dq(9.7, 6.9)	3.59 dq(9.4, 6.8)	3.53 dq(9.5, 7.0)

Table 3-2-5: ^1H NMR spectroscopic data of tirucallane-type saponins **3-2-12** and **3-2-13**.

H	3-2-12	3-2-13	H	3-2-12	3-2-13
3	3.43 dd(3.7, 11.5)	3.44 dd(3.8, 11.8)	19	0.74 s	0.76 s
5	1.36 dd(5.7, 11.0)	1.37 dd(5.7, 11.5)	20	2.47 m	2.49 m
7	5.31 br s	5.33 br s	21	5.05 br s	5.18 d(1.7)
9	2.24 d(10.7)	2.25 d(10.5)	23	5.08 dd(6.5, 14.0)	5.09 dd(7.0, 14.9)
17	1.91 dd(6.6, 12.1)	1.93 dd(6.6, 12.1)	24	5.59 br d(8.4)	5.63 dq(1.1, 8.7)
18	1.03 s	1.06 s	28	1.23 s	1.24 s (ov)
29	1.23 s	1.24 s (ov)	3''	4.57 dd(3.7, 9.3)	4.57 dd(3.4, 9.4)
30	0.99 s	1.02 s	4''	4.28 m	4.28 m
1'	4.85 d(7.0)	4.85 d(7.0)	5''	4.71 dq(8.7)	4.70 dq(6.2, 9.4)
2'	4.16 m	4.14 m	6''	1.65 d(6.5)	1.66 d(6.3)
OMe	3.58 s		1'''	4.92 d(7.0)	4.94 d(7.4)
3'	4.17 m	4.15 m	2'''	4.43 t(7.9)	4.44 t(8.0)
4'	3.94 t(8.5)	3.94 t(8.5)	3'''	4.04 dd(2.8, 9.0)	4.09 dd(3.4, 9.1)
5'	3.85 m	3.86 m	4'''	4.25 m	4.27 m
6'	4.47 m, 4.23 m	4.47 m, 4.25 m	1''''		1.29 t(7.1)
1''	6.37 br s	6.32 br s	2''''		4.00 dq(9.3, 7.1)
2''	4.79 br s	4.79 d(3.4)			3.61 dq(9.3, 7.1)

Table 3-2-6: ^1H NMR spectroscopic data of tirucallane-type saponins **3-2-18~3-2-21**.

H	3-2-18	3-2-19	3-2-20	3-2-21
1	1.25~1.30 m 1.71~1.75 m	1.20~1.24 m 1.73~1.77 m	1.50~1.53 m 2.14~2.18 m	1.25~1.29 m 1.81~1.85 m
2	1.72~1.77 m	1.75~1.79 m	2.29~2.31 m 2.99~3.02 m	1.96~2.00 m 3.22~3.26 m
3	3.23 dd(8.0, 4.5)	3.23 dd(8.0, 4.0)		
5	1.45 dd(2.5, 7.0)	1.47~1.52 m	1.76~1.80 m	1.76~1.80 m
6	1.54~1.57 m 1.77~1.80 m	1.45~1.51 m 1.77~1.82 m	1.60~1.64 m 1.81~1.84 m	1.44~1.50 m 1.76~1.81 m
7	5.27 br s	5.28 br s	5.38 br s	5.22 br s
9	2.25~2.29 m	2.27~2.32 m	2.42~2.46 m	2.26~2.30 m
11	1.60~1.55 m	1.65~1.58 m	1.70~1.73 m 1.78~1.81 m	1.44~1.49 m
12	1.74~1.82 m	1.73~1.79 m	1.78~1.82 m	1.80~1.84 m
15	1.53~1.58 m	1.55~1.61 m	1.63~1.66 m	1.45~1.56 m
16	1.90~1.95 m 2.23~2.29 m	1.95~2.01 m 2.22~2.27 m	2.14~2.18 m 2.28~2.31 m	2.12~2.16 m 2.22~2.28 m
17	2.30~2.35 m	2.29~2.33 m	2.40~2.43 m	1.91~1.95 m
18	0.86 s	0.84 s	0.92 s	0.87 s
19	0.76 s	0.77 s	1.19 s	1.02 s
20	2.79~2.82 m	2.79~2.82 m	2.84~2.88 m	2.80~2.85 m
22	2.18~2.22 m 2.26~2.30 m	1.83~1.89 m 2.38~2.43 m	2.33~2.35 m 2.26~2.30 m	2.22~2.26 m 2.49~2.54 m
23	3.40~3.45 m	3.38~3.42 m	3.43~3.47 m	5.09~5.14 m
24	3.27 br s	4.80 d(5.0)	3.37 br s	5.40 d(5.0)
26	1.23 s	1.27 s	1.29 s	1.56 s
27	1.34 s	1.22 s	1.34 s	1.51 s
28	1.21 s	1.22 s	1.21 s	1.39 s
29	3.98 d(10.0) 4.03 d(10.0)	3.99 d(10.0) 4.02 d(10.0)	3.80 d(10.0) 4.27 d(10.0)	4.42 d(10.0) 4.45 d(10.0)
30	1.04 s	1.04 s	1.14 s	0.96 s
OAc		2.12 s(24-OAc)		2.12 s(24-OAc)
1'	4.38 d(8.0)	4.39 d(7.5)	4.37 d(7.5)	4.79 d(8.0)
2'	3.38~3.42 m	3.73~3.77 m	3.42~3.45 m	3.93~3.95 m
3'	3.39~3.43 m	3.35~3.79 m	3.23~3.27 m	4.12~4.16 m
4'	3.39~3.42 m	3.38~3.42 m	3.37~3.41 m	3.89~3.92 m
5'	3.59 t(7.5)	3.19~3.24 m	3.62~3.66 m	4.23~4.26 m
6'	3.94~4.00 m 3.68~3.73 m	3.93~3.98 m 3.70~3.75 m	4.01~4.05 m 3.68~3.72 m	4.12~4.16 m 4.55~4.59 m
1''	4.62 d(7.5)	4.62 d(8.0)	4.65 d(8.0)	5.35 d(7.5)
2''	3.68~3.72 m	3.58~3.62 m	3.68~3.72 m	3.91~3.95 m
3''	3.22~3.27 m	3.20~3.23 m	3.35~3.38 m	4.10~4.15 m
4''	3.20~3.26 m	3.35~3.40 m	3.30~3.34 m	4.23~4.27 m
5''	3.66~3.70 m	3.68~3.73 m	3.74~3.78 m	4.22~4.26 m

Table 3-2-6 (continued)

H	3-2-18	3-2-19	3-2-20	3-2-21
6''	3.78~3.82 m 3.70~3.75 m	3.78~3.83 m 3.71~3.75 m	3.91~3.95 m 3.81~3.85 m	4.55~4.59 m 4.43~4.48 m
1'''	4.75 s	4.76 s	4.82 s	5.45 s
2'''	3.40~3.43 m	3.35~3.39 m	3.41~3.45 m	4.23~4.27 m
3'''	3.81~3.85 m	3.80~3.85 m	3.73~3.77 m	4.51~4.56 m
4'''	3.41~3.45 m	3.38~3.42 m	3.41~3.45 m	4.25~4.29 m
5'''	3.68~3.72 m	3.68~3.73 m	3.73~3.77 m	4.33~4.38 m
6'''	1.28 d(6.0)	1.29 d(6.0)	1.34 d(6.0)	1.62 d(6.0)

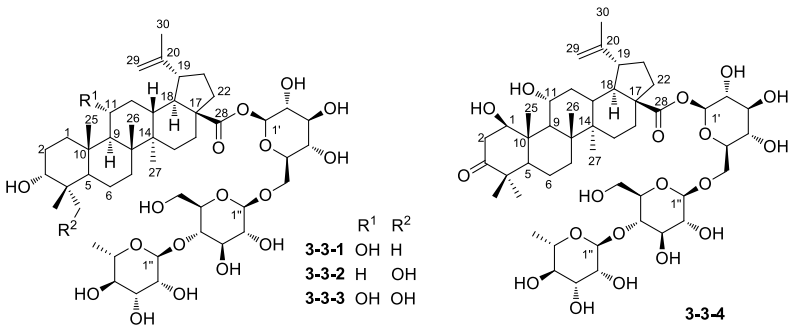
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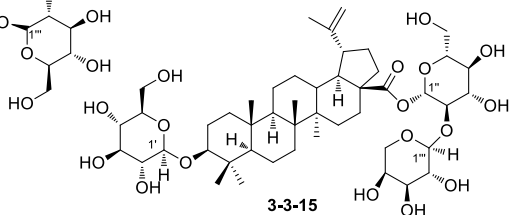
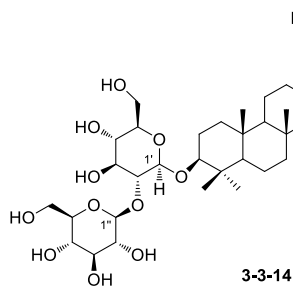
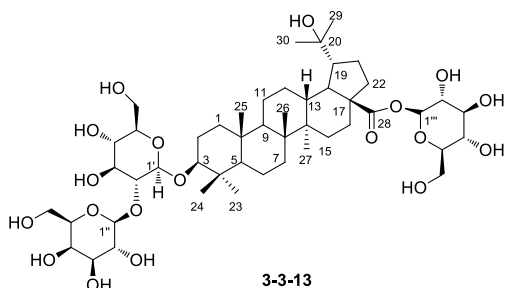
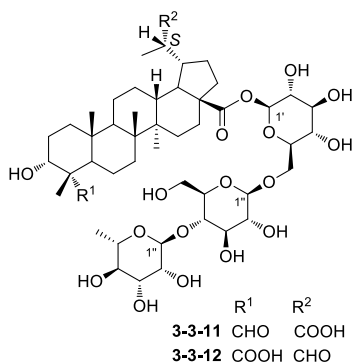
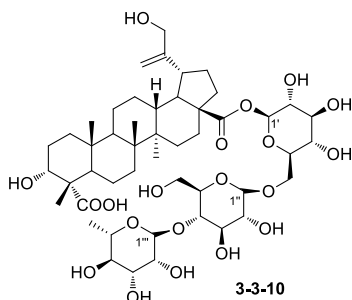
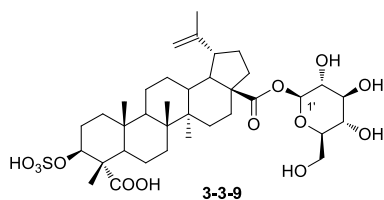
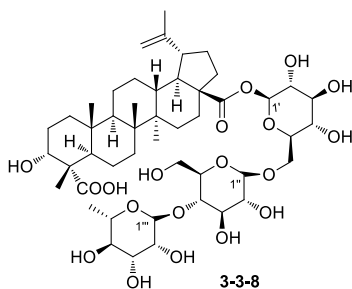
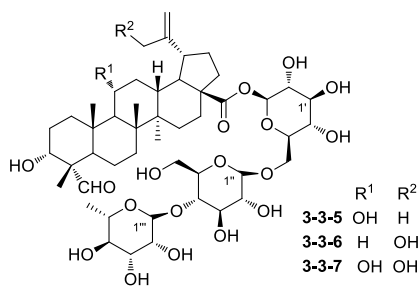
- [37] Teng RW, Ni W, Hua Y et al. *Acta Botanica Sinica*. 2003;45(3):369.
- [38] Huang HC, Tsai WJ, Morris-Natschke SL et al. *J Nat Prod*. 2006;69(5):763.
- [39] Huang HC, Tsai WJ, Liaw CC et al. *Chem Pharm Bull*. 2007;55(9):1412.
- [40] Ni W, Hua Y, Liu HY et al. *Chem Pharm Bull*. 2006;54(10):1443.
- [41] Ni W, Hua Y, Teng RW et al. *J Asian Nat Prod Res*. 2004;6(3):205.
- [42] Cai XH, Du Z-Z, Luo XD. *Helv Chim Acta*. 2007;90:1980.

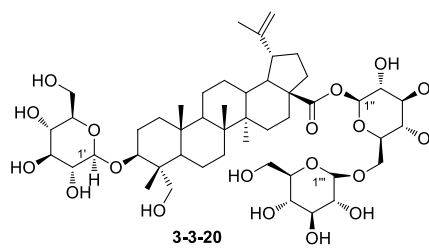
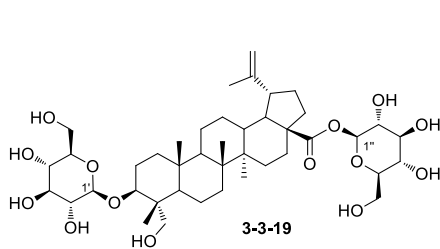
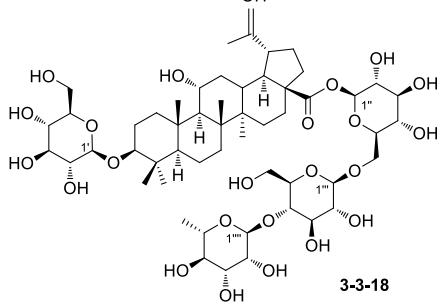
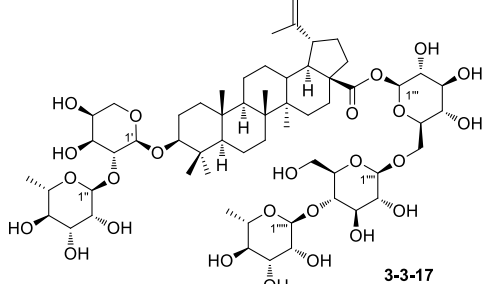
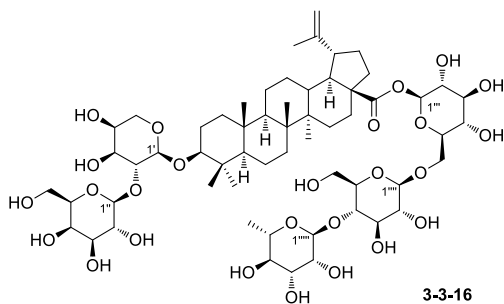
3.3 Lupane-type Saponins

Table 3-3-1: Cos, MFs, and TSs of lupane-type saponins 3-3-1~3-3-29.

No.	Compounds	MFs	Test solvents	References
3-3-1	acantrifoside A	C ₄₈ H ₇₈ O ₁₈	C ₅ D ₅ N	[43]
3-3-2	wujiapioside B	C ₄₈ H ₇₈ O ₁₈	C ₅ D ₅ N	[44]
3-3-3	acankoreoside B	C ₄₈ H ₇₈ O ₁₉	C ₅ D ₅ N	[45]
3-3-4	protochiisanoside	C ₄₈ H ₇₆ O ₁₉	C ₅ D ₅ N	[46]
3-3-5	acankoreoside D	C ₄₈ H ₇₆ O ₁₉	C ₅ D ₅ N	[47]
3-3-6	acankoreoside G	C ₄₈ H ₇₆ O ₁₉	C ₅ D ₅ N	[48]
3-3-7	acankoreoside I	C ₄₈ H ₇₆ O ₂₀	CD ₃ OD	[49]
3-3-8	acankoreoside A	C ₄₈ H ₇₆ O ₁₉	C ₅ D ₅ N	[45]
3-3-9	gypsophilinoside	C ₃₆ H ₅₆ O ₁₃ S	C ₅ D ₅ N	[50]
3-3-10	acankoreoside F	C ₄₈ H ₇₆ O ₂₀	C ₅ D ₅ N	[48]
3-3-11	acankoreoside H	C ₄₈ H ₇₆ O ₂₀	C ₅ D ₅ N	[48]
3-3-12	acankoreoside E	C ₄₈ H ₇₆ O ₂₀	C ₅ D ₅ N	[51]
3-3-13	snatzkein C	C ₄₈ H ₈₀ O ₁₉	C ₅ D ₅ N	[52]
3-3-14	snatzkein D	C ₄₈ H ₈₀ O ₁₉	C ₅ D ₅ N	[52]
3-3-15	cussosaponin A	C ₄₇ H ₇₆ O ₁₇	C ₅ D ₅ N	[53]
3-3-16	cussosaponin B	C ₅₉ H ₉₆ O ₂₆	C ₅ D ₅ N	[53]
3-3-17	cussosaponin C	C ₅₉ H ₉₆ O ₂₅	C ₅ D ₅ N	[53]
3-3-18	acankoreoside C	C ₅₄ H ₈₈ O ₂₃	C ₅ D ₅ N	[47]
3-3-19	bourneioside A	C ₄₂ H ₆₈ O ₁₄	C ₅ D ₅ N	[54]
3-3-20	bourneioside B	C ₄₈ H ₇₈ O ₁₉	C ₅ D ₅ N	[54]
3-3-21	pulsatilloside D	C ₅₉ H ₉₆ O ₂₇	C ₅ D ₅ N	[55]
3-3-22	sessiloside	C ₄₈ H ₇₆ O ₁₈	C ₅ D ₅ N	[56]
3-3-23	inermoside	C ₄₉ H ₇₈ O ₁₉	C ₅ D ₅ N	[57]
3-3-24	sachunoside	C ₅₄ H ₈₄ O ₂₃	C ₅ D ₅ N	[58]
3-3-25	1-deoxychiisanoside	C ₄₈ H ₇₄ O ₁₈	C ₅ D ₅ N	[57]
3-3-26	chiisanoside	C ₄₈ H ₇₄ O ₁₉	C ₅ D ₅ N	[56]
3-3-27	24-hydroxychiisanoside	C ₄₈ H ₇₄ O ₂₀	C ₅ D ₅ N	[57]
3-3-28	11-deoxyisochiisanoside	C ₄₈ H ₇₆ O ₁₉	C ₅ D ₅ N	[56]
3-3-29	isochiisanoside	C ₄₈ H ₇₆ O ₂₀	C ₅ D ₅ N	[56]







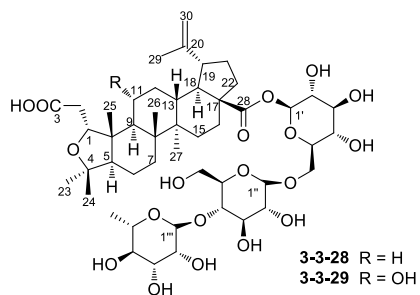
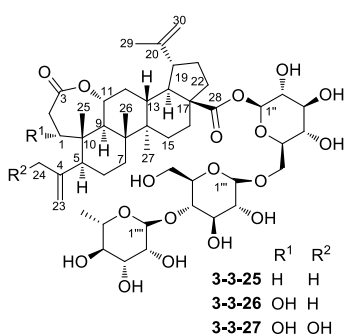
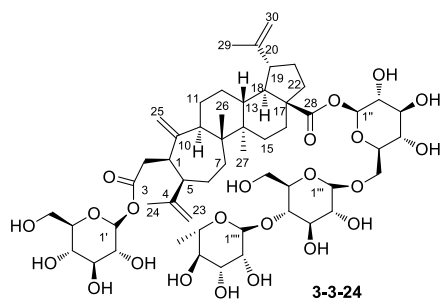
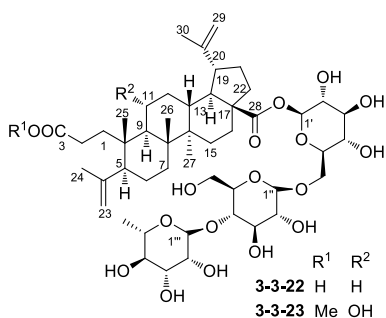
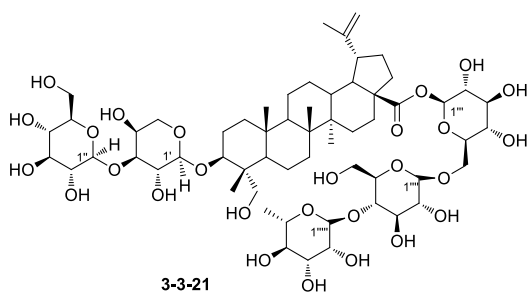


Table 3-3-2: ¹H NMR spectroscopic data of lupane-type saponins **3-3-1**, **3-3-2**, **3-3-6**, **3-3-7**, and **3-3-9**.

H	3-3-1	3-3-2	3-3-6	3-3-7	3-3-9
1	2.22 m (ov) 3.08 br d(12.8)	1.28 (ov), 1.49 (ov)	1.45 m, 1.94 m	1.39 m	1.44, 1.90
2	1.78 m (ov) 2.15 m (ov)	1.71 (ov)	1.75 m, 1.94 m	1.43 m, 1.90 m	1.83, 2.58
3	3.61 br s	3.92 br s	4.01 br s	3.61 m	5.40 dd(9.1, 3.1)
5	1.75 m	2.08 d(11.2)	2.40 br d(12.1)	2.02 m (ov)	1.81
6	1.38 m (ov) 1.50 m (ov)	1.40 (ov), 1.51 (ov)	1.16 m, 1.45 m	1.50 m (ov)	1.40, nd
7	1.34 m (ov) 1.47 m (ov)	1.27 (ov), 1.48 (ov)	1.23 m, 1.57 m	1.31 m (ov) 1.59 m (ov)	1.05 br d(10.5), 1.39
9	1.83 d(10.4)	1.81 d(12.1)	1.57 m	1.67 d(10.5)	1.26
11	4.27 m (ov)	1.48 (ov)	1.07 m, 1.33 m	3.60 m	1.12, nd
12	1.58 m (ov) 2.36 m	1.19 (ov), 1.95 (ov)	1.16 m, 1.33 m	1.29 m	0.98, 1.72
13	2.85 m	2.68 m	2.64 m	2.70 m	2.47 t-like
15	1.19 m (ov) 1.94 m	1.18 (ov), 1.95 (ov)	1.16 m, 1.98 m	1.18 d(13.5) 1.49 m	1.01, 1.63
16	1.51 m (ov) 2.63 dt(12.8)	1.51 (ov), 2.61 (ov)	1.45 m, 2.64 m	2.36 t(9.5)	1.40, 2.53 d(11.9)
18	1.70 m (ov)	1.72 (ov)	1.95 m	1.84 m	1.63
19	3.37 m	3.39 m	3.34 dt(4.0, 11.5)	2.90 dt(4.5, 11.0)	3.24 m
21	1.41 m (ov) 2.14 m (ov)	1.48 (ov), 2.18 (ov)	1.57 m, 2.30 m	2.08 m	1.32, 2.02 m
22	1.47 m (ov) 2.18 m (ov)	1.50 (ov), 2.20 (ov)	1.57 m, 2.18 m	1.52 m, 1.95 m	1.42, 2.10 t-like
23	1.23 s (ov)	3.66 d(11.2) 3.86 d(11.2)	9.93 s	9.48 s	
24	0.96 s	0.79 s	1.09 s	0.99 s	1.40 s
25	1.26 s	1.19 s	0.85 s	1.09 s	0.64 s
26	1.23 s (ov)	0.86 s	1.14 s	0.74 s	0.91 s
27	0.98 s	0.95 s	0.94 s	1.11 s	0.87 s
29	4.61 br s 4.80 br s	4.73 br s 4.85 br s	5.10 br s 5.50 br s	4.95 br s 5.01 br s	4.66 br s 4.75 br s
30	1.65 s	1.65 s	4.42 d(15.3) 4.47 d(15.3)	4.09 s	1.66 s
1'	6.30 d(7.9)	6.32 d(8.1)	6.32 d(8.2)	5.45 d(8.0)	6.18 d(8.1)
2'	4.07 m (ov)	4.0 (ov)	4.10 br t(8.9)	3.33 m (ov)	4.03 t(8.5)
3'	4.19 m (ov)	4.20 (ov)	4.22 t(9.0)	3.43 m (ov)	4.21
4'	4.29 m (ov)	4.31 (ov)	4.31 t(9.3)	3.41 m (ov)	4.15 t(9.1)
5'	4.09 m (ov)	4.10 (ov)	4.08 (ov)	3.43 m (ov)	3.92 m
6'	4.27 m (ov) 4.66 d(11.6)	4.64 d(11.1)	4.29 (ov), 4.67 (ov)	3.80 m (ov) 4.12 d(10.5)	4.19, 4.30 d(12.1)

Table 3-3-2 (continued)

H	3-3-1	3-3-2	3-3-6	3-3-7	3-3-9
1''	4.93 d(7.9)	4.94 d(8.0)	4.95 d(7.6)	4.40 d(8.0)	
2''	3.92 t(8.5)	3.94 (ov)	3.93 br t(8.5)	3.24 m (ov)	
3''	4.11 m (ov)	4.12 (ov)	4.14 t(9.0)	3.47 m (ov)	
4''	4.36 t(9.2)	4.38 t-like	4.38 t(9.3)	3.54 m (ov)	
5''	3.64 dt(9.2)	3.63 (ov)	3.62 m	3.30 m (ov)	
6''	4.08 m (ov)	4.10 (ov), 4.20 (ov)	4.08 (ov), 4.19 (ov)	3.66 m (ov)	
	4.19 m (ov)			3.82 d(6.5)	
1'''	5.80 br s	5.83 br s	5.82 br s	4.85 br s	
2'''	4.64 br s	4.64 br s	4.67 dd(1.4, 3.0)	3.64 dd(3.5, 9.5)	
3'''	4.51 dd(3.1, 9.2)	4.53 dd(9.4, 4.0)	4.53 dd(3.3, 9.2)	3.84 m (ov)	
4'''	4.33 m (ov)	4.30 (ov)	4.33 t(9.4)	3.41 t(9.5)	
5'''	4.93 m (ov)	4.96 (ov)	4.94 dq(6.2, 9.5)	3.98 dd(6.0, 9.5)	
6'''	1.68 d(6.1)	1.70 d(6.1)	1.69 d(6.2)	1.27 d(6.0)	

Table 3-3-3: ¹H NMR spectroscopic data of lupane-type saponins 3-3-3~3-3-5, 3-3-8, and 3-3-15.

H	3-3-3	3-3-4	3-3-5	3-3-8	3-3-15
1	—	4.52 d(8.8)	—	—	0.87 m
2	—	α 2.64 d(13.2)	—	—	—
		β 3.30 dd (8.8, 13.2)			
3	3.92 br s		4.01 br s	4.28 br s	4.20 m
9	1.92 d(11.0)	—	1.97 d(10.4)	1.66 d(11.6)	—
11	4.33 (ov)	—	4.30 (ov)	1.23 (ov), 1.47 (ov)	—
13	2.98 m	—	2.86 m	2.67 m	—
19	3.38 (ov)	3.41 ddd (4.6, 10.0, 10.0)	3.38 m	3.38 m	3.35 dt (10.9, 4.8)
23	3.67 d(11.0)	1.17 s	10.05 s		1.23 s
	3.88 d(11.0)				
24	0.83 s	1.24 s	1.18 s	1.46 s	0.91 s
25	1.29 s	1.15 s	1.26 s	0.95 s	0.77 s
26	1.25 s	1.21 s	1.22 s	1.20 s	1.10 s
27	1.00 s	1.15 s	1.01 s	0.87 s	1.03 s
29	4.61 br s, 4.80 br s	4.63 s, 4.85 s	4.62 br s, 4.80 br s	4.72 br s, 4.85 br s	4.68 br s, 4.85 br s
30	1.64 s	1.70 s	1.65 s	1.70 s	1.69 s
1'	6.32 d(7.9)	6.39 d(8.2)	6.32 d(8.5)	6.34 d(7.9)	5.00 d(7.8)
2'	4.08 t(9.2)	—	4.10 (ov)	4.08 (ov)	3.97 dd(7.6, 8.7)
3'	4.21 t(9.2)	—	4.22 (ov)	4.21 t(11.0)	4.15 dd(8.7, 8.1)

Table 3-3-3 (continued)

H	3-3-3	3-3-4	3-3-5	3-3-8	3-3-15
4'	4.30 (ov)	—	4.31 (ov)	4.30 (ov)	4.18 m
5'	4.11 (ov)	—	4.11 (ov)	4.09 (ov)	3.86 ddd (8.7, 5.3, 2.5)
6'	4.28 (ov)	—	4.27 (ov)	4.28 (ov)	4.46 dd (11.2, 2.5)
	4.67 d(11.0)		4.68 d(11.0)	4.67 d(9.8)	4.29 dd (11.2, 5.3)
1''	4.94 d(7.9)	4.99 d(7.9)	4.94 d(7.9)	4.95 d(7.9)	6.34 d(7.6)
2''	3.94 (ov)	—	3.93 (ov)	3.93 t(9.2)	4.08 dd(7.6, 9.0)
3''	4.15 (ov)	—	4.15 (ov)	4.13 (ov)	4.28 dd(9.0, 8.2)
4''	4.39 t(9.5)	—	4.39 t(9.5)	4.39 t(9.5)	4.17 dd(8.2, 8.6)
5''	3.67 d(11.0)	—	3.65 d(9.8)	3.65 d(9.2)	4.06 ddd (8.6, 5.6, 3.0)
6''	4.11 (ov)	—	4.10 (ov)	4.07 d(10.4)	4.32 dd (11.4, 3.0)
	4.19 (ov)		4.22 (ov)	4.19 (ov)	4.45 dd (11.4, 5.6)
1'''	5.83 br s	5.91 s	5.83 br s	5.84 br s	4.75 d(7.0)
2'''	4.66 br s	—	4.67 br s	4.66 br s	4.40 dd(7.0, 8.7)
3'''	4.53 dd(3.1, 9.2)	—	4.53 d(9.7)	4.54 d(9.2)	4.13 dd(8.7, 3.9)
4'''	4.32 (ov)	—	4.34 (ov)	4.34 (ov)	4.30 ddd (3.9, 3.2, 1.7)
5'''	4.93 (ov)	—	4.95 (ov)	4.96 (ov)	4.00 dd (12.3, 1.7)
					4.22 dd (12.3, 3.2)
6'''	1.70 d(6.1)	1.75 d(6.1)	1.70 d(6.1)	1.69 d(6.1)	

Table 3-3-4: ¹H NMR spectroscopic data of lupane-type saponins 3-3-10~3-3-14.

H	3-3-10	3-3-11	3-3-12	3-3-13	3-3-14
1	1.44 m, 1.81 m	1.49 m, 1.80 m	1.46 (ov), 1.88 (ov)	α 0.72, β 1.42	α 0.71, β 1.44
2	1.93 m, 1.98 m	1.76 m, 1.93 m	1.88 (ov), 2.20 (ov)	α 2.17, β 1.77	α 2.18, β 1.79
3	4.21 (ov)	4.02 br s	4.20 (ov)	α 3.24 (11.7, 4.5)	α 3.23 (9.7, 4.5)
5	2.48 br d(11.0)	2.42 br d(13.3)	2.49 d(10.2)	α 0.61 (12.0, 1.6)	α 0.61 (11.8, 1.4)
6	1.58 m, 1.81 m	1.10 m, 2.15 m	1.68 (ov), 1.79 m	α 1.39, β 1.22	α 1.39, β 1.23
7	1.31 m, 1.69 m	1.25 m, 1.59 m	1.32 (ov), 1.66 (ov)	α 1.31, β 1.31	α 1.32, β 1.32
9	1.61 m	1.66 m	1.65 (ov)	α 1.24	α 1.23

Table 3-3-4 (continued)

H	3-3-10	3-3-11	3-3-12	3-3-13	3-3-14
11	1.31 m, 1.45 m	1.19 m, 1.48 m	1.55 (ov), 2.12 (ov)	α 1.42, β 1.24	α 1.42, β 1.25
12	1.17 m, 1.68 m	1.21 m, 1.86 m	1.69 (ov)	α 1.61, β 2.11	α 1.61, β 2.12
13	2.61 m	2.70 m	2.68 dd (2.9, 10.2, 10.2)	β 2.77 (13.0, 11.2, 3.4)	β 2.76 (12.0, 11.1, 3.4)
15	1.17 m, 2.01 m	1.18 m, 2.01 m	1.30 (ov), 1.97 (ov)	α 1.24, β 2.17	α 1.23, β 2.17
16	1.44 m, 2.61 m	1.46 m, 2.65 m	1.38 (ov), 2.28 dt(11.0)	α 1.54, β 2.68	α 1.55, β 2.67
18	1.91 m	1.55 t(11.0)	1.50 (ov)	α 1.94 (11.2, 8.6)	α 1.95 (11.1, 8.6)
19	3.33 dt(3.6, 11.5)	3.53 m	3.26 br s	β 2.61 (10.4, 8.2, 2.1)	β 2.61 (9.6, 9.6, 2.0)
20		2.98 dq(2.7, 6.9)	2.63 dd(2.2, 6.5)		
21	1.58 m, 2.30 m	1.88 m, 2.11 m	1.92 (ov), 1.23 (ov)	α 1.69, β 2.16	α 1.70, β 2.17
22	1.58 m, 2.19 m	1.41 m, 2.19 m	1.27 (ov), 2.10 (ov)	α 1.60, β 2.05	α 1.60, β 2.05
23		10.0 s		α 1.24	α 1.21
24	1.44 s	1.10 s	1.46 s	β 1.02	β 1.03
25	0.92 s	0.87 s	0.96 s	β 0.71	β 0.72
26	1.17 s	1.16 s	1.19 s	β 1.15	β 1.15
27	0.89 s	0.94 s	0.85 s	α 1.10	α 1.09
29	5.08 br s, 5.49 br s		1.02 d(6.5)	1.30	1.30
30	4.42 d(15.3), 4.47 d(15.3)	1.28 d(6.9)	9.70 s	1.37	1.37
1'	6.30 d(8.0)	6.33 d(8.0)	6.29 d(8.5)	4.87 d(7.6)	4.86 d(7.7)
2'	4.10 dd(8.2, 8.5)	4.08 br t(8.6)	4.07 (ov)	4.15 (9.0)	4.20 (10.2)
3'	4.23 dd(8.1, 9.0)	4.23 t(9.0)	4.20 (ov)	4.25 (9.0)	4.27 (10.0)
4'	4.29 t(9.2)	4.38 t(9.5)	4.24 (ov)	4.12 (9.5)	4.09 (10.0)
5'	4.08 (ov)	4.07 (ov)	4.09 (ov)	3.87	3.89
6'	4.28 dd(5.3, 12.7) 4.67 (ov)	4.28 dd(4.3, 11.2) 4.61 dd(2.0, 11.4)	4.26 (ov), 4.66 (ov)	4.28 (5.7), 4.52 (2.5)	4.29 (2.3), 4.51
1''	4.96 d(7.9)	4.90 d(7.8)	4.92 d(7.5)	5.15 d(7.6)	5.32 d(7.7)
2''	3.93 dd(8.2, 8.6)	3.92 dd(8.0, 8.7)	3.91 dd(8.0, 8.8)	4.57 (9.8)	4.07 (9.0)
3''	4.14 t(9.0)	4.10 t(9.0)	4.11 (ov)	4.10 (1.0)	4.20 (10.2)
4''	4.38 t(9.3)	4.38 t(9.1)	4.36 dd(9.5, 9.5)	4.66 (2.4)	4.28 (10.0)
5''	3.63 m	3.60 m	3.65 dt(9.5)	4.01	3.87
6''	4.08 dd(2.6, 11.4) 4.18 (ov)	4.05 dd(3.5, 12.1) 4.18 dd(1.7, 12.5)	4.07 (ov), 4.19 (ov)	4.34 (4.5), 4.55 (7.6)	4.35, 4.41
1'''	5.82 br s	5.81 br s	5.81 s	6.39 d(8.1)	6.38 d(8.2)
2'''	4.68 br s	4.67 dd(1.5, 3.2)	4.66 (ov)	4.17 (9.0)	4.16 (8.7)

Table 3-3-4 (continued)

H	3-3-10	3-3-11	3-3-12	3-3-13	3-3-14
3'''	4.55 dd(3.3, 9.2)	4.55 dd(3.3, 9.3)	4.53 dd(3.3, 9.5)	4.26 (9.0)	4.27 (9.5)
4'''	4.34 t(9.4)	4.34 t(9.6)	4.32 (ov)	4.32 (9.5)	4.33 (9.5)
5'''	4.95 dq(6.3, 10.2)	4.93 m	4.92 (ov)	4.02	4.01
6'''	1.69 d(6.0)	1.69 d(6.2)	1.68 d(6.5)	4.36 (4.5), 4.41 (2.5)	ca. 4.41, ca. 4.41

Table 3-3-5: ¹H NMR spectroscopic data of lupane-type saponins 3-3-16, 3-3-17, and 3-3-23~3-3-25.

H	3-3-16	3-3-17	3-3-23	3-3-24	3-3-25
1	0.86 m	0.87 m	—	3.04 ddd (7.9, 8.4, 8.5)	—
3	4.20 m	4.18 br d(9.7)	—	—	—
9	—	—	1.93 d(10.4)	2.41 dd(5.5, 10.4)	1.78 d(9.2)
11	—	—	4.17 (ov)	—	4.54 (ov)
12	—	—	2.34 ddd (3.3, 4.3, 12.8)	—	—
13	—	—	2.88 ddd (3.3, 12.2, 12.2)	—	2.78 ddd (4.5, 13.0, 13.0)
19	3.53 dt(10.9, 4.8)	3.37 dt(10.9, 4.8)	3.37 ddd (4.5, 10.4, 10.9)	3.37 ddd (4.9, 10.5, 10.5)	3.48 ddd (4.3, 9.5, 9.5)
23	1.13 s	1.11 s	4.88 br s, 4.97 br s	4.85 (ov) (2H)	4.74 br s, 4.90 br s
24	0.94 s	1.00 s	1.80 s	1.67 s	1.77 s
25	0.71 s	0.68 s	1.20 s	4.80 s, 4.95 s	1.04 s
26	1.03 s	1.08 s	1.21 s	1.00 s	1.04 s
27	0.97 s	1.01 s	1.13 s	1.02 s	1.01 s
29	4.66 br s, 4.80 br s	4.62 br s, 4.82 br s	1.69 s	1.71 s	1.66 s
30	1.66 s	1.68 s	4.63 br s, 4.8 br s	4.71 s, 4.85 (ov)	4.61 br s, 4.87 br s
OMe	—	—	3.59 s(3-OMe)	—	—
1'	4.88 d(7.6)	4.88 d(6.0)	6.32 d(7.9)	6.33 d(7.9)	6.34 d(8.6)
1''	4.98 d(7.6)	5.78 br s	4.95 d(7.3)	6.31 d(7.9)	4.94 d(7.9)
6''	—	1.58 d(6.0)	—	—	—
1'''	6.28 d(8.0)	6.29 d(8.0)	5.84 s	4.93 d(7.9)	5.84 s
6'''	—	—	1.70 d(6.1)	—	1.70 d(6.7)
1''''	4.90 d(7.8)	4.90 d(7.8)	—	5.83 br s	—
6''''	—	—	—	1.71 d(6.7)	—
1'''''	5.80 br s	5.99 br s	—	—	—
6'''''	1.60 d(6.0)	1.65 d(6.2)	—	—	—

Table 3-3-6: ^1H NMR spectroscopic data of lupane-type saponins **3-3-18~3-3-22**.

H	3-3-18	3-3-19	3-3-20	3-3-21	3-3-22
1	—	1.58 m, 0.91 m	1.57 m, 0.93 m	0.91, 1.53	2.46 m, 2.66 (ov)
2	—	1.92 m, 2.29 m	1.92 m, 2.27 m	1.82, 1.84	1.87 (ov), 1.87 (ov)
3	3.67 br s	4.28 m	4.25 m	4.57 dd(6.8, 10.0)	
5	—	1.57 m	1.57 m	0.78	2.09 br d(13.4)
6	—	1.35 m, 1.67 m	1.65 m, 1.38 m	1.32, 1.40	1.71 (ov), 1.30 m
7	—	1.51 m, 1.29 m	1.28 m, 1.50 m	1.36, 1.43	1.38 (ov), 1.20 (ov)
9	1.71 (ov)	1.41 m	1.40 m	1.40	1.67 (ov)
11	4.17 (ov)	1.38 m, 1.17 m	1.38 m, 1.20 m	1.15, 1.38	1.43 (ov), 1.21 (ov)
12	—	1.89 m, 1.19 m	1.85 m, 1.20 m	1.20, 1.82	1.85 (ov), 1.20 (ov)
13	2.79 m	2.67 m	2.63 m	2.61	2.67 (ov)
15	—	2.02 m, 1.18 m	1.98 m, 1.16 m	1.18, 1.72	1.99 br dd (12.2, 12.2) 1.19 (ov)
16	—	2.63 m, 1.46 m	2.61 m, 1.46 m	1.43, 2.63	2.64 (ov), 1.51 (ov)
18	—	1.73 m	1.70 m	1.68	1.75 (ov)
19	3.33 m	3.40 dt(10.7, 4.4)	3.38 dt(10.9, 4.8)	3.36	3.38 ddd (4.5, 10.7, 10.7)
21	—	2.09 m, 1.38 m	2.20 m, 1.38 m	1.45, 2.20	2.14 (ov), 1.41(ov)
22	—	2.17 m, 1.50 m	2.20 m, 1.45 m	1.47, 2.15	2.20 br dd (11.2, 11.2) 1.49 (ov)
23	1.22 m	4.33 m 3.69 d(10.8)	4.31 m 3.68 d(10.8)	3.72 d(10.4) 4.21 d(10.4)	4.93 br s 4.86 br s
24	0.89 s	0.95 s	0.94 s	0.84 s	1.77 s
25	1.20 s	0.84 s	0.85 s	0.92 s	0.82 s
26	1.16 s	1.14 s	1.13 s	0.99 s	1.16 s
27	0.77 s	0.99 s	0.97 s	1.12 s	1.05 s
29	4.66 br s, 4.80 br s	4.71 br s, 4.86 br s	4.68 br s, 4.84 br s	4.68 br s, 4.82 br s	4.88 br s, 4.74 br s
30	1.66 s	1.72 s	1.69 s	1.70 s	1.72 s
1'	4.82 d(7.9)	5.12 d(7.8)	5.10 d(8.0)	5.14 d(6.4)	6.34 d(8.3)
2'	3.87 (ov)	4.02 m	4.01 m	4.25	4.10 (ov)
3'	4.19 (ov)	4.14 m	4.12 m	4.14	4.40 dd(9.2, 9.3)
4'	4.17 (ov)	4.22 m	4.18 m	4.28	4.33 dd(9.3, 9.9)
5'	3.88 (ov)	3.87 m	3.86 m	3.67 d(11.0) 4.26	3.63 br d(9.9)
6'	4.33 (ov) 4.51 (ov)	4.50 dd(11.7, 2.2) 4.35 m	4.48 m, 4.36 m		4.68 (ov) 4.29 dd(4.6, 11.3)
1''	6.24 d(7.9)	6.42 d(8.0)	6.33 d(8.0)	5.15 d(7.8)	4.94 d(8.4)
2''	4.02 (ov)	4.17 m	4.07 m	4.07	3.94 dd(8.4, 8.7)
3''	4.15 (ov)	4.28 m	4.16 m	4.13	4.14 dd(8.7, 9.0)
4''	4.24 (ov)	4.35 m	4.28 m	4.22	4.23 dd(9.0, 9.0)

Table 3-3-6 (continued)

H	3-3-18	3-3-19	3-3-20	3-3-21	3-3-22
5''	4.06 (ov)	4.03 m	4.10 m	3.82	4.10 (ov)
6''	4.27 (ov)	4.39 m	4.69 d(10.7)	4.35	4.19 br d(11.3)
	4.64 (ov)	4.45 dd(12.4, 2.4)	4.32 m	4.46	4.07 dd(4.0, 11.3)
1'''	4.88 d(7.9)		4.99 d(7.6)	6.33 d(8.4)	5.85 br s
2'''	3.98 (ov)		3.97 m	4.07	4.68 (ov)
3'''	4.09 (ov)		4.16 m	4.33	4.56 dd(3.1, 9.2)
4'''	4.35 (ov)		4.20 m	4.28	4.34 dd(9.2, 9.5)
5'''	3.61 (ov)		3.86 m	4.06	4.96 m
6'''	4.04 (ov)		4.46 m	4.30	1.70 d(6.4)
	4.18 (ov)		4.34 m	4.61	
1''''	5.75 br s			4.93 d(8.0)	
2''''	4.62 br s			3.92	
3''''	4.43 (ov)			4.12	
4''''	4.27 (ov)			4.22	
5''''	4.90 (ov)			3.61	
6''''	1.66 (ov)			4.05, 4.14	
1'''''				5.85 br s	
2'''''				4.76	
3'''''				4.53	
4'''''				4.34	
5'''''				4.96	
6'''''				1.69 d(6.8)	

Table 3-3-7: ¹H NMR spectroscopic data of lupane-type saponins 3-3-26~3-3-29.

H	3-3-26	3-3-27	3-3-28	3-3-29
1	3.70 d(5.5)	3.69 d(7.9)	4.45 dd(3.7, 10.7)	5.07 dd(2.0, 11.7)
2	3.07 d(14.4)	3.06 d(14.6)	2.79 dd(10.7, 13.9)	3.86 dd(2.0, 13.6)
	2.84 (ov)		2.71 dd(3.7, 13.9)	2.83 dd(11.7, 13.6)
5	2.90 dd(2.8, 13.4)	—	1.69 (ov)	1.80 (ov)
6	1.83 m, 1.40 (ov)	—	1.71 (ov), 1.35 (ov)	1.32 (ov), 1.69 (ov)
7	1.33 m, 1.12 (ov)	—	1.36 (ov), 1.27 (ov)	1.32 (ov), 1.43 (ov)
9	2.70 d(9.8)	2.70 d(9.8)	1.82 (ov)	2.03 (ov)
11	4.49 ddd(8.3, 9.0, 9.0)	4.33 (ov)	1.47 (ov), 1.13 (ov)	4.20 (ov)
12	2.46 ddd	2.46 ddd	1.81 (ov)	2.22 dd(8.4, 11.9)
	(4.0, 8.3, 12.2)	(3.5, 13.3, 13.3)	1.24 (ov)	1.47 (ov)
	1.71 (ov)			
13	2.84 (ov)	—	2.67 (ov)	2.82 dd(8.4, 12.7)
15	1.91 (ov), 1.08 (ov)	—	2.07 m, 1.20 (ov)	2.01 (ov), 1.25 (ov)

Table 3-3-7 (continued)

H	3-3-26	3-3-27	3-3-28	3-3-29
16	1.47 (ov) 2.61 ddd (3.1, 3.1, 12.5)	—	2.65 (ov) 1.53 ddd (3.3, 13.3, 13.3)	2.68 br d(12.9) 1.54 (ov)
18	1.67 (ov)	—	1.70 (ov)	1.78 (ov)
19	3.37 ddd (4.6, 10.7, 10.7)	3.37 ddd (4.9, 11.0, 11.0)	3.37 ddd (4.7, 10.6, 10.6)	3.36 ddd (4.3, 10.6, 10.6)
21	2.17 (ov), 1.41 (ov)	—	2.15 (ov), 1.40 (ov)	2.14 m, 1.41 (ov)
22	2.19 (ov), 1.48 (ov)	—	2.21 (ov), 1.49 (ov)	2.40 m, 1.56 (ov)
23	5.15 br s, 5.02 br s	5.20 (ov), 5.60 br s	1.14 s	1.20 s
24	1.89 s	4.44 d(14.0), 4.65 d(14.0)	1.40 s	1.49 s
25	1.01 s	1.10 s	1.07 s	1.37 s
26	1.11 s	1.14 s	1.14 s	1.20 s
27	1.01 s	1.01 s	1.08 s	1.14 s
29	4.86 br d(1.8) 4.60 br s	1.65 s	4.88 br s 4.74 br s	4.81 br s 4.64 br s
30	1.64 s	4.61 br s, 4.87 br s	1.76 s	1.71 s
1'	6.35 d(8.3)	6.34 d(8.6)	6.38 d(8.3)	6.34 d(8.2)
2'	4.13 (ov)	—	4.11 (ov)	4.11 (ov)
3'	4.42 dd(9.2, 9.5)	—	4.43 dd(8.9, 9.5)	4.42 dd(9.3, 9.3)
4'	4.33 dd(9.2, 9.5)	—	4.35 dd(8.5, 8.9)	4.34 dd(9.2, 9.3)
5'	3.65 dd(2.6, 4.9, 9.5)	—	3.65 br d(8.5)	3.65 m
6'	4.71 br dd(2.6, 11.3) 4.30 dd(4.9, 11.3)	—	4.70 (ov) 4.30 dd(5.6, 11.0)	4.68 br d(11.3) 4.29 dd(4.5, 11.3)
1''	4.94 d(7.7)	4.95 d(7.9)	4.96 d(7.9)	4.96 d(7.9)
2''	3.95 dd(7.7, 9.2)	—	3.95 dd(7.9, 9.0)	3.94 dd(7.9, 9.3)
3''	4.15 dd(9.2, 9.0)	—	4.15 dd(9.0, 9.0)	4.14 dd(9.2, 9.3)
4''	4.24 dd(9.0, 9.0)	—	4.25 dd(8.9, 9.0)	4.23 dd(9.2, 9.2)
5''	4.12 (ov)	—	4.11 (ov)	4.11 (ov)
6''	4.20 br d(11.4) 4.09 dd(4.2, 11.4)	—	4.20 br d(11.0) 4.09 dd(3.4, 12.2)	4.20 br d(11.5) 4.08 dd(3.4, 11.5)
1'''	5.86 br s	5.85 s	5.87 br s	5.86 br s
2'''	4.68 br dd(1.5, 3.4)	—	4.69 (ov)	4.68 m
3'''	4.56 dd(3.4, 9.2)	—	4.57 dd(3.4, 9.1)	4.55 dd(6.5, 9.2)
4'''	4.34 dd(9.2, 9.5)	—	4.35 dd(8.5, 9.1)	4.32 dd(8.6, 9.2)
5'''	4.97 m	—	4.99 m	4.98 m
6'''	1.72 d(5.5)	1.70 d(6.1)	1.71 d(6.4)	1.69 d(5.5)

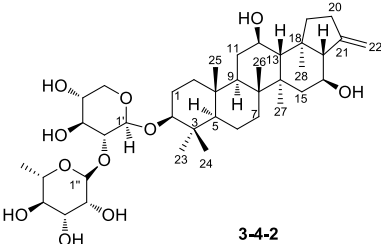
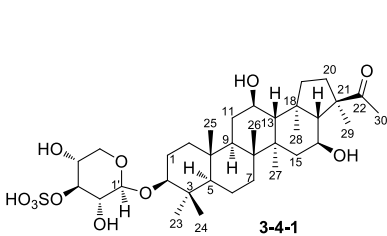
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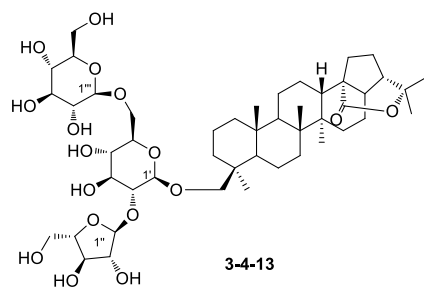
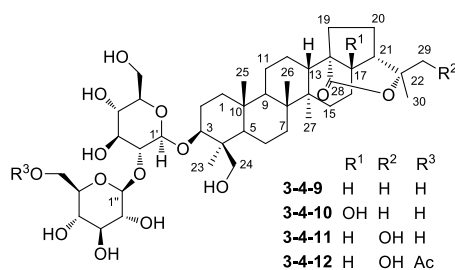
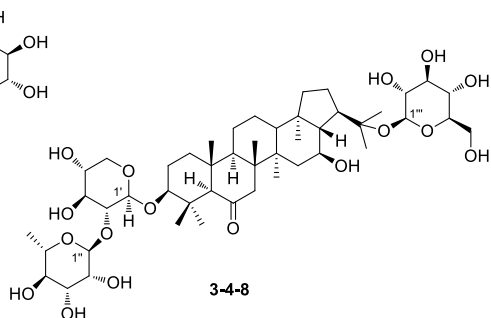
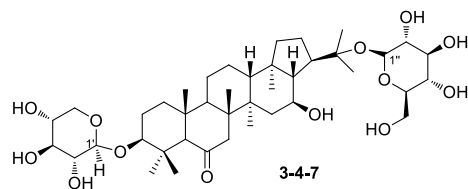
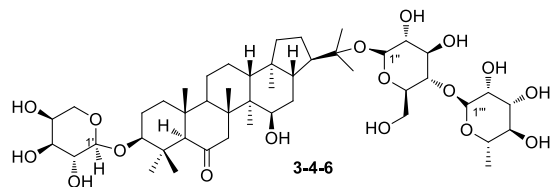
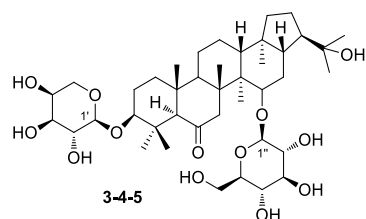
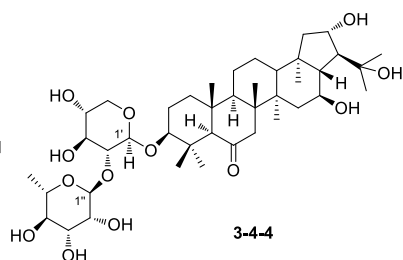
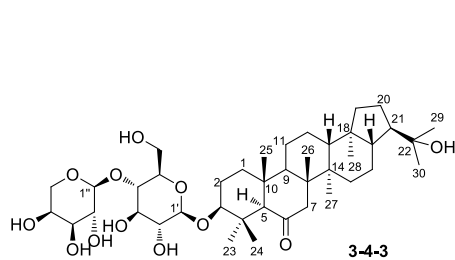
- [43] Yook CS, Kim IH, Hahn DR et al. *Phytochemistry*. 1998;49(3):839.
- [44] Yook CS, Liu XQ, Chang SY et al. *Chem Pharm Bull*. 2002;50(10):1383.
- [45] Chang SY, Yook CS, Nohara T. *Chem Pharm Bull*. 1998;46(1):163.
- [46] Shirasuna K, Miyakoshi M, Mimoto S et al. *Phytochemistry*. 1997;45(3):579.
- [47] Chang SY, Yook C-S, Nohara T. *Phytochemistry*. 1999;50:1369.
- [48] Choi HS, Kim HJ, Nam SG et al. *Chem Pharm Bull*. 2008;56(11):1613.
- [49] Nhiem NX, Tung NH, Kiem PV et al. *Chem Pharm Bull*. 2009;57(9):986.
- [50] Elbandy M, Miyamoto T, Lacaille-Dubois M-A. *Chem Pharm Bull*. 2007;55(5):808.
- [51] Park SY, Choi HS, Yook CS et al. *Chem Pharm Bull*. 2005;53(1):97.
- [52] Elgamal MHA, Soliman HSM, Elmunajjed DT et al. *Phytochemistry*. 1998;49(1):189.
- [53] Harinantenaina L, Kasai R, Yamasaki K. *Chem Pharm Bull*. 2002;50(9):1290.
- [54] Xiang T, Tezuka Y, Wu LJ et al. *Phytochemistry*. 2000;54:795.
- [55] Ye WC, Zhang QW, Hsiao WWL et al. *Planta Med*. 2002;68:183.
- [56] Yoshizumi K, Hirano K, Ando H et al. *J Agric Food Chem*. 2006;54(2):335.
- [57] Park SY, Chang SY, Yook CS et al. *J Nat Prod*. 2000;63(12):1630.
- [58] Park SY, Yook CS, Nohara T. *Tetrahedron Lett*. 2001;42:2825.

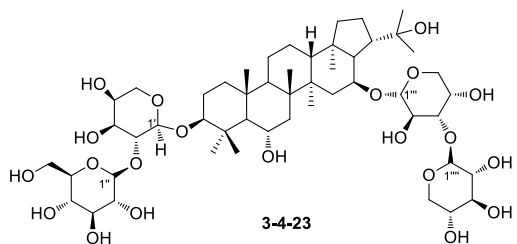
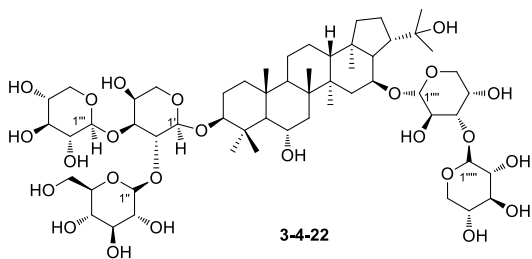
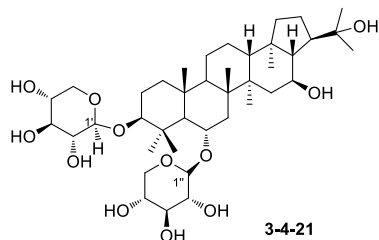
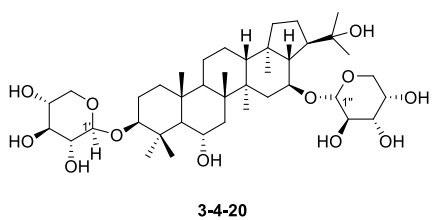
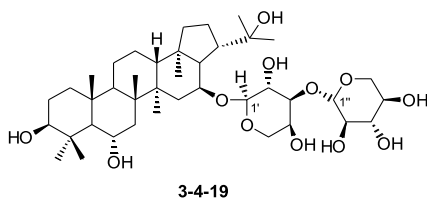
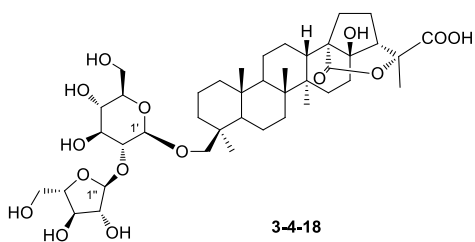
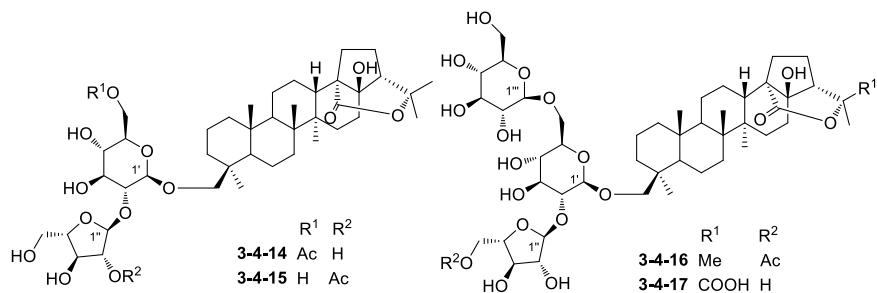
3.4 Hopane-type Saponins

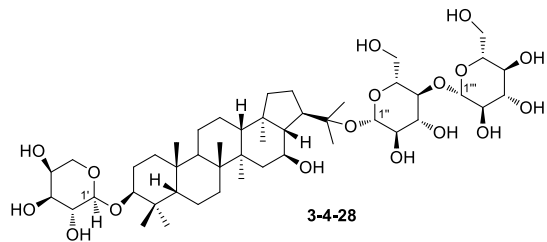
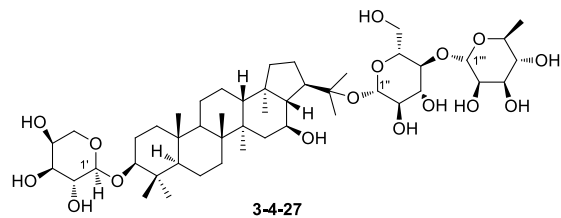
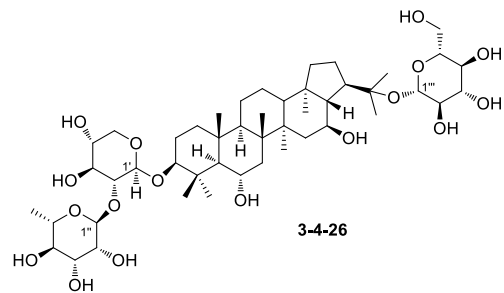
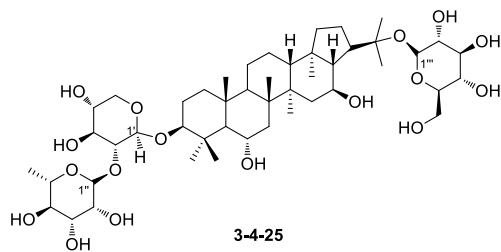
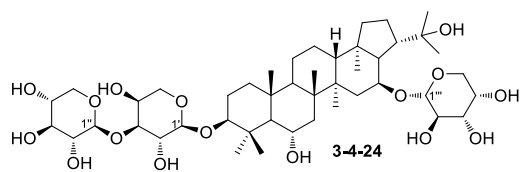
Table 3-4-1: Cos, MFs, and TSs of hopane-type saponins 3-4-1~3-4-33.

No.	Compounds	MFs	Test solvents	References
3-4-1	spergulin A	C ₃₅ H ₅₈ O ₁₁ S	DMSO- <i>d</i> ₆	[59]
3-4-2	spergulin B	C ₃₉ H ₆₄ O ₁₁	C ₅ D ₅ N	[59]
3-4-3	glinuside C	C ₄₁ H ₆₈ O ₁₂	C ₅ D ₅ N	[60]
3-4-4	lotoidoside C	C ₄₁ H ₆₈ O ₁₃	CD ₃ OD	[61]
3-4-5	glinuside B	C ₄₁ H ₆₈ O ₁₃	C ₅ D ₅ N	[60]
3-4-6	glinuside A	C ₄₇ H ₈₀ O ₁₈	C ₅ D ₅ N	[60]
3-4-7	lotoideside F	C ₄₁ H ₆₈ O ₁₃	C ₅ D ₅ N	[62]
3-4-8	lotoidoside B	C ₄₇ H ₈₀ O ₁₇	CD ₃ OD	[61]
3-4-9	diplazioside V	C ₄₂ H ₆₈ O ₁₄	C ₅ D ₅ N	[63]
3-4-10	diplazioside VI	C ₄₂ H ₆₈ O ₁₅	C ₅ D ₅ N	[63]
3-4-11	diplazioside VII	C ₄₂ H ₆₈ O ₁₅	C ₅ D ₅ N	[63]
3-4-12	6''-O-acetyl diplazioside VII	C ₄₄ H ₇₀ O ₁₆	C ₅ D ₅ N	[63]
3-4-13	diplazioside I	C ₄₇ H ₇₆ O ₁₇	C ₅ D ₅ N	[64]
3-4-14	6'-O-acetyl glycoside B	C ₄₃ H ₆₈ O ₁₄	C ₅ D ₅ N	[65]
3-4-15	2''-O-acetyl glycoside B	C ₄₃ H ₆₈ O ₁₄	C ₅ D ₅ N	[65]
3-4-16	5''-O-acetyl glycoside C	C ₄₉ H ₇₈ O ₁₉	C ₅ D ₅ N	[65]
3-4-17	diplazioside IV	C ₄₇ H ₇₄ O ₂₀	C ₅ D ₅ N	[65]
3-4-18	diplazioside II	C ₄₁ H ₆₄ O ₁₅	C ₅ D ₅ N	[64]
3-4-19	succulentoside F	C ₄₀ H ₆₈ O ₁₂	C ₅ D ₅ N	[66]
3-4-20	lotoideside D	C ₄₀ H ₆₈ O ₁₂	C ₅ D ₅ N	[62]
3-4-21	lotoideside E	C ₄₀ H ₆₈ O ₁₂	C ₅ D ₅ N	[62]
3-4-22	succulentoside C	C ₅₆ H ₉₂ O ₂₅	C ₅ D ₅ N	[66]
3-4-23	succulentoside D	C ₅₁ H ₈₆ O ₂₁	C ₅ D ₅ N	[66]
3-4-24	succulentoside E	C ₄₅ H ₇₆ O ₁₆	C ₅ D ₅ N	[66]
3-4-25	lotoideside B	C ₄₇ H ₈₀ O ₁₇	DMSO- <i>d</i> ₆	[62]
3-4-26	lotoideside A	C ₄₇ H ₈₀ O ₁₇	CD ₃ OD	[61]
3-4-27	glinuside D	C ₄₇ H ₇₈ O ₁₆	C ₅ D ₅ N	[67]
3-4-28	glinuside E	C ₄₇ H ₇₈ O ₁₇	C ₅ D ₅ N	[67]
3-4-29	diplazioside III	C ₅₃ H ₈₈ O ₂₄	C ₅ D ₅ N	[65]
3-4-30	lotoidesid C	C ₄₅ H ₇₆ O ₁₆	C ₅ D ₅ N	[62]
3-4-31	succulentoside A	C ₅₀ H ₈₄ O ₂₀	C ₅ D ₅ N	[68]
3-4-32	succulentoside B	C ₄₅ H ₇₆ O ₁₆	C ₅ D ₅ N	[68]
3-4-33	lotoideside A	C ₅₂ H ₈₈ O ₂₁	DMSO- <i>d</i> ₆	[62]









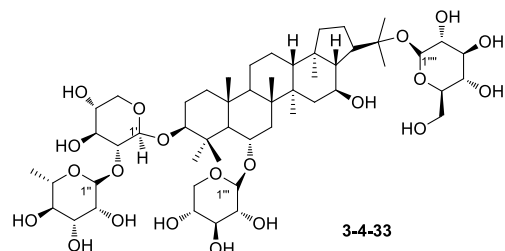
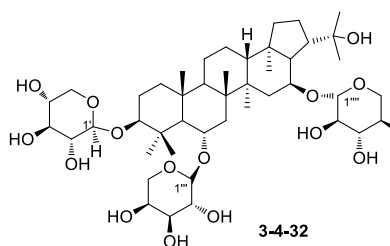
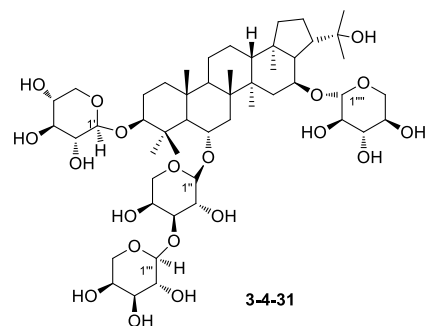
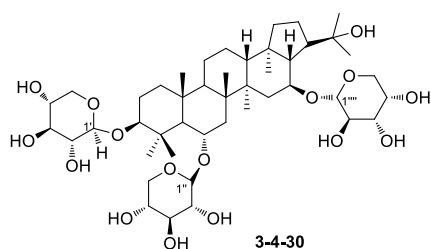
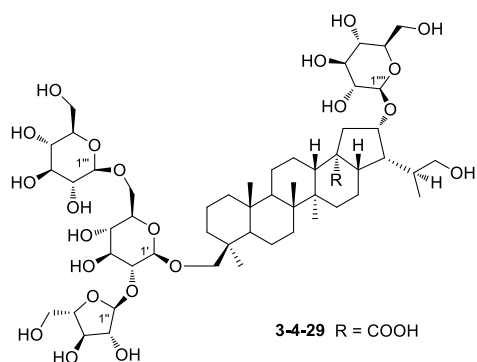


Table 3-4-2: ¹H NMR spectroscopic data of hopane-type saponins 3-4-1~3-4-5.

H	3-4-1	3-4-2	3-4-3	3-4-4	3-4-5
1	α 1.58 (ov), β 0.91 (ov)	—	2.18 m, 1.95 m	—	2.09 m, 1.93 m
2	α 1.68 m, β 1.56 m	—	1.65 m, 1.40 m	—	1.65 m, 1.40 m
3	α 3.04 dd-like	α 3.30 dd(11.7, 4.1)	3.35 dd(11.6, 3.9)	3.15 dd(11.0, 4.5)	3.30 dd(11.9, 4.8)
5	0.68 d(11.5)	0.74 d(11.5)	2.30 s	2.32 s	2.28 s
6	α 1.48 (ov), β 1.37 (ov)	—	—	—	—
7	α 1.17 (ov) β 1.41 (ov)	—	2.61 d(11.8) 1.96 d(11.8)	2.71 d(11.4)	2.62 d(12.2) 1.99 d(12.2)
9	α 1.17 m	—	1.77 m	—	1.77 m
11	α 1.67 m, β 1.22 t-like	—	1.53 m, 1.30 m	—	1.53 m, 1.29 m
12	α 3.67 m	α 4.18 t(8.5)	1.34 m, 1.30 m	—	1.34 m, 1.29 m
13	β 1.31 d(10.6)	1.77 d(10.8)	1.53 m	—	1.53 m
15	α 1.17 (ov), β 1.41 (ov)	—	1.31 m	—	4.29 (ov)
16	α 3.59 m	α 4.30 m	1.61 m, 1.31 m	α 3.83 dt, (4.0, 10.5)	1.67 m, 1.34 m
17	β 1.63 d(11.4)	2.12 m	2.73 dd(9.3, 10.1)	—	2.73 q(9.3, 9.3)
19	α 1.33 m β 2.01 dd(7.4, 12.4)	—	1.40 m, 0.92 m	—	1.40 m, 0.91 m
20	α 1.49 m β 1.76 dd(7, 14.3)	—	1.40 m, 1.61 m	β 3.90 m	1.40 m 1.69 m
21	—	—	1.81 m	α 2.09 d(5.7, 12.0)	1.65 m
23	0.98 s	1.25 s	0.99 s	1.11 s	0.99 s
24	0.73 s	1.18 s	1.06 s	1.27 s	1.04 s
25	0.80 s	0.84 s	0.74 s	—	0.74 s
26	0.96 s	1.04 s	0.87 s	1.04 s	0.86 s
27	0.92 s	1.17 s	1.35 s	1.23 s	1.45 s
28	0.92 s	1.07 s	1.41 s	1.05 s	1.41 s
29	1.26 s	—	1.57 s	1.37 s	1.57 s
30	2.10 s	—	1.62 s	1.18 s	1.59 s
1'	4.23 d(7.4)	4.84 d(6.2)	5.17 d(7.7)	4.41 d(7.5)	4.78 d(7.6)
2'	3.13 m	4.23 m	4.03 t(8.7)	3.46 dd(7.5, 9.0)	4.05 (ov)
3'	3.91 t(9)	4.16 m	4.19 t(8.7)	3.41 t(9.0)	4.25 (ov)
4'	3.43 m	4.14 m	4.26 (ov)	3.50 m	4.25 (ov)
5'	3.09 m 3.71 dd(5.5, 11.4)	4.33 m 3.71 dd(9.6, 11.0)	3.99 (ov)	3.21 t(11.0) 3.91 dd(4.5, 11.0)	3.69 t(9.7) 4.24 (ov)

Table 3-4-2 (continued)

H	3-4-1	3-4-2	3-4-3	3-4-4	3-4-5
6'			4.53 dd(5.1, 11.6) 4.41 dd(5.1, 11.6)		
1''		6.52 br s	4.84 d(7.4)	5.36 d(1.5)	5.17 d(7.7)
2''		4.86 dd(1.4, 3.2)	4.16 (ov)	3.98 dd(1.5, 2.5)	4.04 d(8.9)
3''		4.67 dd(3.4, 9.4)	4.27 (ov)	3.76 dd(2.5, 9.0)	4.12 d(8.9)
4''		4.33 m	4.27 (ov)	3.42 dd(9.0, 9.0)	4.24 (ov)
5''		4.76 m	3.80 t(10.3), 4.27 (ov)	3.97 m	3.99 m
6''		1.71 d(6.2)		1.26 d(6.5)	4.52 dd(3.3, 10.6) 4.24 (ov)

Table 3-4-3: ¹H NMR spectroscopic data of hopane-type saponins 3-4-6~3-4-10.

H	3-4-6	3-4-7	3-4-8	3-4-9	3-4-10
1	2.14 m 1.93 m	1.66 m 1.21 m	—	α 0.73 ddd (13.2, 13.2, 3.6) β 1.45 (ov)	α 0.74 ddd (13.2, 13.2, 3.6) β 1.46 (ov)
2	1.65 m 1.40 m	2.13 m 1.86 m	—	α 2.33 m β 1.90 m	α 2.32 (ov) β 1.89 (ov)
3	3.33 dd(11.6, 3.9)	3.30 dd(11.5, 4.0)	3.14 dd(11.0, 4.5)	α 3.46 dd(11.7, 4.2)	α 3.45 dd(11.7, 4.2)
5	2.26 s	2.25 s	2.32 s	α 0.77 d(12.0)	α 0.79 d(12.0)
6				α 1.54 (ov) β 1.23 (ov)	α 1.51 (ov) β 1.25 (ov)
7	2.54 d(11.7) 1.95 d(11.7)	2.54 d(11.5) 1.92 d(11.5)	—	α 1.25 (ov) β 1.38 (ov)	α 1.25 (ov) β 1.44 (ov)
9	1.77 m	1.77 dd(12.5, 2.0)	—	α 1.28 (ov)	α 1.30 (ov)
11	1.53 m 1.29 m	1.47 m 1.23 m	—	α 1.45 (ov) β 1.13 (ov)	α 1.51 (ov) β 1.25 (ov)
12	1.34 m 1.29 m	1.40 m 1.33 m	—	α 2.75 dddd (13.2, 13.2, 13.2, 4.2) β 1.74 br d(13.2)	α 2.84 dddd (13.2, 13.2, 13.2, 4.2) β 1.77 br d(13.2)
13	1.53 m	1.25 m	—	β 1.56 (ov)	β 2.64 dd(13.2, 4.2)
15	4.28 (ov)	1.65 m 1.39 m	—	α 1.25 (ov) β 1.32 (ov)	α 1.11 (ov) β 2.42 ddd (13.2, 13.2, 4.2)

Table 3-4-3 (continued)

H	3-4-6	3-4-7	3-4-8	3-4-9	3-4-10
16	1.67 m 1.34 m	4.22 m	α 4.19 dt(4.0, 10.5) 2.72 m	α 1.76 (ov) β 1.67 br d(13.2) β 1.28 (ov)	α 2.27 ddd (13.2, 13.2, 4.2) β 2.04 br d(13.2)
17	2.72 q(9.4, 9.4)	1.49 (ov)	—	1.57 (ov), 1.86 m	1.92 (ov), 2.11 ddd (12.8, 12.8, 3.6)
19	1.40 m, 0.91 m	1.41 m, 0.87 m	—		1.91 (ov) 2.39 (ov)
20	1.40 m 1.69 m	1.64 m 1.28 m	—	1.57 (ov) 1.79 (ov)	β 2.23 d(6.6)
21	1.65 m	2.68 q(9.5)	α 2.72 m	β 1.93 br dd (4.8, 4.8)	
23	0.98 s	1.43 s	1.11 s	1.36 s	1.36 s
24	1.04 s	1.55 s	1.27 s	4.32 d(10.8) 3.38 dd(10.8, 11.4)	4.31 d(10.8) 3.36 dd(10.8, 11.4)
25	0.73 s	0.84 s	—	0.66 s	0.65 s
26	0.86 s	0.93 s	1.04 s	0.92 s	1.12 s
27	1.79 s	1.01 s	1.22 s	1.10 s	1.18 s
28	1.56 s	0.69 s	0.89 s		
29	1.41 s	1.36 s	1.40 s	1.39 s	1.51 s
30	1.43 s	1.51 s	1.25 s	1.19 s	1.27 s
OH				4.36 d(11.4) (24-OH)	5.89 s(17-OH) 4.34 d(11.4) (24-OH)
1'	4.84 d(7.3)	4.77 d(7.5)	4.41 d(7.5)	4.89 d(7.8)	4.88 d(7.8)
2'	4.07 (ov)	3.99 t(8.5)	3.46 dd(7.5, 9.0)	4.09 dd(7.8, 9.0)	4.08 dd(7.8, 9.0)
3'	4.06 (ov)	4.12 t(8.5)	3.41 dd(9.0, 9.0)	4.29 dd(9.0, 9.0)	4.28 dd(9.0, 9.0)
4'	4.16 (ov)	4.19 m	3.50 m	4.17 dd(9.0, 9.0)	4.17 dd(9.0, 9.0)
5'	3.53 t(10.5) 4.22 (ov)	4.36 dd(11.0, 5.0) 3.74 t(10.5)	3.21 t(11.0) 3.91 dd(4.5, 11.0)	3.94 ddd (9.0, 5.4, 2.4)	3.94 ddd (9.0, 5.4, 2.4)
6'				4.36 (ov) 4.59 dd(11.7, 2.4)	4.36 (ov) 4.58 dd(11.7, 2.4)
1''	5.16 d (7.8)	5.10 d (7.5)	5.36 d(1.5)	5.54 d(7.8)	5.53 d(7.8)
2''	3.98 d (8.5)	3.96 m	3.98 dd (1.5, 2.5)	4.10 dd (7.8, 9.0)	4.09 dd (7.8, 9.0)
3''	4.12 d (8.5)	4.21 m	3.76 dd (2.5, 9.0)	4.20 dd (9.0, 9.0)	4.19 dd (9.0, 9.0)
4''	4.79 m	4.08 t(9.0)	3.42 dd (9.0, 9.0)	4.38 dd (9.0, 9.0)	4.37 dd (9.0, 9.0)
5''	3.74 m	3.91 m	3.97 m	3.74 ddd (9.0, 2.4, 2.4)	3.73 ddd (9.0, 2.4, 2.4)

Table 3-4-3 (continued)

H	3-4-6	3-4-7	3-4-8	3-4-9	3-4-10
6''	4.50 dd (2.4, 11.6) 4.35 dd (6.2, 17.4)	4.46 dd (2.0, 11.5) 4.24 m	1.26 d (6.5)	4.34 (ov) 4.39 (ov)	4.34 (ov) 4.39 (ov)
1'''	6.51 br s		4.63 d(7.5)		
2'''	4.85 dd(1.0, 3.3)		3.11 dd(7.5, 9.0)		
3'''	4.67 dd(3.3, 9.3)		3.41 dd(9.0, 9.0)		
4'''	4.29 (ov)		3.36 dd(9.0, 9.0)		
5'''	4.18 t(9.0)		3.29 m		
6'''	1.70 d(6.2)		3.70 dd(4.5, 12.0) 3.86 dd(2.5, 12.0)		

Table 3-4-4: ¹H NMR spectroscopic data of hopane-type saponins **3-4-11~3-4-13**, **3-4-18**, and **3-4-20**.

H	3-4-11	3-4-12	3-4-13	3-4-18	3-4-20
1	α 0.74 ddd (13.2, 13.2, 3.6) β 1.46 (ov)	α 0.77 (ov) β 1.50 (ov)	α 0.75 ddd (13.2, 13.2, 3.6) β 1.60 br d(13.2)	α 0.81 m β 1.63 br d(13.2)	1.65 m 0.97 (ov)
2	α 2.33 m β 1.90 (ov)	α 2.26 (ov) β 1.95 (ov)	α 1.38 (ov) β 1.74 (ov)	α 1.44 m β 1.74 m	2.19 m 1.93 m
3	α 3.45 dd (11.7, 4.2)	α 3.45 dd (11.7, 4.2)	α 1.00 ddd (13.2, 13.2, 3.6) β 2.22 br d(13.2)	α 1.05 ddd (13.2, 13.2, 3.5) β 2.38 br d(13.2)	3.37 dd (12.0, 4.5)
5	α 0.78 br d(12.0)	α 0.79 (ov)	α 0.86 br d(11.0)	α 0.91 br d(13.2)	1.68 d(13.0)
6	α 1.53 br d(13.2) β 1.24 (ov)	α 1.61 (ov) β 1.38 (ov)	α 1.72 (ov) β 1.47 ddd (13.2, 11.0, 3.6)	α 1.58 m β 1.29 m	4.36 m
7	α 1.24 (ov) β 1.37 (ov)	α 1.25 (ov) β 1.38 (ov)	α 1.26 (ov) β 1.36 m (ov)	α 1.31 m β 1.46 (ov)	2.02 (ov) 1.64 m
9	α 1.30 (ov)	α 1.30 (ov)	α 1.38 (ov)	α 1.46 (ov)	1.26 m
11	α 1.46 (ov) β 1.15 (ov)	α 1.48 (ov) β 1.16 (ov)	α 1.50 m β 1.15 m	α 1.59 m β 1.27 m	1.52 m 1.48 m
12	α 2.77 dddd(13.2, 13.2, 13.2, 4.2) β 1.77 br d(13.2)	α 2.77 dddd(13.2, 13.2, 13.2, 4.2) β 1.78 br d(13.2)	α 2.71 dddd(13.2, 13.2, 13.2, 4.8) β 1.72 (ov)	α 2.87 m β 1.79 br d(13.2)	1.37 (ov) 1.37 (ov)
13	β 1.61 (ov)	β 1.61 (ov)	β 1.54 (ov)	β 2.70 dd (13.2, 3.5)	1.37 (ov)

Table 3-4-4 (continued)

H	3-4-11	3-4-12	3-4-13	3-4-18	3-4-20
15	α 1.28 (ov) β 1.37 (ov)	α 1.28 (ov) β 1.36 (ov)	α β 1.26 (ov)	α 1.14 br d(13.2) β 2.46 ddd (13.2, 13.2, 4.0)	2.35 dd (12.5, 3.5) 1.88 m
16	α 1.83 dddd(13.2, 13.2, 13.2, 3.6) β 1.74 br d(13.2)	α 1.85 dddd(13.2, 13.2, 13.2, 3.6) β 1.73 br d(13.2)	α β 1.68 m	α 2.35 ddd (13.2, 13.2, 4.0) β 2.12 m	4.20 m
17	β 1.36 (ov)	β 1.33 (ov)	β 1.26 (ov)		1.30 (ov)
19	1.63 (ov) 2.00 m	1.62 (ov) 2.00 m	1.54 (ov) 1.84 m	2.14 m(2H)	1.46 (ov) 0.97 (ov)
20	1.63 (ov) 2.24 m	1.62 (ov) 2.25 m	1.54 (ov) 1.81 m	2.67 m 2.00 m	1.75 m 1.39 (ov)
21	β 2.30 br dd (4.8, 4.8)	β 2.31 br dd (4.8, 4.8)	β 1.96 br dd (4.2, 4.2)	β 2.89 d(7.0)	2.74 q(9.5)
23	1.36 s	1.39 s	1.21 s	1.22 s	2.00 s
24	4.32 d(10.8) 3.38 dd(10.8, 11.4)	4.34 d(10.8) 3.50 dd(10.8, 11.4)	4.24 d(9.6) 3.81 d(9.6)	4.05 d(9.5) 3.92 d(9.5)	1.46 s
25	0.67 s	0.75 s	0.89 s	0.80 s	0.92 s
26	0.94 s	0.94 s	0.94 s	1.12 s	1.11 s
27	1.13 s	1.14 s	1.05 s	1.21 s	1.05 s
28					0.77 s
29	1.62 s	1.62 s	1.39 s	1.99 s	1.30 s
30	3.76 s(2H)	3.76 s(2H)	1.20 s		1.41 s
OH	4.35 d(11.4) (24-OH)	3.69 d(11.4) (24-OH)			
1'	4.88 d(7.8)	4.89 d(7.8)	4.79 d(7.8)	4.93 d(7.8)	4.83 d(7.0)
2'	4.08 dd(7.8, 9.0)	4.20 dd(7.8, 9.0)	3.99 dd(7.8, 9.0)	4.12 dd(7.8, 9.1)	4.00 t(8.0)
3'	4.28 dd(9.0, 9.0)	4.28 dd(9.0, 9.0)	4.15 dd(9.0, 9.0)	4.29 dd(9.1, 9.1)	4.11 m
4'	4.16 dd(9.0, 9.0)	4.14 dd(9.0, 9.0)	4.00 dd(9.0, 9.0)	4.18 dd(9.1, 9.1)	4.17 m
5'	3.94 ddd (9.0, 5.4, 2.4)	3.92 ddd (9.0, 5.4, 2.4)	3.99 (ov)	3.91 ddd (9.1, 5.2, 2.5)	4.34 m 3.75 t(10.5)
6'	4.36 (ov) 4.59 dd(11.7, 2.4)	4.37 dd(11.7, 5.4) 4.58 dd(11.7, 2.4)	4.73 d(10.8) 4.28 dd(10.8, 5.4)	4.53 dd(11.8, 2.5) 4.37 dd(11.8, 5.2)	
1''	5.53 d(7.8)	5.55 d(7.8)	6.28 s	6.39 s	4.83 d(7.0)
2''	4.10 dd(7.8, 9.0)	4.15 dd(7.8, 9.0)	4.93 d(1.8)	5.05 d(2.2)	4.14 m
3''	4.19 dd(9.0, 9.0)	4.19 dd(9.0, 9.0)	4.80 (ov)	4.88 dd(4.1, 2.2)	4.39 t(8.0)
4''	4.38 dd(9.0, 9.0)	4.12 dd(9.0, 9.0)	4.91 ddd (4.2, 4.2, 4.2)	4.97 ddd (4.1, 4.1, 4.1)	4.26 m
5''	3.73 ddd (9.0, 2.4, 2.4)	4.01 ddd (9.0, 6.6, 1.8)	4.28 dd(11.5, 4.2) 4.20 dd(11.5, 4.2)	4.33 dd(11.3, 4.1) 4.25 dd(11.3, 4.1)	4.16 (ov) 3.65 m
6''	4.34 (ov) 4.38 (ov)	4.87 dd(11.4, 6.6) 5.08 dd(11.4, 1.8)			

Table 3-4-4 (continued)

H	3-4-11	3-4-12	3-4-13	3-4-18	3-4-20
OAc		2.07 s(6''-OAc)			
1'''			5.04 d(7.8)		
2'''			3.98 dd(9.0, 7.8)		
3'''			4.17 dd(9.0, 9.0)		
4'''			4.13 dd(9.0, 9.0)		
5'''			3.88 ddd (9.0, 5.4, 2.4)		
6'''			4.46 dd(12.0, 2.4) 4.29 dd(12.0, 5.4)		

Table 3-4-5: ¹H NMR spectroscopic data of hopane-type saponins **3-4-14**~**3-4-17** and **3-4-19**.

H	3-4-14	3-4-15	3-4-16	3-4-17	3-4-19
3	—	—	—	—	3.43 dd(11.5, 5.0)
6	—	—	—	—	4.28 m
7	—	—	—	—	2.39 dd(12.0, 4.0) 1.90 m
15	—	—	—	—	2.30 dd(10.0, 5.0) 1.75 m
16	—	—	—	—	4.47 ddd(10.0, 10.0, 4.0) 1.85 t(10.0)
17					2.71 q(10.0)
21			—	—	
23	1.21 s	1.23 s	1.24 s	1.25 s	1.80 s
24	4.07 d(9.5) 3.88 d(9.5)	4.06 d(9.5) 3.87 d(9.5)	4.12 d(9.5) 3.86 d(9.5)	4.15 d(9.6) 3.86 d(9.6)	1.58 s
25	0.88 s	0.79 s	0.86 s	0.88 s	0.82 s
26	1.17 s	1.12 s	1.15 s	1.16 s	0.96 s
27	1.18 s	1.17 s	1.17 s	1.21 s	1.10 s
28					1.05 s
29	1.50 s	1.50 s	1.49 s	1.98 s	1.42 s
30	1.26 s	1.26 s	1.26 s		1.31 s
1'	4.88 d(7.8)	4.92 d(7.8)	4.83 d(7.8)	4.84 d(7.8)	4.92 d(7.3)
2'	4.15 dd(7.8, 9.0)	4.23 dd(7.8, 9.0)	4.09 dd(7.8, 9.0)	4.03 dd(7.8, 9.0)	4.21 t(8.5)
3'	4.25 dd(9.0, 9.0)	4.30 dd(9.0, 9.0)	4.20 (ov)	4.19 dd(9.0, 9.0)	4.53 m
4'	4.00 dd(9.0, 9.0)	4.18 dd(9.0, 9.0)	4.02 (ov)	4.05 dd(9.0, 9.0)	4.30 (ov)
5'	3.96 ddd (9.0, 5.5, 2.5)	3.91 ddd (9.0, 4.8, 2.4)	4.02 (ov)	4.02 (ov)	4.22 m 3.77 br d(10.0)

Table 3-4-5 (continued)

H	3-4-14	3-4-15	3-4-16	3-4-17	3-4-19
6'	4.89 dd(12.0, 2.5) 4.77 dd(12.0, 5.5)	4.53 dd(12.0, 2.4) 4.36 dd(12.0, 4.8)	4.77 d(10.8) 4.29 dd(10.8, 5.4)	4.77 d(10.8) 4.31 dd(10.8, 5.4)	
1''	6.41 s	6.32 s	6.38 s	6.33 s	4.98 d(7.5)
2''	5.06 br s	5.92 d(1.8)	5.01 d(3.0)	4.98 d(1.8)	4.01 t(7.5)
3''	4.90 (ov)	4.91 (ov)	4.62 dd(5.4, 3.0)	4.84 (ov)	4.14 (ov)
4''	5.00 ddd (4.2, 4.2, 4.2)	5.03 ddd (4.2, 4.2, 4.2)	4.97 ddd (6.0, 5.4, 3.0)	4.96 ddd (4.2, 4.2, 4.2)	4.18 m
5''	4.36 dd(11.5, 4.2) 4.28 dd(11.5, 4.2)	4.34 dd(11.5, 4.2) 4.32 dd(11.5, 4.2)	4.80 dd(11.4, 3.6) 4.65 dd(11.4, 6.0)	4.32 dd(11.5, 4.2) 4.24 dd(11.5, 4.2)	4.31 m 3.68 dd(11.0, 5.0)
OAc	2.00 s(6'-OAc)	1.88 s(2''-OAc)	1.98 s(5''-OAc)		
1'''			5.05 d(7.8)	5.07 d(7.8)	
2'''			4.02 (ov)	4.01 dd(9.0, 7.8)	
3'''			4.20 (ov)	4.20 dd(9.0, 9.0)	
4'''			4.20 (ov)	4.18 dd(9.0, 9.0)	
5'''			3.91 ddd (9.0, 5.4, 2.4)	3.91 ddd (9.0, 5.4, 2.4)	
6'''			4.49 dd(12.0, 2.4) 4.34 dd(12.0, 5.4)	4.49 dd(12.0, 2.4) 4.33 dd(12.0, 5.4)	

Table 3-4-6: ¹H NMR spectroscopic data of hopane-type saponins 3-4-21, 3-4-25, and 3-4-27~3-4-29.

H	3-4-21	3-4-25	3-4-27	3-4-28	3-4-29
1	1.64 m, 1.02 (ov)	1.52 m, 0.83 m	1.65 m, 1.00 m	1.65 m, 1.00 m	α 0.72 ddd, (13.2, 13.2, 3.5) β 1.59 (ov)
2	2.19 m, 1.91 m	1.69 m, 1.51 m	2.24 m, 1.93 m	2.45 m, 1.93 m	α 1.40 (ov) β 1.77 (ov)
3	3.37 dd (11.5, 4.0)	2.88 dd(11.5, 3.5)	3.43 dd(4.1, 9.1)	3.54 dd (5.2, 10.8)	α 1.00 ddd (13.2, 13.2, 3.5) β 2.25 br d(13.2)
5	1.31 (ov)	0.70 d(11.0)	2.03 s	2.03 s	α 0.86 br d(12.6)
6	4.21 m	3.75 m	1.07 m, 1.38 m	1.07 m, 1.38 m	α 1.71 br d(13.2) β 1.51 (ov)
7	2.34 m, 1.89 m	1.44 m, 1.05 (ov)	1.95 m(2H)	1.95 m(2H)	α β 1.33 (ov)
9	1.26 m	1.10 (ov)	1.27 (ov)	1.18 (ov)	α 1.30 br d(12.0)
11	1.48 (ov), 1.48 (ov)	1.47 m, 1.20 (ov)	1.53 m, 1.29 m	1.53 m, 1.29 m	α 1.44 br d(13.2) β 1.16 ddd (13.2, 13.2, 3.5)

Table 3-4-6 (continued)

H	3-4-21	3-4-25	3-4-27	3-4-28	3-4-29
12	1.37 (ov), 1.37 (ov)	1.46 m, 1.33 m	1.34 m, 1.29 m	1.34 m, 1.29 m	α 2.16 dddd (13.2, 13.2, 13.2, 4.0) β 1.88 (ov)
13	1.37 (ov)	1.21 (ov)	1.53 m	1.53 m	β 1.56 (ov)
15	2.01 m, 1.67 (ov)	1.48 m, 1.35 m	1.60 m, 1.15 m	1.60 m, 1.15 m	α β 1.36 (ov)
16	4.32 (ov)	3.92 m	4.25 (ov)	4.25 (ov)	α 2.93 ddd (13.2, 13.2, 4.0) β 1.86 (ov)
17	1.67 (ov)	1.29 t(11.0)	1.89 (ov)	1.90 (ov)	β 1.53 (ov)
19	1.47 m, 0.97 m	1.42 m, 0.90 (ov)	1.40 m, 0.90 m	1.40 m, 0.90 m	α 3.43 d(12.6) β 1.57 (ov)
20	1.73 m, 1.31 (ov)	1.72 m, 1.39 m	1.60 m, 1.35 m	1.70 m, 1.40 m	β 4.58 dd (7.2, 7.2)
21	2.73 q(9.5)	2.48 m	2.73 m	2.72 m	β 2.36 ddd (10.8, 10.8, 7.2)
22					3.05 m
23	2.05 s	1.23 s	0.98 s	1.00 s	1.23 s
24	1.51 s	0.87 s	1.06 s	1.17 s	4.18 d(9.6), 3.85 d(9.6)
25	0.92 s	0.77 s	0.71 s	0.70 s	0.91 s
26	1.10 s	0.95 s	0.93 s	0.95 s	0.98 s
27	1.05 s	0.94 s	1.61 s	1.58 s	1.20 s
28	0.76 s	0.69 s	1.55 s	1.52 s	
29	1.29 s	1.11 s	1.40 s	1.40 s	1.53 d(6.0)
30	1.39 s	1.22 s	1.40 s	1.40 s	3.98 dd (10.5, 6.6) 3.67 dd(10.5, 2.5)
1'	4.84 d(7.0)	4.18 d(6.0)	4.89 d(7.4)	4.92 (ov)	4.84 d(7.8)
2'	3.99 t(8.0)	3.21 m	4.02 (ov)	4.05 (ov)	4.03 dd(7.8, 9.0)
3'	4.09 m	3.25 m	4.00 (ov)	4.01 (ov)	4.20 dd(9.0, 9.0)
4'	4.16 m	2.98 m	4.17 (ov)	4.17 (ov)	4.04 dd(9.0, 9.0)
5'	4.32 (ov), 3.71 t(11.0)	3.63 m, 3.01 m	3.72 (ov), 4.16 (ov)	3.72 (ov), 4.16 (ov)	4.03 (ov)
6'					4.78 d(10.8) 4.32 dd (10.8, 5.4)
1''	4.84 d(7.0)	5.21 s	5.17 d(7.6)	5.16 d(7.7)	6.34 s
2''	3.95 t(8.0)	2.97 m	3.99 d(8.4)	3.99 d(8.4)	4.99 d(1.8)
3''	4.06 m	3.45 dd(3, 9.0)	4.13 d(8.4)	4.15 d(8.4)	4.85 dd(4.1, 1.8)
4''	4.07 m	3.17 m	4.86 m	4.92 m	4.96 ddd (4.1, 4.1, 4.1)
5''	4.12 m, 3.56 m	3.80 m	3.70 m	3.78 m	4.32 dd(11.5, 4.1) 4.24 dd(11.5, 4.1)
6''		1.03 s	4.30 (ov), 4.40 (ov)	4.30 (ov), 4.40 (ov)	

Table 3-4-6 (continued)

H	3-4-21	3-4-25	3-4-27	3-4-28	3-4-29
1'''		4.41 d(7.5)	6.56 br s	4.99 d(7.2)	5.09 d(7.8)
2'''		2.83 t(8.0)	4.87 (ov)	4.92 (ov)	4.03 dd(9.0, 7.8)
3'''		3.14 d(11.5)	4.37 (ov)	4.14 (ov)	4.21 dd(9.0, 9.0)
4'''		3.68 m	4.27 (ov)	4.86 (ov)	4.20 dd(9.0, 9.0)
5'''		3.09 m	4.23 m	3.80 t(4.9)	3.93 ddd (9.0, 5.4, 2.4)
6'''		3.55 m 3.37 (ov)	1.72 d(6.1)	4.32 m 4.56 dd(2.4, 11.7)	4.51 dd(12.0, 2.4) 4.35 dd (12.0, 5.4) 4.81 d(7.8)
1''''					3.83 dd(9.0, 7.8)
2''''					4.12 dd(9.0, 9.0)
3''''					3.98 dd(9.0, 9.0)
4''''					3.89 ddd (9.0, 5.3, 2.4)
5''''					4.47 dd (12.0, 2.4) 4.22 (ov)
6''''					

Table 3-4-7: ¹H NMR spectroscopic data of hopane-type saponins 3-4-22~3-4-24 and 3-4-26.

H	3-4-22	3-4-23	3-4-24	3-4-26
3	3.40 dd(11.7, 4.2)	3.41 dd(11.5, 5.0)	3.56 dd(11.7, 4.2)	3.09 dd(11.0, 4.5)
6	4.21 m	4.25 m	4.23 m	β 4.00 ddd (10.0, 10.0, 4.5)
7	2.37 m 1.92 m	2.39 dd(12.0, 4.0) 1.93 m	2.33 m 1.89 m	—
15	2.25 m 1.69 m	2.29 dd(10.0, 5.0) 1.74 m	2.29 m 1.76 m	—
16	4.40 m	4.49 m	4.38 m	α 4.19 dt(4.0, 10.5)
17	1.87 t(10.5)	1.84 t(10.0)	1.83 t(10.5)	—
21	2.70 q(10.5)	2.73 q(10.0)	2.74 q(10.5)	α 2.72 ddd (9.5, 9.5, 9.5)
23	1.84 s	1.86 s	1.79 s	1.37 s
24	1.51 s	1.62 s	1.52 s	1.06 s
25	0.81 s	0.80 s	0.80 s	0.94 s
26	0.94 s	0.96 s	0.94 s	1.13 s
27	1.08 s	1.10 s	1.09 s	1.11 s
28	1.06 s	1.06 s	1.05 s	0.84 s
29	1.46 s	1.43 s	1.44 s	1.40 s
30	1.32 s	1.30 s	1.30 s	1.25 s

Table 3-4-7 (continued)

H	3-4-22	3-4-23	3-4-24	3-4-26
1'	4.84 d(7.2)	4.92 d(7.2)	4.91 d(7.0)	4.41 d(7.5)
2'	4.64 t(8.5)	4.62 t(8.5)	4.16 t(7.5)	3.46 dd(7.5, 9.0)
3'	4.36 (ov)	4.17 m	4.46 (ov)	3.41 dd(9.0, 9.0)
4'	4.45 (ov)	4.47 m	4.32 (ov)	3.50 m
5'	4.16 (ov)	4.24 m	4.29 m	3.21 t(11.0)
	3.66 m	3.74 br d(10.0)	3.73 m	3.91 dd(4.5, 11.0)
1''	5.38 d(7.7)	5.41 d(7.7)	4.89 d(7.5)	5.36 d(1.5)
2''	4.00 t(7.8)	3.91 (ov)	3.95 t(7.5)	3.98 dd(1.5, 2.5)
3''	4.23 (ov)	4.24 (ov)	4.16 m	3.76 dd(2.5, 9.0)
4''	4.10 (ov)	4.17 m	4.18 m	3.42 dd(9.0, 9.0)
5''	3.67 m	3.93 m	3.71 dd(12.0, 7.0), 4.34 m	3.97 m
6''	4.28 m, 4.32 m	4.31 m, 4.42 m		1.26 d(6.5)
1'''	5.20 d(7.5)	4.99 d(7.4)	5.03 d(7.3)	4.63 d(7.5)
2'''	3.94 t(7.5)	4.60 t(8.5)	4.57 t(7.5)	3.11 dd(7.5, 9.0)
3'''	4.15 (ov)	4.36 (ov)	4.18 (ov)	3.41 dd(9.0, 9.0)
4'''	4.18 m	4.00 (ov)	4.04v	3.36 dd(9.0, 9.0)
5'''	4.25 m	4.27 m	4.37 m	3.29 m
	3.74 br d(12.0)	3.69 m	3.70 m	
6'''				3.70 dd(4.5, 12.0) 3.86 dd(2.5, 12.0)
1''''	5.06 d(7.2)	4.95 d(7.5)		
2''''	4.17 (ov)	4.01 t(7.5)		
3''''	4.45 m	4.14 (ov)		
4''''	4.03 (ov)	4.28 m		
5''''	3.70 m, 4.33 m	3.80 br d(11.0), 4.33 m		
1'''''	4.94 d(7.4)			
2'''''	4.02 (ov)			
3'''''	4.31 (ov)			
4'''''	4.14 (ov)			
5'''''	4.30 (ov)			
	3.71 m			

Table 3-4-8: ^1H NMR spectroscopic data of hopane-type saponins 3-4-30~3-3-33.

H	3-4-30	3-4-31	3-4-32	3-4-33
1	1.59 m, 1.65 m	1.69 br dt(12.5, 20) 0.99 br dd(12.5, 2.5)	1.04 (ov), 1.70 m	0.86 m, 1.54 m
2	1.96 m, 2.21 m	1.96 m, 2.26 m	1.98 m, 2.26 dd(10.0, 4.0)	1.49 m, 1.73 m

Table 3-4-8 (continued)

H	3-4-30	3-4-31	3-4-32	3-4-33
3	3.39 dd(12.0, 4.0)	3.42 dd(12.0, 4.5)	3.43 dd(11.5, 5.0)	2.89 dd(11.5, 4.0)
5	1.30 d(11.0)	1.35 d(9.5)	1.36 d(10.5)	0.92 (ov)
6	4.25 ddd(10.5, 10.5, 3.0)	4.25 m	4.31 ddd(10.5, 10.5, 4.0)	3.79 m
7	1.89 m, 2.35 dd(13.0, 3.0)	1.89 m, 2.33 m	1.93 m, 2.39 dd(12.0, 4.0)	1.05 m, 1.40 m
9	1.26 (ov)	1.41 (ov)	1.40 (ov)	1.18 (ov)
11	1.46 m, 1.49 m	1.46 m, 1.55 m	1.46 m, 1.54 m	1.20 m, 1.47 m
12	1.15 m, 1.31 m	1.33 m, 1.43 (ov)	1.28 (ov), 1.48 m	1.30 m, 1.32 m
13	1.32 (ov)	1.29 (ov)	1.24 (ov)	1.25 (ov)
15	2.25 dd(13.5, 3.5)	2.29 m	2.29 dd(10.0, 5.0)	1.76 m
	1.71 m	1.76 m	1.74 m	1.11 (ov)
16	4.44 m	4.48 td(10.5.4.0)	4.49 ddd (10.0, 10.0, 4.0)	3.93 m
17	1.77 t(11.5)	1.83 t(10.5)	1.81 t(10.0)	1.27 m
19	0.95 m, 1.43 m	0.95 (ov), 1.22 (ov)	0.98 m, 1.18 (ov)	0.96 (ov), 1.44 m
20	1.33 (ov), 1.74 m	1.38 m, 1.79 m	1.38 m, 1.76 m	1.37 (ov), 1.74 m
21	2.69 q(9.5)	2.74 q(10.5)	2.73 q(10.0)	2.49 m
23	2.04 s	1.85 s	1.86 s	1.24 s
24	1.58 s	1.52 s	1.62 s	0.91 s
25	0.90 s	0.80 s	0.80 s	0.77 s
26	1.05 s	0.94 s	0.96 s	0.95 s
27	1.02 s	1.09 s	1.10 s	0.92 s
28	0.75 s	1.05 s	1.06 s	0.69 s
29	1.25 s	1.44 s	1.43 s	1.10 s
30	1.39 s	1.30 s	1.30 s	1.22 s
1'	4.88 d(7.0)	4.90 d(7.5)	4.92 d(7.5)	4.23 d(6.5)
2'	4.02 t(8.0)	4.06 t(7.5)	4.05 t(7.5)	3.22 (ov)
3'	4.15 t(8.5)	4.14 (ov)	4.17 m	3.28 (ov)
4'	4.21 m	4.20 (ov)	4.17 m	3.20 (ov)
5'	4.34 dd(11.0, 5.0)	4.39 m	4.44 dd(10.0, 4.0)	3.65 (ov)
	3.73 t(10.5)	3.76 m	3.77 m	3.03 (ov)
1''	4.87 d(7.0)	4.84 d(7.5)	4.91 d(7.5)	5.21 s
2''	3.98 t(7.5)	3.93 t(7.5)	3.95 t(7.5)	3.69 m
3''	4.18 m	4.11 (ov)	4.13 (ov)	3.53 m
4''	4.07 m	4.30 m	4.26 m	3.18 m
5''	4.42 m	4.32 m	4.38 dd(11.0, 5.0)	3.92 (ov)
	3.72 t(10.5)	3.78 dd(11.5, 6.5)	3.78 m	
6''				1.03 s
1'''	4.68 d(7.0)	5.16 d(7.5)	4.89 d(7.5)	4.20 d(6.5)
2'''	3.92 t(7.5)	4.57 t(7.5)	4.01 t(7.5)	3.01 m
3'''	4.11 m	4.18 m	4.14 (ov)	3.81 (ov)
4'''	4.12 m	4.04 m	4.28 m	3.25 m
5'''	4.38 m	4.37 m	4.41 dd(11.0, 5.0)	3.61 m
	3.79 m	3.70 ddd (17.0, 11.0, 9.0)	3.80 m	2.95 m

Table 3-4-8 (continued)

H	3-4-30	3-4-31	3-4-32	3-4-33
1 ^{'''}		4.89 d(7.5)		4.41 d(7.5)
2 ^{'''}		3.95 t(7.5)		2.83 t(8.5)
3 ^{'''}		6.16 (ov)		3.18 m
4 ^{'''}		4.13 m		2.97 (ov)
5 ^{'''}		4.34 m		3.10 t(8.5)
		3.80 dd(12.0, 7.0)		
6 ^{'''}				3.64 m, 3.37 (ov)

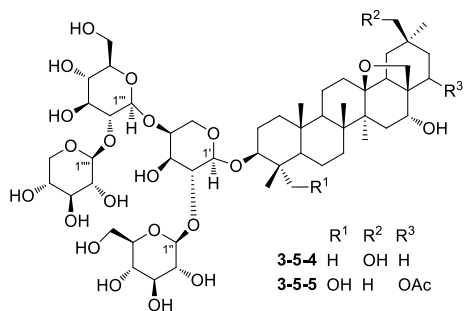
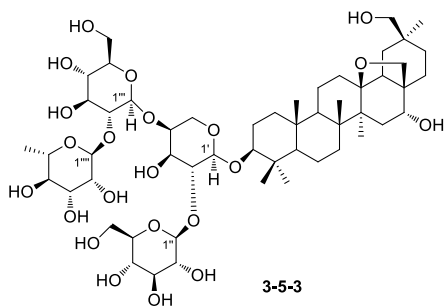
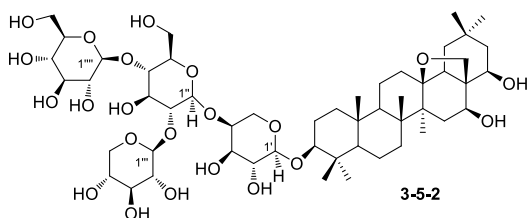
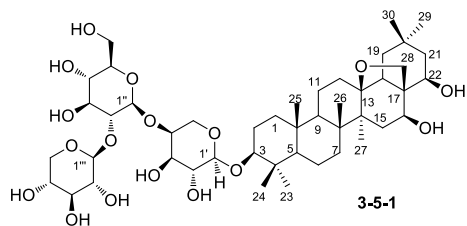
Bibliography

- [59] Sahu NP, Koike K, Banerjee S et al. *Phytochemistry*. 2001;58:1177.
- [60] Hamed AI, Springuel I, El-Emary NA et al. *Phytochemistry*. 1996;43(1):183.
- [61] Hamed AI, Piacente S, Autore G et al. *Planta Med*. 2005;71:554.
- [62] Biswas T, Gupta M, Achari B et al. *Phytochemistry*. 2005;66:621.
- [63] Inatomi Y, Inada A, Murata H et al. *Chem Pharm Bull*. 2000;48(12):1930.
- [64] Nakanishi T, Inatomi Y, Nishi M et al. *Chem Pharm Bull*. 1995;43(12):2256.
- [65] Nakanishi T, Inatomi Y, Nishi M et al. *Chem Pharm Bull*. 1997;45(1):8.
- [66] Meselhy MR. *Phytochemistry*. 1998;48(8):1415.
- [67] Hamed AI, El-Emary NA. *Phytochemistry*. 1999;50:477.
- [68] Meselhy MR, Aboutabl E-S A. *Phytochemistry*. 1997;44(5):925.

3.5 Oleanane-type Saponins

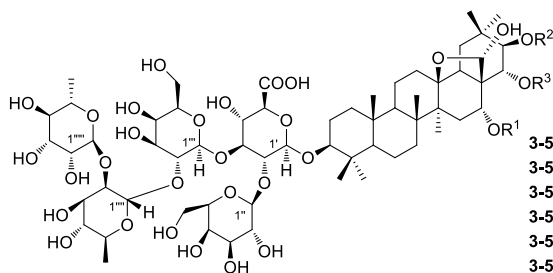
Table 3-5-1: Cos, MFs, and TSs of oleanane-type saponins 3-5-1~3-5-24.

No.	Compounds	MFs	Test solvents	Refer-ences
3-5-1	anagallosaponin VI	C ₄₆ H ₇₆ O ₁₇	C ₅ D ₅ N	[69]
3-5-2	anagallosaponin VII	C ₅₂ H ₈₆ O ₂₂	C ₅ D ₅ N	[69]
3-5-3	ardisicrenoside A	C ₅₃ H ₈₈ O ₂₂	C ₅ D ₅ N	[70]
3-5-4	ardisicrenoside B	C ₅₂ H ₈₆ O ₂₂	C ₅ D ₅ N	[70]
3-5-5	anagallosaponin VIII	C ₅₄ H ₈₈ O ₂₄	C ₅ D ₅ N	[69]
3-5-6	anagallosaponin IX	C ₆₀ H ₉₈ O ₂₉	C ₅ D ₅ N	[69]
3-5-7	maesasaponin I	C ₅₉ H ₉₆ O ₂₆	DMSO- <i>d</i> ₆	[71]
3-5-8	maesasaponin IV ₃	C ₆₂ H ₁₀₀ O ₂₇	DMSO- <i>d</i> ₆	[71]
3-5-9	maesasaponin V ₂	C ₆₄ H ₁₀₂ O ₂₈	DMSO- <i>d</i> ₆	[71]
3-5-10	maesasaponin VI ₂	C ₆₄ H ₁₀₀ O ₂₈	DMSO- <i>d</i> ₆	[71]
3-5-11	maesasaponin VI ₃	C ₆₅ H ₁₀₀ O ₂₈	DMSO- <i>d</i> ₆	[71]
3-5-12	maesabalide I	C ₇₆ H ₁₀₈ O ₃₂	C ₅ D ₅ N	[72]
3-5-13	maesabalide II	C ₇₄ H ₁₁₀ O ₃₂	C ₅ D ₅ N	[72]
3-5-14	maesabalide III	C ₇₆ H ₁₀₈ O ₃₂	C ₅ D ₅ N	[72]
3-5-15	maesabalide IV	C ₇₄ H ₁₁₀ O ₃₂	C ₅ D ₅ N	[72]
3-5-16	maesabalide V	C ₇₈ H ₁₁₀ O ₃₃	C ₅ D ₅ N	[72]
3-5-17	maesabalide VI	C ₇₆ H ₁₁₂ O ₃₃	C ₅ D ₅ N	[72]
3-5-18	3- <i>O</i> -(α -L-rhamnopyranosyl-(1 $\rightarrow$ 2))- β -D-glucopyranosyl-(1 $\rightarrow$ 4)- α -L-arabinopyranosyl) cyclamiretin A	C ₄₆ H ₇₄ O ₁₄	CD ₃ OD	[73]
3-5-19	ardisimamilloside A	C ₅₃ H ₈₆ O ₂₃	C ₅ D ₅ N	[74]
3-5-20	ardisimamilloside B	C ₅₃ H ₈₄ O ₂₂	C ₅ D ₅ N	[74]
3-5-21	cyclamiretin A-3 β - <i>O</i> - α -L-rhamnopyranosyl-(1 $\rightarrow$ 3)-[β -D-xylopyranosyl-(1 $\rightarrow$ 2)]- β -D-glucopyranosyl-(1 $\rightarrow$ 4)-[β -D-glucopyranosyl-(1 $\rightarrow$ 2)]- α -L-arabinopyranoside	C ₅₈ H ₉₄ O ₂₆	C ₅ D ₅ N	[75]
3-5-22	cyclamiretin A-3 β - <i>O</i> - α -L-rhamnopyranosyl-(1 $\rightarrow$ 3)-[β -D-glucopyranosyl-(1 $\rightarrow$ 3)]- β -D-xylopyranosyl-(1-2)]- β -D-glucopyranosyl-(1 $\rightarrow$ 4)-[β -D-glucopyranosyl-(1 $\rightarrow$ 2)]- α -L-arabinopyranoside	C ₆₄ H ₁₀₄ O ₃₁	C ₅ D ₅ N	[75]
3-5-23	cyclamiretin A-3 β - <i>O</i> - α -L-rhamnopyranosyl-(1 $\rightarrow$ 3)-[β -D-xylopyranosyl-(1 $\rightarrow$ 2)]- β -D-galactopyranosyl-(1 $\rightarrow$ 4)-[β -D-6- <i>O</i> -acetylglucopyranosyl-(1 $\rightarrow$ 2)]- α -L-arabinopyranoside	C ₆₀ H ₉₆ O ₂₇	C ₅ D ₅ N	[75]
3-5-24	thalicoside F	C ₄₇ H ₇₄ O ₁₇	C ₅ D ₅ N	[76]

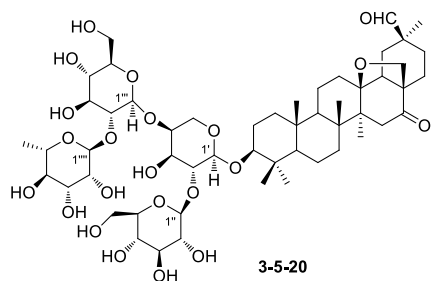
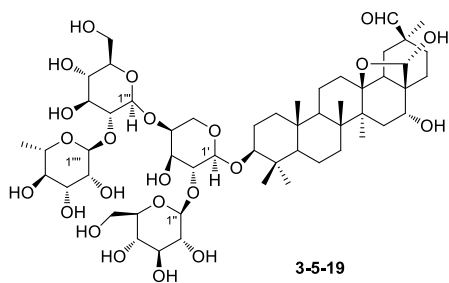
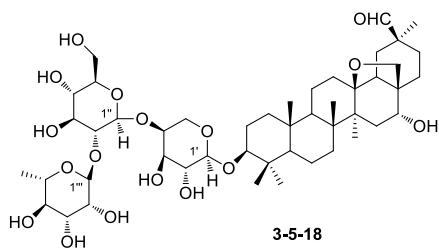
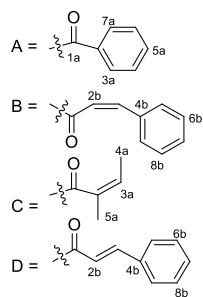


	R ¹	R ²	R ³
3-5-4	H	OH	H
3-5-5	OH	H	OAc





	R ¹	R ²	R ³
3-5-12	H	A	B
3-5-13	H	C	B
3-5-14	H	A	D
3-5-15	H	C	D
3-5-16	Ac	A	D
3-5-17	Ac	C	D



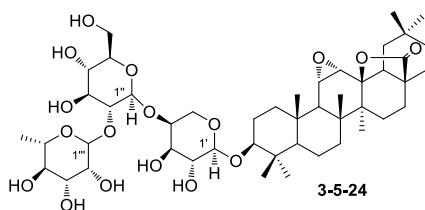
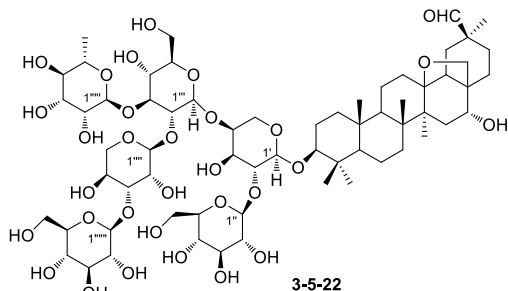
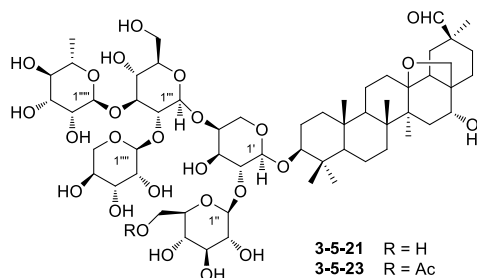


Table 3-5-2: ^1H NMR spectroscopic data of oleanane-type saponins 3-5-1, 3-5-2, and 3-5-5~3-5-7.

H	3-5-1	3-5-2	3-5-5	3-5-6	3-5-7
3	3.34 dd(11.5, 5.0)	3.32 dd(11.0, 5.0)	4.13 m	4.13 m	2.96 br d
16	4.14 m	4.08 m	4.57 m	4.57 m	4.12 m
19	α 2.95 dd (13.5, 12.0)	α 2.93 dd (13.0, 12.0)	α 2.80 dd (12.0, 11.0)	α 2.80 dd (12.0, 11.0)	—
21	β 2.90 dd (12.0, 10.0)	β 2.90 dd (12.0, 10.0)	β 2.77 dd (12.0, 11.5)	β 2.76 dd (12.0, 11.5)	5.65 d(9.8)
22	—	—	5.22 dd(11.5, 5.5)	5.25 dd(12.5, 5.5)	3.86 (ov)
23	1.28 s	1.28 s	3.70 d(10.0) 4.22 d(10.0)	3.70 d(10.0) 4.20 d(10.0)	—
24	1.05 s	1.05 s	1.08 s	1.07 s	—
25	0.89 s	0.89 s	0.94 s	0.93 s	—

Table 3-5-2 (continued)

H	3-5-1	3-5-2	3-5-5	3-5-6	3-5-7
26	1.35 s	1.35 s	1.33 s	1.33 s	—
27	1.63 s	1.63 s	1.49 s	1.48 s	—
28	3.69 d(8.0) 4.02 d(8.0)	3.71 d(8.0) 4.02 d(8.0)	—	—	4.61 d(6.8)
29	1.13 s	1.13 s	1.05 s	1.05 s	—
30	1.01 s	1.01 s	1.01 s	1.00 s	—
OAc			2.02 s(22-OAc)	2.02 s(22-OAc)	
3a					5.98 br q(7.2)
4a					1.89 br d(7.2)
5a					1.85 br s
1'	4.67 d(6.5)	4.66 d(7.5)	5.01 d(7.0)	4.97 d(7.0)	4.38 d(7.0)
1''	5.03 d(7.5)	4.87 d(7.5)	5.03 d(7.0)	5.03 d(6.0)	4.61 d(6.8)
1'''	4.89 d(6.0)	4.93 d(8.0)	5.50 d(7.5)	5.14 d(8.0)	5.03 (ov)
1''''		5.16 d(8.0)	4.96 d(7.5)	4.91 d(7.5)	5.06 br s (ov)
1'''''				5.47 d(7.5)	

Table 3-5-3: ¹H NMR spectroscopic data of oleanane-type saponins **3-5-3**, **3-5-4**, and **3-5-8~3-5-10**.

H	3-5-3	3-5-4	3-5-8	3-5-9	3-5-10
1	0.75, 1.56	0.78, 1.56	1.60 m, 0.8 m	—	—
2	1.71, 1.89	1.71, 1.91	1.71 m, 1.52 m	—	—
3	3.09 dd(11.6, 4.6)	3.11 dd(11.6, 4.4)	2.98 br d	2.99 br d(11.1)	2.99 br d(11.3)
5	0.60 d(11.0)	0.63 d(11.0)	0.61 d(10.6)	—	—
6	1.34	1.34	1.29 m, 1.38 m	—	—
7	1.15, 1.43	1.16, 1.46	1.40 m, 1.06 m	—	—
9	1.17	1.19	1.06 m	—	—
11	1.35, 1.66	1.35, 1.63	1.40 m, 1.14 m	—	—
12	1.40, 2.05 ddd(13.5, 9.3, 5.2)	1.42, 2.06 ddd(13.5, 9.3, 5.2)	1.90 m, 1.25 m	—	—
15	1.39, 2.16 dd(14.0, 5.0)	1.40, 2.18 dd(14.3, 5.9)	1.81 m, 1.14 m	—	—
16	4.11	4.12	4.11 m	5.19 m	4.13 m
18	1.70	1.70	1.71 m	—	—
19	1.88, 2.61 t(14.0, 12.5)	1.89, 2.63 t(14.1, 12.5)	2.53 m, 1.22 m	—	—
21	1.54, 2.16 td	1.58, 2.43 td	5.90 d(10.0)	5.43 (ov)	5.95 d(10.0)
22	1.58, 1.85	1.59, 1.85	5.42 d(10.0)	5.43 (ov)	5.50 d(10.0)
23	1.08 s	1.14 s	0.95 s	—	—
24	0.91 s	0.98 s	0.73 s	—	—

Table 3-5-3 (continued)

H	3-5-3	3-5-4	3-5-8	3-5-9	3-5-10
25	0.79 s	0.79 s	0.79 s	—	—
26	1.23 s	1.25 s	1.06 s	—	—
27	1.45 s	1.47 s	1.16 s	—	—
28	3.21 d(7.4), 3.52 d(7.4)	3.22 d(7.4), 3.53 d(7.4)	4.50 br s	4.70 br s	4.52 br s
29	1.19 s	1.21 s	0.82 s	—	—
30	3.60 d(10.7), 3.82	3.61, 3.83	0.93 s	—	—
OAc				2.16 s(16-OAc)	
3a			6.02 br q(7.2)	6.08 br q(7.2)	5.99 br q(7.2)
4a			1.86 br d(7.2)	1.87 br d(7.2)	1.84 br d(7.2)
5a			1.76 br s	1.76 br s	1.76 br s
2b			2.14 m, 2.04 m	2.04 m, 2.04 m	
3b			0.91 t(7.6)	0.88 t(7.7)	5.90 br q(7.2)
4b					1.77 br d(7.2)
5b					1.73 br s
1'	4.83 (ov)	4.69 d(6.1)	4.41 d(7.0)	4.41 d(7.1)	4.39 d(7.2)
2'	4.39	4.36	3.60 m	—	—
3'	4.35	4.16	3.80 t(8.7)	—	—
4'	4.44	4.16	3.35 m	—	—
5'	3.74 d(10.6), 4.30	3.61, 4.51 dd(12.0, 3.3)	3.66 d(10.1)	—	—
1''	5.15 d(7.6)	5.27 d(7.6)	4.59 (ov)	4.60 d(7.1)	4.62 (ov)
2''	3.84	3.87	3.25 (ov)	—	—
3''	4.08	4.06	3.22 m	—	—
4''	4.00	4.01	3.63 m	—	—
5''	3.84	3.84	3.39 m	—	—
6''	4.18 dd(11.6, 4.9), 4.29	4.21 dd(11.9, 5.0), 4.36	3.35~3.50 m(2H)	—	—
1'''	5.03 d(7.6)	4.87 d(8.0)	5.01 (ov)	5.01 (ov)	5.03 (ov)
2'''	4.05	3.78 t(8.3)	3.49 m	—	—
3'''	3.99	4.03	3.49 m	—	—
4'''	3.88	3.99	3.55 m	—	—
5'''	3.63 m	3.66 m	3.35 m	—	—
6'''	4.28	4.28 dd(10.1, 2.0)	3.35~3.50 m(2H)	—	—
	4.10	4.12			
1''''	6.10 d(11.2)	4.81 d(7.3)	5.03 br s (ov)	5.03 br s (ov)	5.03 br s (ov)
2''''	4.51	3.83	3.66 m	—	—
3''''	4.44	3.87	3.49 m	—	—
4''''	4.03	3.98	3.22 m	—	—
5''''	4.81	3.60, 4.41 dd(11.3, 5.2)	3.85 m	—	—
6''''	1.66 d(6.1)		1.10 d(6.1)	—	—

Table 3-5-4: ^1H NMR spectroscopic data of oleanane-type saponins **3-5-11~3-5-15**.

H	3-5-11	3-5-12	3-5-13	3-5-14	3-5-15
1	—	1.51 m, 0.77 m	1.49 m, 0.79 m	1.52 m, 0.79 m	1.50 m, 0.79 m
2	—	2.19 m, 1.80 m	2.16 m, 1.77 m	2.19 m, 1.80 m	2.16 m, 1.78 m
3	2.96 br d	3.27 br d(10.8)	3.24 br d(11.6)	3.26 br d(12.4)	3.24 br d(11.2)
5	—	0.73 d(9.6)	0.71 d(11.0)	0.73 d(11.2)	0.71 d(11.7)
6	—	1.39 m, 1.55 m	1.39 m, 1.53 m	1.38 m, 1.53 m	1.34 m, 1.52 m
7	—	1.60 m, 1.27 m	1.59 m, 1.23 m	1.60 m, 1.27 m	1.54 m, 1.28 m
9	—	1.29 m	1.25 m	1.30 m	1.28 m
11	—	1.72 m, 1.45 m	1.71 m, 1.42 m	1.75 m, 1.48 m	1.73 m, 1.43 m
12	—	2.16 m, 1.67 m	2.12 m, 1.61 m	2.17 m, 1.70 m	2.14 m, 1.64 m
15	—	2.12 m, 1.63 m	2.14 m, 1.61 m	2.23 m, 1.70 m	2.20 m, 1.68 m
16	5.18 m	4.61 m	4.57 m	4.83 m	4.77 m
18	—	2.46 br d(14.3)	2.38 br d(14.7)	2.49 br d(14.5)	2.42 br d(16.0)
19	—	3.18 m, 1.57 m	3.12 m, 1.51 m	3.20 m, 1.60 m	3.14 m, 1.55 m
21	5.43 (ov)	6.96 d(9.9)	6.79 d(10.1)	7.04 d(9.8)	6.86 d(10.0)
22	5.43 (ov)	6.57 d(9.9)	6.41 d(10.1)	6.60 d(9.8)	6.43 d(10.0)
23	—	1.29 s	1.27 s	1.29 s	1.27 s
24	—	1.20 s	1.17 s	1.18 s	1.16 s
25	—	0.84 s	0.82 s	0.83 s	0.81 s
26	—	1.35 s	1.33 s	1.36 s	1.34 s
27	—	1.65 s	1.61 s	1.67 s	1.64 s
28	4.67 br s	5.20 s	5.16 s	5.26 s	5.21 s
29	—	1.18 s	1.15 s	1.21 s	1.18 s
30	—	1.35 s	1.27 s	1.37 s	1.28 s
OAc	2.16 s(16-OAc)				
3a	6.09 br q(7.2)	8.36 d(7.6)	5.93 q (ov)	8.36 d(7.6)	5.93 q(7.3)
4a	1.88 br d(7.2)	7.43 m	2.09 d(7.2)	7.40 m	2.09 d(7.3)
5a	1.76 br s	7.52 m	2.02 s	7.45 m	2.02 s
6a		7.43 m		7.40 m	
7a		8.36 d(7.6)		8.36 d(7.2)	
2b	2.03 m, 2.00 m	5.84 d(12.8)	5.93 d(12.8)	6.39 d(16.0)	5.93 d(16.0)
3b	1.38 m, 1.38 m	6.71 d(12.8)	6.83 d(12.8)	7.67 d(16.0)	6.83 d(16.0)
4b	0.76 m				
5b		7.52 d(7.4)	7.79 d(8.1)	7.24 m	7.79 m
6b		7.18 m	7.32 m	7.15 m	7.32 m
7b		7.25 m	7.32 m	7.27 m	7.32 m
8b		7.18 m	7.32 m	7.15 m	7.32 m
9b		7.52 d(7.4)	7.79 d(8.1)	7.24 m	7.79 m
1'	4.37 d(7.0)	4.98 d(5.6)	4.97 d(5.6)	4.99 d(5.8)	4.97 d(6.7)
2'	—	4.73 m	4.73 m	4.74 m	4.72 m
3'	—	4.75 m	4.74 m	4.75 m	4.74 m
4'	—	4.67 m	4.68 m	4.71 m	4.67 m
5'	—	4.58 m	4.57 m	4.59 m	4.57 m
1''	4.61 d(7.0)	5.73 d(6.8)	5.73 d(7.4)	5.73 d(7.3)	5.72 d(7.0)
2''	—	4.52 m	4.52 m	4.53 m	4.50 m

Table 3-5-4 (continued)

H	3-5-11	3-5-12	3-5-13	3-5-14	3-5-15
3''	—	4.29 m	4.30 m	4.31 m	4.28 m
4''	—	4.44 m	4.41 m	4.42 m	4.40 m
5''	—	4.39 m	4.43 m	4.43 m	4.43 m
6''	—	4.53 m, 4.34 m	4.55 m, 4.31 m	4.56 m, 4.35 m	4.53 m, 4.31 m
1'''	5.03 (ov)	6.12 d(7.1)	6.09 d(7.7)	6.09 d(7.3)	6.09 d(7.3)
2'''	—	4.66 m	4.66 m	4.66 m	4.65 m
3'''	—	4.49 m	4.52 m	4.51 m	4.48 m
4'''	—	4.47 m	4.48 m	4.45 m	4.46 m
5'''	—	4.24 m	4.23 m	4.31 m	4.22 m
6'''	—	4.33 m	4.33 m	4.33 m	4.33 m
1''''	5.05 brs (ov)	6.17 brs	6.17 brs	6.17 brs	6.16 brs
2''''	—	4.87 m	4.87 m	4.87 m	4.86 m
3''''	—	4.75 m	4.76 m	4.76 m	4.75 m
4''''	—	4.15 t(9.0)	4.16 t(9.2)	4.15 t(9.2)	4.15 t(9.3)
5''''	—	4.84 m	4.84 m	4.83 m	4.83 m
6''''	—	1.43 d(5.3)	1.45 d(6.1)	1.44 d(5.5)	1.44 d(5.9)
1'''''		6.01 brs	6.02 brs	6.01 brs	6.01 brs
2'''''		4.77 m	4.78 m	4.77 m	4.77 m
3'''''		4.54 m	4.55 m	4.56 m	4.55 m
4'''''		4.25 t(8.8)	4.26 t(9.5)	4.26 d(9.9)	4.25 t(9.3)
5'''''		4.56 m	4.55 m	4.57 m	4.53 m
6'''''		1.67 d(5.7)	1.68 d(6.1)	1.68 d(6.1)	1.67 d(6.1)

Table 3-5-5: ¹H NMR spectroscopic data of oleanane-type saponins 3-5-16~3-5-20.

H	3-5-16	3-5-17	3-5-18	3-5-19	3-5-20
1	1.48 m, 0.73 m	1.44 m, 0.74 m	—	0.78, 1.62	0.76, 1.58
2	2.14 m, 1.75 m	2.13 m, 1.74 m	—	1.88, 2.02	1.80, 2.01
3	3.19 br d(11.1)	3.18 br d(11.4)	3.12 dd(11, 5)	3.16	3.16
5	0.66 d(8.4)	0.65 d(9.2)	0.73 dd(10, 2)	0.62 d(11.3)	0.62 d(11.0)
6	1.30 m, 1.52 m	1.30 m, 1.48 m	—	1.42	1.41
7	1.32 m, 1.08 m	1.31 m, 1.05 m	—	1.18, 1.52	0.94
9	1.18 m	1.22 m	—	1.26	1.08
11	1.63 m, 1.41 m	1.73 m, 1.44 m	—	1.36, 1.60	1.67
12	2.09 m	2.05 m	—	2.07	1.54
	1.63 m	1.57 m		2.60 td(13.0, 5.5)	
15	2.23 m	2.20 m	—	14.6	2.82
	1.49 m	1.48 m		2.20 dd(13.5, 5.0)	
16	5.97 m	5.92 m	3.92 m	4.16	
18	2.52 br d(14.0)	2.45 br d(14.4)	1.06 m	1.88	1.88
19	2.80 m	2.67 m	1.95 dd(12, 3)	2.17	
	1.65 m	1.60 m	2.5 dd(14, 12)		

Table 3-5-5 (continued)

H	3-5-16	3-5-17	3-5-18	3-5-19	3-5-20
21	6.24 d(10.1)	6.07 d(10.2)	—	2.60	1.93
22	6.58 d(10.1)	6.42 d(10.2)	—	1.85, 2.01	0.96
23	1.26 s	1.25 s	1.03 s	1.17 s	1.18 s
24	1.16 s	1.15 s	0.82 s	1.01 s	1.03 s
25	0.78 s	0.77 s	0.89 s	0.84 s	0.80 s
26	1.26 s	1.25 s	1.13 s	1.33 s	1.26 s
27	1.38 s	1.35 s	1.27 s	1.54 s	1.10 s
28	5.32 s	5.29 s	2.97 d(7.6), 3.47 d(7.6)	5.14 s	3.89 d(8.0), 4.32 d(8.0)
29	1.16 s	1.15 s	0.97 s	1.04 s	0.91 s
30	1.34 s	1.25 s	9.4 s	9.71 s	9.53 s
OAc	2.66 s(16-OAc)	2.61 s(16-OAc)			
3a	8.30 d(7.7)	5.92 q(7.3)			
4a	7.40 m	1.98 d(7.3)			
5a	7.47 m	1.99 s			
6a	7.40 m				
7a	8.30 d(7.7)				
2b	6.50 d(16.1)	6.68 d(16.1)			
3b	7.91 d(16.1)	8.03 d(16.1)			
5b	7.25 d(7.0)	7.32 m			
6b	7.47 m	7.61 m			
7b	7.48 m	7.32 m			
8b	7.47 m	7.61 m			
9b	7.25 d(7.0)	7.32 m			
1'	4.95 d(5.9)	4.95 d(5.9)	4.26 d(6)	4.97 br s	4.95 br s
2'	4.75 m	4.74 m	3.56 m	4.58	4.59
3'	4.76 m	4.75 m	3.56 m	4.27	4.28
4'	4.70 m	4.71 m	3.92 m	4.61	4.60
5'	4.57 m	4.60 m	4.13 dd(12.2, 3.1)	4.32, 4.46	4.28, 4.48
1''	5.74 d(6.6)	5.74 d(7.3)	4.56 d(7.3)	5.38 d(7.6)	5.38 d(7.6)
2''	4.53 m	4.50 m	3.44 m	4.08	4.10
3''	4.30 m	4.31 m	3.44 m	4.23	4.28
4''	4.37 m	4.39 m	3.3 m	4.27	4.22
5''	4.40 m	4.41 m	3.25 m	4.33	4.32
6''	4.57 m, 4.33 m	4.54 m, 4.32 m	3.65 dd(12, 5) 3.84 dd(12, 2)	4.28, 4.50	4.26, 4.49
1'''	6.13 d(7.3)	6.12 d(7.8)	5.26 d(1.9)	5.10 d(7.5)	5.25 d(7.6)
2'''	4.67 m	4.67 m	3.91 dd(3.4, 1.9)	4.04	4.00
3'''	4.51 m	4.50 m	3.79 dd(9.5, 3.5)	4.21	4.20
4'''	4.48 m	4.48 m	3.35 t(9.5)	4.13	4.12
5'''	4.25 m	4.26 m	4.06 qd(9.4, 6.5)	3.83	3.82
6'''	4.35 m	4.36 m	1.26 d(6.5)	4.25, 4.50	4.26, 4.50
1''''	6.18 br s	6.19 br s		6.38 br s	6.41 br s

Table 3-5-5 (continued)

H	3-5-16	3-5-17	3-5-18	3-5-19	3-5-20
2''''	4.88 m	4.88 m		4.75	4.75
3''''	4.76 m	4.76 m		4.70	4.70
4''''	4.16 t(9.2)	4.16 m		4.61	4.60
5''''	4.86 m	4.86 m		5.04	5.02
6''''	1.44 d(5.6)	1.45 m		1.82 d(6.2)	1.82 d(6.1)
1'''''	6.02 br s	6.02 br s			
2'''''	4.77 m	4.77 m			
3'''''	4.55 m	4.56 m			
4'''''	4.28 t(8.7)	4.26 m			
5'''''	4.55 m	4.53 m			
6'''''	1.68 d(5.6)	1.69 m			

Table 3-5-6: ¹H NMR spectroscopic data of oleanane-type saponins 3-5-21~3-5-24.

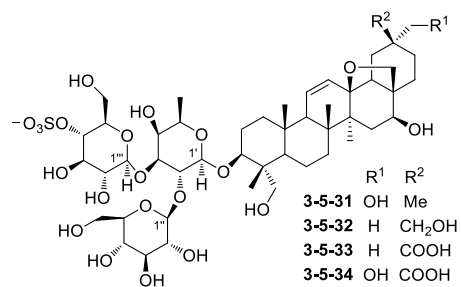
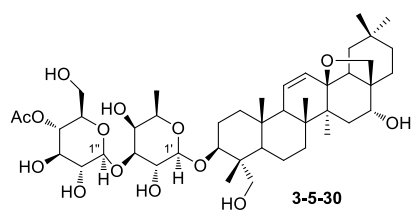
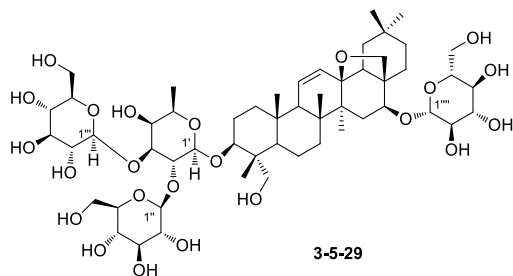
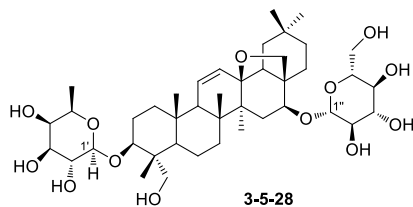
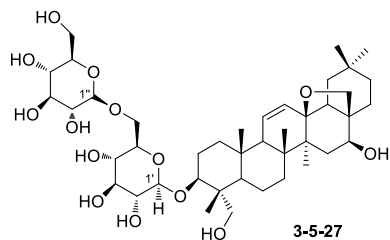
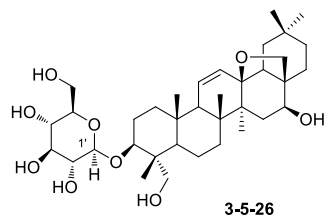
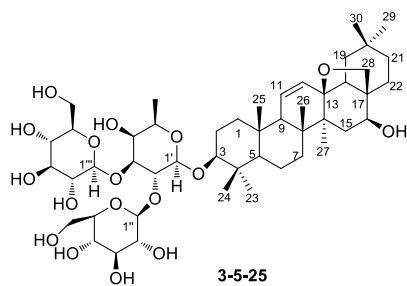
H	3-5-21	3-5-22	3-5-23	3-5-24
1	0.85 (ov), 1.59 (ov)	0.85 (ov), 1.61 (ov)	0.81 (ov), 1.59 (ov)	1.05, 1.76
2	1.72 m, 1.96 m	1.77 (ov), 1.94 (ov)	1.72 (ov), 1.96 (ov)	1.83, 2.02
3	3.12 m	3.11	3.12 (ov)	3.24 dd(11.5, 4.6)
5	0.65 d(10.7)	0.65 d(10.7)	0.70 d(11.0)	0.71 br d
6	1.40 (ov)	1.41 (ov)	1.40 (ov)	1.45, 0.88
7	1.19 (ov), 1.51 (ov)	1.20 (ov), 1.51 (ov)	1.19 (ov), 1.51 (ov)	1.03, 1.18
9	1.26 (ov)	1.27 (ov)	1.26 (ov)	1.64
11	1.70 m	1.71 m	1.70 (ov)	3.07 dd(3.9, 1.5)
12	1.43 (ov)	1.42 (ov)	1.43 (ov)	3.24 m(3.9)
15	1.42 (ov), 2.18 m	1.42 (ov), 2.17 m	1.42 (ov), 2.18 (ov)	1.00, 1.34
16	4.21 (ov)	4.21 (ov)	4.21 (ov)	1.28, 2.16
18	1.36 (ov)	1.39 (ov)	1.36 (ov)	2.52 dd
19	2.12 (ov), 2.84 t(13.5)	2.09 (ov), 2.84 t(13.5)	2.12 (ov), 2.84 t(13.5)	1.72, 1.94
21	2.08 (ov), 2.58 m	2.08 (ov), 2.51 m	2.08 (ov), 2.58 m	1.19, 1.33
22	1.56 (ov), 1.96 (ov)	1.56 (ov), 1.96 (ov)	1.56 (ov), 1.96 (ov)	1.64, 1.78
23	1.17 s	1.17 s	1.23 s	1.20 s
24	1.02 s	1.02 s	1.07 s	0.93 s
25	0.82 s	0.82 s	0.85 s	0.90 s
26	1.27 s	1.28 s	1.29 s	1.22 s
27	1.52 s	1.52 s	1.52 s	1.12 s
28	3.15 (ov), 3.53 (ov)	3.15 (ov), 3.53 (ov)	3.15 (ov), 3.53 (ov)	
29	1.01 s	1.00 s	1.01 s	0.89 s
30	9.62 s	9.61 s	9.62 s	0.81 s
1'	4.82 d(5.6)	4.82 (ov)	4.79 (ov)	4.74 d(6.3)
2'	4.51 (ov)	4.48 (ov)	4.51 (ov)	4.44
3'	4.30 (ov)	4.29 (ov)	4.26 (ov)	4.25
4'	4.02 (ov)	4.02 (ov)	4.02 (ov)	4.38 br s
5'	3.64 (ov), 4.53 (ov)	3.64 (ov), 4.53 (ov)	3.66 (ov), 4.53 (ov)	3.82, 4.67

Table 3-5-6 (continued)

H	3-5-21	3-5-22	3-5-23	3-5-24
1''	5.39 d(7.6)	5.34 d(7.6)	5.34 d(7.6)	5.17 d(7.5)
2''	4.03 (ov)	4.03 (ov)	4.03 (ov)	4.17
3''	4.23 (ov)	4.23 (ov)	4.03 (ov)	4.20
4''	4.25 (ov)	4.25 (ov)	4.10 (ov)	4.17
5''	4.00 (ov)	4.00 (ov)	4.10 (ov)	3.87
6''	4.39 m, 4.52 (ov)	4.39 m, 4.49 (ov)	4.80 (ov), 4.92 (ov)	4.33, 4.46
OAc			2.05 s(6''-OAc)	
1'''	4.87 d(7.7)	4.85 d(7.9)	4.89 d(7.4)	6.27 s
2'''	3.98 (ov)	3.96 (ov)	4.02 (ov)	4.75 s
3'''	4.09 (ov)	4.09 (ov)	4.09 (ov)	4.76
4'''	4.27 (ov)	4.27 (ov)	4.27 (ov)	4.22
5'''	3.67 (ov)	3.67 (ov)	3.67 (ov)	4.96
6'''	4.28 (ov), 4.34 (ov)	4.28 (ov), 4.34 (ov)	4.28 (ov), 4.34 (ov)	1.68 d(6.0)
1''''	5.01 d(6.8)	5.01 d(6.5)	5.07 d(6.8)	
2''''	4.01 (ov)	4.01 (ov)	4.01 (ov)	
3''''	4.23 (ov)	4.03 (ov)	4.02 (ov)	
4''''	4.26 (ov)	4.06 (ov)	4.26 (ov)	
5''''	3.56 (ov), 4.45 (ov)	3.51 (ov), 4.39 (ov)	3.56 (ov), 4.45 (ov)	
1'''''	5.93 s	5.89 s	5.92 s	
2'''''	4.97 (ov)	4.94 (ov)	4.97 (ov)	
3'''''	4.49 (ov)	4.49 (ov)	4.49 (ov)	
4'''''	4.30 (ov)	4.30 (ov)	4.30 (ov)	
5'''''	4.79 (ov)	4.82 (ov)	4.79 (ov)	
6'''''	1.63 d(6.2)	1.63 d(6.1)	1.63 d(6.1)	
1''''''		5.14 d(7.8)		
2''''''		4.03 (ov)		
3''''''		4.02 (ov)		
4''''''		4.28 (ov)		
5''''''		3.89 (ov)		
6''''''		4.04 (ov), 4.42 (ov)		

Table 3-5-7: Cos, MFs, and TSs of oleanane-type saponins 3-5-25~3-5-34.

No.	Compounds	MFs	Test solvents	References
3-5-25	clinoposaponin XI	C ₄₈ H ₇₈ O ₁₇	C ₅ D ₅ N	[77]
3-5-26	clinoposaponin IX	C ₃₆ H ₅₈ O ₉	C ₅ D ₅ N	[77]
3-5-27	clinoposaponin X	C ₄₂ H ₆₈ O ₁₄	C ₅ D ₅ N	[77]
3-5-28	clinoposaponin VI	C ₄₂ H ₆₈ O ₁₃	C ₅ D ₅ N	[78]
3-5-29	clinoposaponin VIII	C ₅₄ H ₈₈ O ₂₃	C ₅ D ₅ N	[78]
3-5-30	4''-O-acetylsaikosaponind	C ₄₄ H ₇₀ O ₁₄	CD ₃ OD	[79]
3-5-31	sandrosaponin II	C ₄₈ H ₇₇ O ₂₂ S ⁻	CD ₃ OD	[80]
3-5-32	sandrosaponin V	C ₄₈ H ₇₇ O ₂₂ S ⁻	CD ₃ OD	[80]
3-5-33	sandrosaponin III	C ₄₈ H ₇₅ O ₂₃ S ⁻	CD ₃ OD	[80]
3-5-34	sandrosaponin IV	C ₄₈ H ₇₅ O ₂₄ S ⁻	CD ₃ OD	[80]



	R ¹	R ²
3-5-31	OH	Me
3-5-32	H	CH ₂ OH
3-5-33	H	COOH
3-5-34	OH	COOH

Table 3-5-8: ^1H NMR spectroscopic data of oleanane-type saponins **3-5-25~3-5-29**.

H	3-5-25	3-5-26	3-5-27	3-5-28	3-5-29
3	3.23 dd(11.5, 4.5)	4.29 dd(11.5, 4.5)	4.27 dd(11.5, 5)	4.26 dd(12, 5)	4.12 dd(12, 5)
11	5.95 d(10.5)	5.98 d(10.5)	5.94 d(10.5)	5.98 d(10)	5.95 d(10)
12	5.66 dd(10.5, 3)	5.66 dd(10.5, 2.5)	5.60 dd(10.5, 3)	5.61 dd(10, 2)	5.59 dd(10, 2)
16	4.54 m	4.50 (ov)	4.48 (ov)	4.59 m	4.57 brt(7.5)
23	1.28 s	3.72 d(11), 4.35 d(11)	3.69 d(11), 4.33 d(11)	3.67 d(10), 4.32 d(10)	3.67 d(11), 4.34 d(11)
24	1.08 s	0.99 s	0.98 s	0.97 s	1.02 s
25	0.97 s	0.97 s	0.96 s	0.94 s	0.94 s
26	1.36 s	1.40 s	1.38 s	1.27 s	1.25 s
27	1.15 s	1.11 s	1.05 s	1.12 s	1.10 s
28	3.34 d(7), 4.39 d(7)	3.34 d(7), 4.38 d(7)	3.33 d(7), 4.38 d(7)	3.29 d(7), 4.27 d(7)	3.27 d(7), 4.25 d(7.7)
29	0.92 s	0.94 s	0.94 s	0.89 s	0.93 s
30	0.90 s	0.90 s	0.91 s	0.88 s	0.89 s
1'	4.69 d(8)	5.12 d(8)	5.06 d(8.5)	4.95 d(8)	4.91 d(8)
2'	4.68 t(8.5)	4.03 t(8)	3.96 t(8.5)	4.33 dd(8, 8)	4.64 dd(10, 8)
3'	4.25 (ov)	4.14 t(8)	4.07 t(8.5)	4.01 dd(10, 2.5)	4.09 dd(10, 3)
4'	4.30 (ov)	4.22 t(8)	4.12 t(9)	4.31 (ov)	4.24 (ov)
5'	3.73 q(6.5)	3.89 m(8)	3.98 (ov)	3.78 m	3.62 m
6'	1.44 d(6.5)	4.37 dd(11.5, 4) 4.50 br d(11.5)	4.32 (ov) 4.77 br d(11)	1.56 d(6)	1.40 d(6)
1''	5.56 d(8)		5.08 d(8.5)	5.04 d(8)	5.56 d(8)
2''	4.05 t(8)		4.02 t(8.5)	—	—
3''	4.19 t(9)		4.03 (ov)	—	—
4''	4.13 t(9)		4.19 (ov)	—	—
5''	3.68 m		3.90 m	—	—
6''	4.26 (ov) 4.35 dd(11, 3)		4.34 (ov) 4.48 dd(11.5, 1.5)	—	—
1'''	4.35 dd(8)				5.27 d(8)
2'''	3.99 t(8)				—
3'''	4.21 (ov)				—
4'''	4.21 (ov)				—
5'''	3.93 m				—
6'''	4.32 (ov) 4.45 dd(11.5, 2)				—
1''''					5.03 d(8)

Table 3-5-9: ^1H NMR spectroscopic data of oleanane-type saponins **3-5-30~3-5-34**.

H	3-5-30	3-5-31	3-5-32	3-5-33	3-5-34
1	—	1.83, 0.90	1.82, 0.93	1.83, 0.93	1.83, 0.92
2	—	1.96, 1.82	1.96, 1.81	1.96, 1.81	1.96, 1.80
3	—	3.6 dd(11.7, 4.8)	3.61 dd(11.7, 4.8)	3.61 dd(11.7, 4.8)	3.61 dd(11.7, 4.9)
5	—	1.17	1.18	1.16	1.18
6	—	1.54	1.52	1.54, 1.51	1.52, 1.11
7	—	1.52, 1.21	1.51, 1.20	1.53, 1.21	1.53, 1.20
9	—	1.90	1.89	1.89	1.90
11	5.94 d(10.4)	5.94 d(11.5)	5.93 d(10.4)	5.93 d(10.4)	5.88
12	5.37 dd(10.4, 2.4)	5.38 dd(11.5, 3.2)	5.42 dd(10.4, 3.0)	5.53 dd(10.5, 3.2)	5.52 dd(11.5, 3.2)
15	—	1.59, 1.44	1.58, 1.43	1.59, 1.42	1.58, 1.42
16	3.91 d(4.8)	4.16 dd(10.0, 5.9)	4.21 dd(10.2, 6.4)	4.18 dd(10.3, 5.9)	4.18 dd(9.2, 5.8)
18	—	1.81	1.74 dd(12.6, 5.5)	1.90	1.96
19	—	1.23, 1.85	1.58, 1.62	1.52, 2.18 dt (12.2, 3.2, 3.2)	1.70 2.10 dd(11.7, 3.5)
21	—	1.57, 1.13	1.40, 1.28	2.03, 1.26	1.96, 1.41
22	—	2.10, 1.28	2.03, 1.21	2.05, 1.36	2.10, 1.41
23	—	3.78, 3.26	3.78, 3.25	3.77, 3.27	3.78, 3.26
24	0.71 s ^①	0.72 s	0.72 s	0.72 s	0.72 s
25	0.93 s ^①	0.94 s	0.94 s	0.94 s	0.94 s
26	0.95 s ^①	1.09 s	1.08 s	1.08 s	1.09 s
27	0.96 s ^①	1.05 s	1.06 s	1.05 s	1.06 s
28	3.11 d(7.4) 3.45 d(7.4)	3.9 d(7.1) 3.05 d(7.1)	3.88 d(7.1) 3.02 d(7.1)	3.86 d(7.1) 2.95 d(7.1)	3.87 d(7.3) 2.98 d(7.3)
29	1.05 s ^①	3.24 b. s.	0.95 s	1.12 s	3.46 b. s.
30	1.30 s ^①	0.9 s	3.52 d(11.3) 3.37 d(11.3)		
1'	4.39 d(7.2)	4.46 d(7.8)	4.46 d(7.8)	4.46 d(7.8)	4.46 d(7.8)
2'	—	3.92 dd(7.8, 9.8)	3.92 dd(7.8, 9.8)	3.92 dd(7.8, 9.8)	3.92 dd(7.8, 9.8)
3'	—	3.78	3.78	3.78	3.78
4'	—	3.87 dd(3.4, 1)	3.87 dd(3.4, 1)	3.87 dd(3.4, 1)	3.87 dd(3.4, 1)
5'	—	3.64 dq(1, 6.4)	3.64 dq(1, 6.4)	3.64 dq(1, 6.4)	3.64 dq(1, 6.4)
6'	1.27 d(6.4)	1.26 d(6.4)	1.26 d(6.4)	1.26 d(6.4)	1.26 d(6.4)
1''	4.59 d(7.6)	4.85 d(7.8)	4.85 d(7.8)	4.85 d(7.8)	4.85 d(7.8)
2''	—	3.12 dd(7.8, 9.5)	3.12 dd(7.8, 9.5)	3.12 dd(7.8, 9.5)	3.12 dd(7.8, 9.5)
3''	—	3.34 dd(9.0, 9.5)	3.34 dd(9.0, 9.5)	3.34 dd(9.0, 9.5)	3.34 dd(9.0, 9.5)
4''	—	3.13 dd(9.0, 9.2)	3.13 dd(9.0, 9.2)	3.13 dd(9.0, 9.2)	3.13 dd(9.0, 9.2)
5''	—	3.27 m	3.27 m	3.27 m	3.27 m

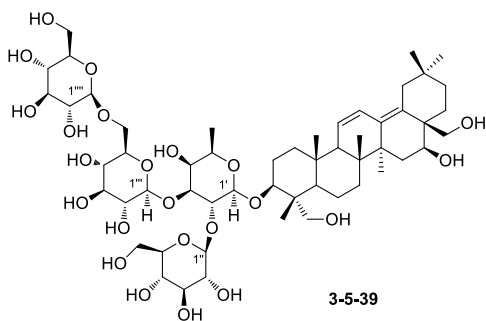
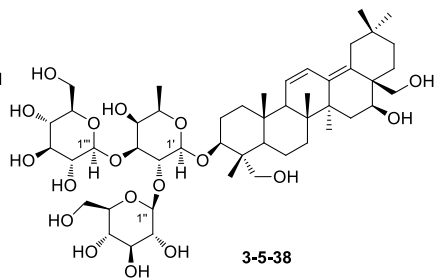
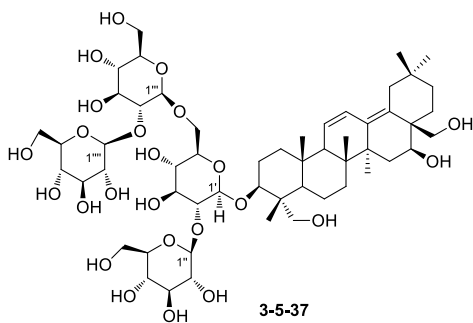
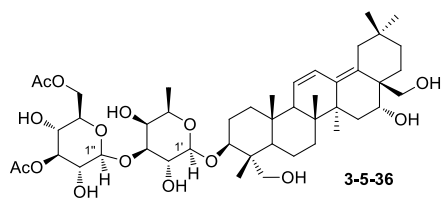
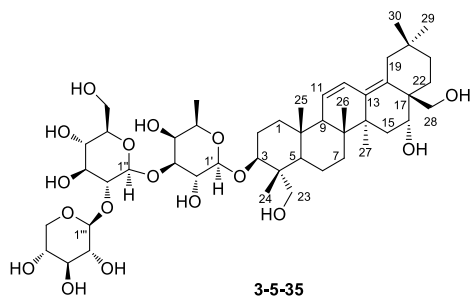
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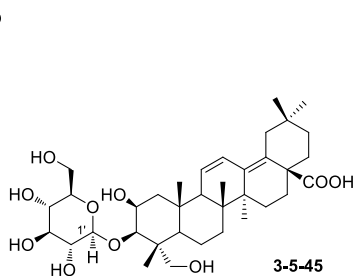
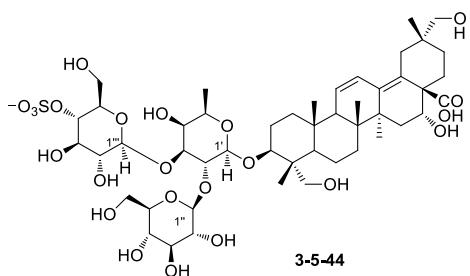
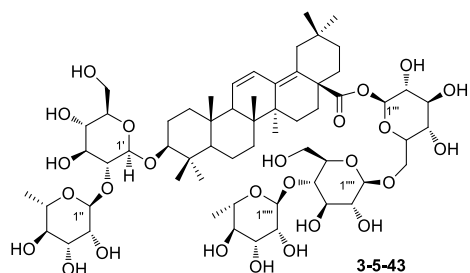
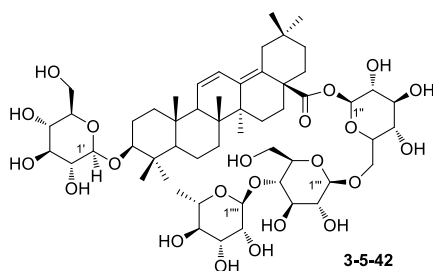
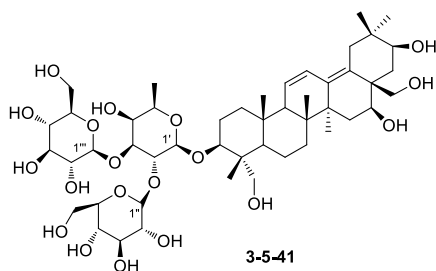
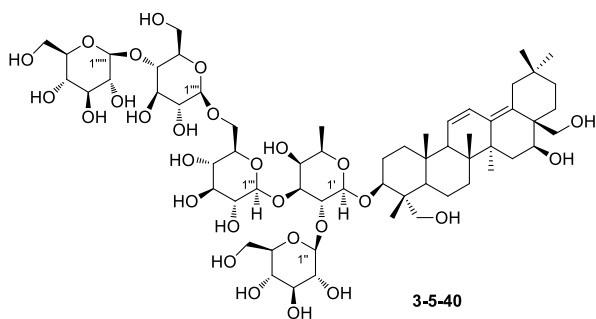
H	3-5-30	3-5-31	3-5-32	3-5-33	3-5-34
6''	—	3.80 dd(2.4, 12.0) 3.54 dd(7.1, 12.0)	3.80 dd(2.4, 12.0) 3.54 dd(7.1, 12.0)	3.80 dd(2.4, 12.0) 3.54 dd(7.1, 12.0)	3.80 dd(2.4, 12.0) 3.54 dd(7.1, 12.0)
OAc	2.09 s(4''-OAc)				
1'''		4.64 d(8.0)	4.64 d(8.0)	4.64 d(8.0)	4.64 d(8.0)
2'''		3.41 dd(8.0, 9.0)	3.41 dd(8.0, 9.0)	3.41 dd(8.0, 9.0)	3.41 dd(8.0, 9.0)
3'''		3.65 t(9.0)	3.65 t(9.0)	3.65 t(9.0)	3.65 t(9.0)
4'''		4.14 dd(9.0, 9.7)	4.14 dd(9.0, 9.7)	4.14 dd(9.0, 9.7)	4.14 dd(9.0, 9.7)
5'''		3.42 m	3.42 m	3.42 m	3.42 m
6'''		3.85, 3.75	3.85, 3.75	3.85, 3.75	3.85, 3.75

① The data of methyls in the literature were not assigned, and here, the deployments are only to display the data.

Table 3-5-10: Cos, MFs, and TSs of oleanane-type saponins **3-5-35~3-5-46**.

No.	Compounds	MFs	Test solvents	References
3-5-35	2''-O-β-D-xylopyranosylsaikosaponin b ₂	C ₄₇ H ₇₆ O ₁₇	C ₅ D ₅ N	[81]
3-5-36	3'',6''-O,O-diacetylsaikosaponin b ₂	C ₄₆ H ₇₂ O ₁₅	C ₅ D ₅ N	[81]
3-5-37	saikosaponin O	C ₅₃ H ₈₈ O ₂₂	C ₅ D ₅ N	[82]
3-5-38	buddlejasaponin IVb	C ₄₈ H ₇₈ O ₁₈	C ₅ D ₅ N	[83]
3-5-39	clinoposaponin IIIb	C ₅₄ H ₈₈ O ₂₃	C ₅ D ₅ N	[83]
3-5-40	clinoposaponin Vb	C ₆₀ H ₉₈ O ₂₈	C ₅ D ₅ N	[83]
3-5-41	clinopodiside G	C ₄₈ H ₇₈ O ₁₉	C ₅ D ₅ N	[84]
3-5-42	3-O-β-D-glucopyranosyl-3β-hydroxy olean-11,13(18)-dien-28-oic acid-28-O-[α-L-rhamnopyranosyl-(1→4)-β-D-glucopyranosyl-(1→6)-β-D-glucopyranosyl] ester	C ₅₄ H ₈₆ O ₂₂	C ₅ D ₅ N	[85]
3-5-43	3-O-[α-L-rhamnopyranosyl-(1→2)-β-D-glucopyranosyl]-3β-hydroxyolean-11,13(18)-dien-28-oic acid-28-O-[α-L-rhamnopyranosyl-(1→4)-β-D-glucopyranosyl-(1→6)-β-D-glucopyranosyl] ester	C ₆₀ H ₉₆ O ₂₆	C ₅ D ₅ N	[85]
3-5-44	sandrosaponin VIII	C ₄₈ H ₇₅ O ₂₃ S ⁻	C ₅ D ₅ N	[86]
3-5-45	polygalasaponin XXV	C ₃₆ H ₅₆ O ₁₀	C ₅ D ₅ N	[87]
3-5-46	polygalasaponin XXVI	C ₄₂ H ₆₆ O ₁₅	C ₅ D ₅ N	[87]





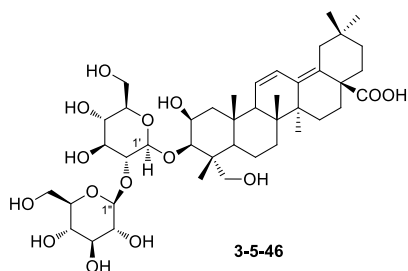


Table 3-5-11: ^1H NMR spectroscopic data of oleanane-type saponins **3-5-35**, **3-5-36**, and **3-5-42~3-5-44**.

H	3-5-35	3-5-36	3-5-42	3-5-43	3-5-44
1	α 1.12 dt(12.5, 4) β 1.82 m	α 1.12 dt(12.5, 4) β 1.82 m	ax 0.99 eq 1.76 br d (12.3)	ax 0.96 eq 1.73	1.87 1.00
2	α 2.28 dt(12.5, 4.0) β 2.03 dq(12.5, 4)	α 2.28 dt(12.5, 4.0) β 2.03 dq(12.5, 4)	ax 1.91 eq 2.31	ax 1.94 eq 2.34	1.98 1.82
3	α 4.20 m	α 4.20 m	3.42 dd(11.1, 4.3)	3.38 dd(11.1, 4.9)	3.64(11.6, 4.9)
5	α 1.66 d(12)	α 1.66 d(12)	0.83	0.78 br d(11.7)	1.25
6	α 1.68 m β 1.36 m	α 1.68 m β 1.36 m	ax 1.37	ax 1.38	1.57, 1.40
7	α 1.54 dt(12, 3.5) β 1.25 bd(12)	α 1.54 dt(12, 3.5) β 1.25 bd(12)	—	—	1.49, 1.39
9	α 2.18 bs	α 2.18 bs	1.99 br s	1.96 br s	2.04
11	5.66 d(9)	5.66 d(9)	6.59 dd(11.0, 3.0)	6.59 dd(10.5, 2.5)	5.58(10.7)
12	6.65 dd(9, 2)	6.65 d(9)	5.71 d(11.0)	5.69 d(10.5)	6.46(3.1)
15	α 1.63 m β 2.14 d(12)	α 1.63 m β 2.14 d(12)	ax 2.09 dt (13.5, 2.5) eq 1.11 br d(13.5)	ax 2.08 dt (13.5, 2.5) eq 1.11 br d(12.3)	1.93, 1.44
16	β 4.75 br s	β 4.75 br s	ax 1.77 dt(13.5, 3.1) eq 2.35 dt(13.5, 3.7, 2.5)	ax 1.78 dt(13.5, 3.1) eq 2.35	4.04(3.1)
19	α 2.64 d(12) β 1.91 d(12)	α 2.64 d(12) β 1.91 d(12)	ax 2.18 d(14.1) eq 2.63 d(14.1)	ax 2.19 d(13.5) eq 2.63 d(13.5)	2.77, 2.17
21	α 1.45 m β 1.79 m	α 1.45 m β 1.79 m	ax 1.69 eq 1.29 br d (11.7)	ax 1.69 eq 1.28	2.01, 1.57
22	α 2.62 m β 2.21 m	α 2.62 m β 2.21 m	ax 1.46 dt(13.5, 3.7) eq 2.56 br d (11.9)	ax 1.46 dt(13.5, 3.7) eq 2.57 br d (11.9)	2.01, 1.65
23	3.65 m, 4.29 m	3.65 m, 4.29 m	1.33 s	1.28 s	3.78, 3.26

Table 3-5-11 (continued)

H	3-5-35	3-5-36	3-5-42	3-5-43	3-5-44
24	0.93 s	0.93 s	1.01 s	1.20 s	0.72 s
25	1.00 s	1.00 s	0.85 s	0.86 s	0.94 s
26	0.88 s	0.88 s	1.02 s	1.02 s	0.73 s
27	1.61 s	1.61 s	1.07 s	1.06 s	1.25 s
28	4.14 m, 3.70 d(11.5)	4.14 m, 3.70 d(11.5)			
29	1.03 s	1.03 s	0.85 s	0.84 s	3.77, 3.28
30	0.98 s	0.98 s	0.92 s	0.92 s	1.10 s
1'	4.98 d(7.5)	4.89 d(7.5)	4.95 d(8.0)	4.96 d(8.0)	4.47 d(8.0)
2'	4.45 bt(8)	4.46 t(8)	4.04 t(8.0)	4.30	3.93(9.7)
3'	3.83 m	4.01 m	4.25 t(8.0)	4.30	3.78
4'	4.21 m	4.20 d(2.5)	4.23 t(8.0)	4.16	3.87
5'	3.67 q(6.5)	3.77 q(6)	4.02 m	3.97 m	3.65
6'	1.40 d(6.5)	1.51 d(6)	4.41 dd(12.3, 4.5) 4.59 dd(12.3, 2.5)	4.36 dd(12.0, 3.7) 4.56 dd(12.0, 2.5)	1.26 d(6.4)
OAc		1.97 s(3'-OAc) 1.97 s(6'-OAc)			
1''	5.15 d(8)	5.29 d(8)	6.27 d(8.0)	6.57 d(1.5)	4.87 d(7.9)
2''	3.87 m	4.00 m	4.06 t(8.0)	4.84 dd(3.0, 1.5)	3.12(9.1)
3''	4.23 m	5.83 m	4.16	4.69	3.34(9.1)
4''	4.12 m	4.06 m	4.13 t(8.0)	4.30 t(9.0)	3.12(9.2)
5''	3.85 m	4.05 m	4.13	4.80 dq(9.0, 6.0)	3.27
6''	4.43 m 4.28 m	4.89 d(12) 4.72 dd(12, 5)	4.22 dd(12.0, 2.0)	1.71 d(6.0)	3.80 3.55
1'''	5.01 d(7)		4.96 d(8.0)	6.27 d(8.0)	4.65 d(7.9)
2'''	3.98 m		3.91 t(8.0)	4.06 t(8.0)	3.42
3'''	3.99 m		4.15	4.15	3.65(9.2)
4'''	4.01 m		4.37 t(8.0)	4.10	4.14(9.4)
5'''	4.31 dd(12, 5) 3.54 bd(9)		3.68 m	4.12 m	3.43
6'''			4.09 dd(12.0, 2.0) 4.22 d(12.0)	4.23 dd(12.0, 2.0)	3.86, 3.75
1''''			5.81 br s	4.98 d(8.0)	
2''''			4.66 dd(2.5, 1.5)	3.92 t(8.0)	
3''''			4.52 dd(9.0, 3.0)	4.16	
4''''			4.30 t(9.0)	4.39 t(8.0)	
5''''			4.91 dq(9.0, 6.0)	3.71 m	
6''''			1.69 d(6.0)	4.12 dd(12.0, 2.0) 4.23	
1'''''				5.83 d(1.5)	
2'''''				4.67 dd(2.5, 1.5)	
3'''''				4.53 dd(9.0, 3.0)	
4'''''				4.28 t(9.0)	
5'''''				4.92 dq(9.0, 6.0)	
6'''''				1.69 d(6.0)	

Table 3-5-12: ^1H NMR spectroscopic data of oleanane-type saponins **3-5-37~3-5-41**.

H	3-5-37	3-5-38	3-5-39	3-5-40	3-5-41
3	—	4.15 dd(12, 5)	4.07 (ov)	—	4.17 m
11	5.68 d(10.5)	6.51 dd(10, 2)	6.52 br d(10)	6.52 dd(10, 2)	5.65 d(11)
12	6.41 d(10.5)	5.68 br d(10)	5.70 br d(10)	5.69 br d(10)	6.60 dd(11, 2)
16	—	4.22 (ov)	4.21 m	—	4.23 m
21	—	—	—	—	3.63 t(5)
22	—	—	—	—	1.71, 3.01
23	—	3.70 d(11), 4.37 d(11)	3.69 d(11), 4.35 d(11)	3.69 d(11), 4.35 d(11)	3.69, 4.38
24	0.79 s ^①	1.05 s	1.06 s	1.06 s	1.04 s
25	0.84 s ^①	0.95 s	0.96 s	0.95 s	0.92 s
26	0.91 s ^①	0.85 s	0.85 s	0.85 s	0.81 s
27	0.97 s ^①	1.07 s	1.08 s	1.08 s	1.08 s
28	—	4.18 (ov), 4.20 (ov)	—	—	4.17, 4.24
29	1.03 s ^①	0.87 s	0.87 s	0.87 s	1.04 s
30	1.07 s ^①	0.97 s	0.98 s	0.98 s	1.30 s
1'	5.130 d(6.8)	4.92 d(8)	4.91 d(8)	4.91 d(8)	4.96 d(8)
2'	4.210	4.64 dd(9, 8)	4.63 dd(9.5, 8)	4.64 dd(9.5, 8)	4.67 dd(9, 5)
3'	4.195	4.09 dd(9, 3.5)	4.14 (ov)	4.15 (ov)	4.09 m
4'	4.175	4.25 d(3.5)	4.39 d(3)	4.39 br s	4.25 m
5'	4.050	3.63 m	3.86 m	3.85 m	3.57 m
6'	4.625, 4.325	1.41 d(6)	1.55 d(6)	1.56 d(6)	1.41 d(7)
1''	5.410 d(7.7)	5.56 d(8)	5.52 d(8)	5.53 d(8)	5.57 d(8)
2''	4.095	—	—	—	—
3''	4.205	—	—	—	—
4''	4.275	—	—	—	—
5''	3.910	—	—	—	—
6''	4.485, 4.410	—	—	—	—
1'''	5.175 d(7.7)	5.28 d(8)	5.16 d(8)	5.15 d(8)	5.25 d(8)
2'''	4.085	3.98 t(8.5)	3.94 t(8.5)	—	3.99 t(8)
3'''	4.275	4.22 (ov)	3.94 t(8.5)	—	3.93 br s
4'''	4.175	4.20 (ov)	4.06 m	—	4.22 m
5'''	3.860	3.93 m	—	—	4.24 m
6'''	4.465, 4.305	4.30 dd(12, 6) 4.44 dd(12, 2)	4.78 br d(12)	4.73 br d(12)	4.34, 4.45
1''''	5.250 d(7.7)	—	4.96 d(8)	4.92 d(8)	—
2''''	4.080	—	3.98 t(8.5)	—	—
3''''	4.160	—	—	4.20 t(8.5)	—
4''''	4.215	—	—	4.30 t(9)	—
5''''	3.850	—	3.86 m	3.80 m	—
6''''	4.495, 4.345	—	4.32 dd(12, 6) 4.47 dd(12, 2)	—	—
1'''''	—	—	—	5.15 d(8)	—

^① The data of methyls in the literature were not assigned, and here, the deployments are only to display the data.

Table 3-5-13: ^1H NMR spectroscopic data of oleanane-type saponins **3-5-45** and **3-5-46**.

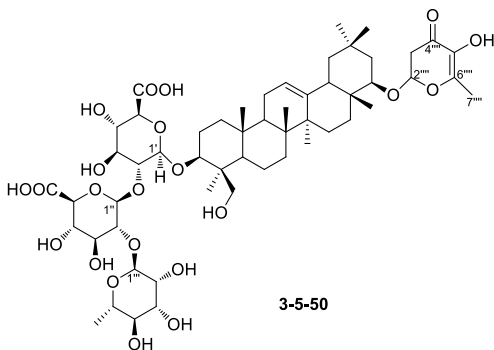
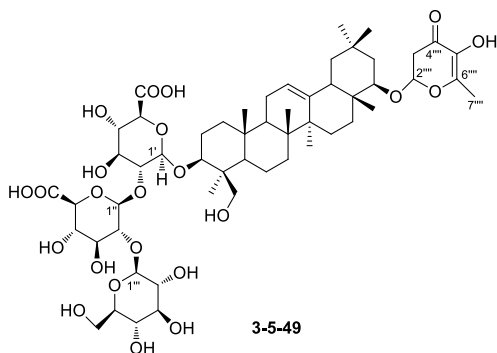
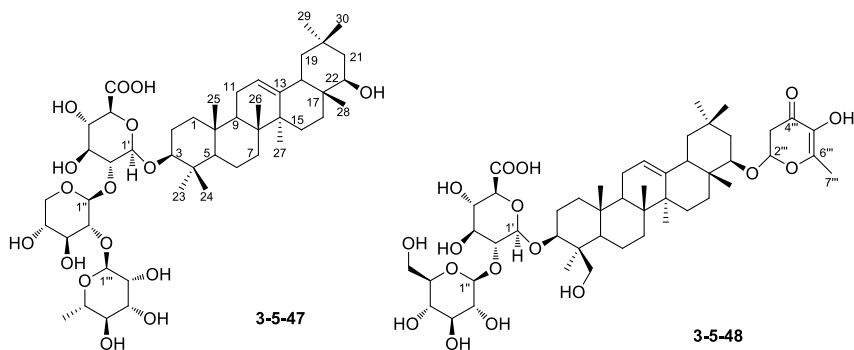
H	3-5-45	3-5-46	H	3-5-45	3-5-46
2	4.88 m	4.83 m	2'	4.03 t(8.5)	4.11 t(8.5)
3	4.37 d(3)	4.26 d(3)	3'	4.16 t(8.5)	4.22 t(8.5)
11	5.91 br d(11)	5.89 br d(11)	4'	4.21 t(8.5)	4.13 t(9)
12	6.65 dd(11, 2.5)	6.64 br d(11)	5'	3.91 m	3.84 m
23	3.69 d(11)	3.74 d(11)	6'	4.33 dd(12, 5)	4.27 (ov)
	4.39 d(11)	4.39 d(11)		4.47 dd(12, 2)	4.44 (ov)
24	1.33 s	1.41 s	1''		5.34 d(8)
25	1.63 s	1.61 s	2''		4.09 t(8.5)
26	1.14 s	1.13 s	3''		4.19 t(8.5)
27	1.07 s	1.05 s	4''		4.23 t(9)
29	0.94 s	0.94 s	5''		3.92 m
30	0.90 s	0.90 s	6''		4.39 (ov)
					4.51 dd(12, 2)
1'	5.18 d(8)	5.13 d(8)			

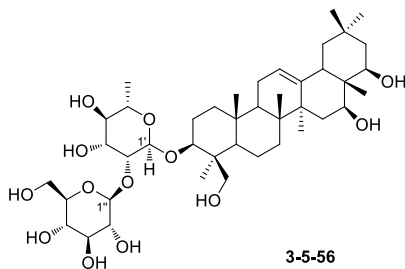
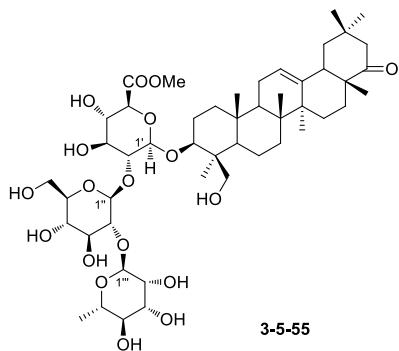
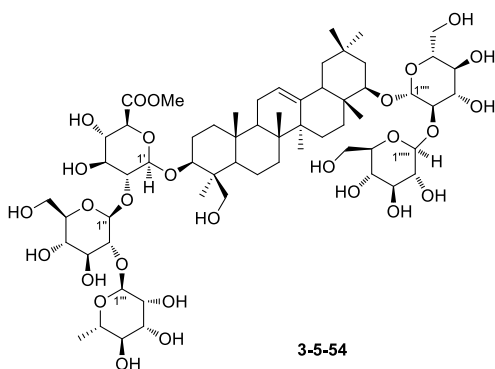
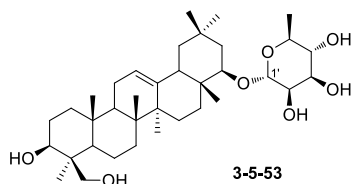
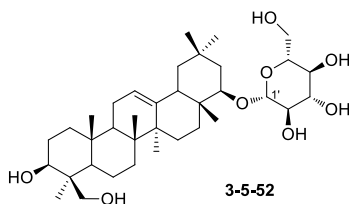
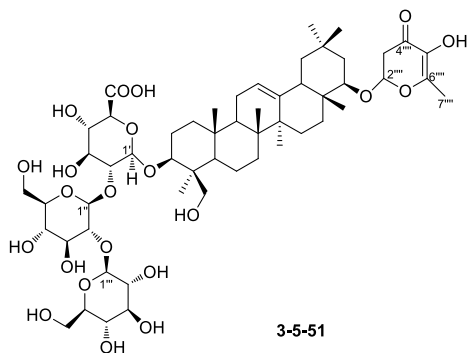
Table 3-5-14: Cos, MFs, and TSs of oleanane-type saponins **3-5-47~3-5-62**.

No.	Compounds	MFs	Test solvents	References
3-5-47	baptisiasaponin I	$\text{C}_{47}\text{H}_{76}\text{O}_{16}$	$\text{C}_5\text{D}_5\text{N}$	[88]
3-5-48	—	$\text{C}_{48}\text{H}_{74}\text{O}_{17}$	$\text{DMSO}-d_6$	[89]
3-5-49	—	$\text{C}_{54}\text{H}_{82}\text{O}_{23}$	$\text{DMSO}-d_6$	[90]
3-5-50	—	$\text{C}_{54}\text{H}_{82}\text{O}_{22}$	$\text{DMSO}-d_6$	[90]
3-5-51	—	$\text{C}_{54}\text{H}_{84}\text{O}_{22}$	$\text{DMSO}-d_6$	[90]
3-5-52	sigmoside C	$\text{C}_{36}\text{H}_{60}\text{O}_8$	CD_3OD	[91]
3-5-53	sigmoside D	$\text{C}_{36}\text{H}_{60}\text{O}_7$	CD_3OD	[91]
3-5-54	bersimoside II methyl ester	$\text{C}_{61}\text{H}_{100}\text{O}_{28}$	$\text{C}_5\text{D}_5\text{N}$	[92]
3-5-55	dehydroazukisaponin V methyl ester	$\text{C}_{49}\text{H}_{78}\text{O}_{18}$	$\text{C}_5\text{D}_5\text{N}$	[92]
3-5-56	junceoside	$\text{C}_{42}\text{H}_{70}\text{O}_{15}$	$\text{C}_5\text{D}_5\text{N}$	[93]
3-5-57	6'-methylesterof-3-O-[α -L-rhamnopyranosyl-(1 $\rightarrow$ 2)-O- β -D-glucopyranosyl-(1 $\rightarrow$ 2)- β -D-glucuronopyranosyl]-3 β ,16 β ,22 β ,24-tetrahydroxy-olean-12-ene	$\text{C}_{49}\text{H}_{80}\text{O}_{19}$	$\text{C}_5\text{D}_5\text{N}$	[94]
3-5-58	3 β ,21 β ,22 β ,24-tetrahydroxy-12-en-3-O- α -L-rhamnopyranosyl-(1 $\rightarrow$ 3)-[α -L-rhamnopyranosyl-(1 $\rightarrow$ 2)]- β -D-galactopyranosyl-(1 $\rightarrow$ 2)- β -D-glucuronopyranoside	$\text{C}_{54}\text{H}_{88}\text{O}_{23}$	$\text{C}_5\text{D}_5\text{N}$	[95]
3-5-59	3 β ,21 β ,22 β ,24-tetrahydroxy-12-en-3-O- α -L-rhamnopyranosyl-(1 $\rightarrow$ 3)-[α -L-rhamnopyranosyl-(1 $\rightarrow$ 2)]- β -D-galactopyranosyl-(1 $\rightarrow$ 2)- β -D-glucuronopyranosyl-21-O- α -L-rhamnopyranoside	$\text{C}_{60}\text{H}_{98}\text{O}_{27}$	$\text{C}_5\text{D}_5\text{N}$	[95]
3-5-60	polybosaponin A	$\text{C}_{48}\text{H}_{76}\text{O}_{19}$	$\text{C}_5\text{D}_5\text{N}$	[96]

Table 3-5-14 (continued)

No.	Compounds	MFs	Test solvents	References
3-5-61	3- <i>O</i> -[α -L-rhamnopyranosyl-(1 $\rightarrow$ 2)- β -D-glucopyranosyl-(1 $\rightarrow$ 2)- β -D-glucuronopyranosyl]-3 β ,22 α -dihydroxyolean-12-en-16-one	C ₄₈ H ₇₆ O ₁₈	CD ₃ OD	[97]
3-5-62	3- <i>O</i> -[α -L-rhamnopyranosyl-(1 $\rightarrow$ 2)- β -D-glucopyranosyl-(1 $\rightarrow$ 2)- β -D-glucuronopyranosyl]-3 β ,22 α ,27-trihydroxyolean-12-en-16-one	C ₄₈ H ₇₆ O ₁₉	CD ₃ OD	[97]





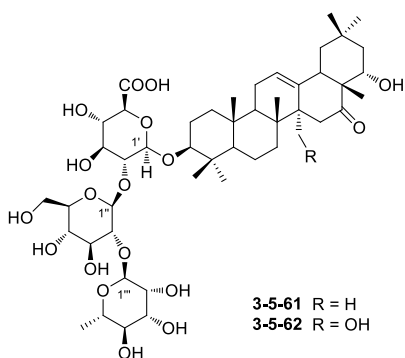
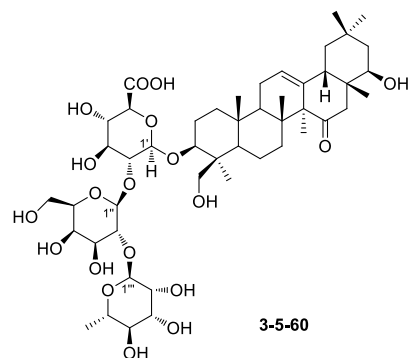
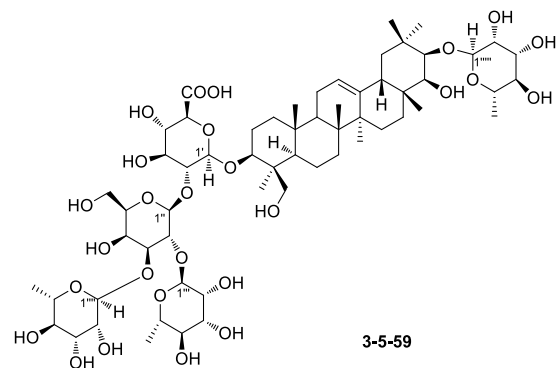
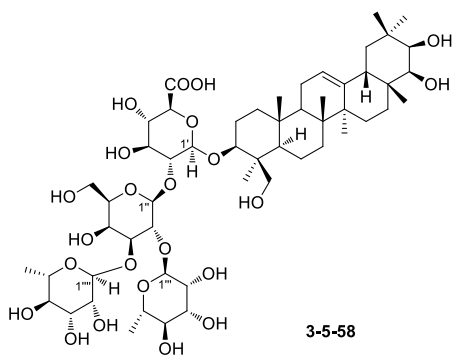
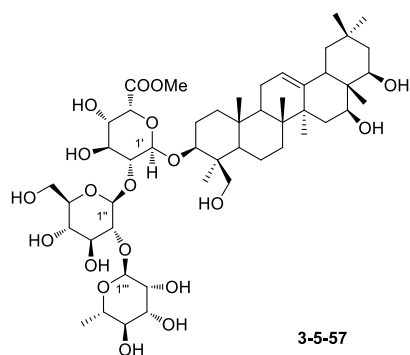


Table 3-5-15: ^1H NMR spectroscopic data of oleanane-type saponins 3-5-47~3-5-51.

H	3-5-47	3-5-48	3-5-49	3-5-50	3-5-51
12	5.33 s	—	—	—	—
23	0.88 s	—	—	—	—
24	1.00 s	—	—	—	—
25	1.01 s	—	—	—	—
26	1.10 s	—	—	—	—
27	1.24 s	—	—	—	—
28	1.28 s	—	—	—	—
29	1.29 s	—	—	—	—
30	1.34 s	—	—	—	—
1'	—	4.43 d(8.0)	4.32 dd(6.8)	4.25 dd(7.1)	4.40 dd(6.6)
1''	5.67 d(7.3)	4.60 d(7.7)	5.01 d(7.6)	4.84 d(6.3)	4.84 d(7.7)
1'''	—	—	4.42 d(6.3)	4.99 s	4.38 d(7.4)
2'''	—	5.39 d(3.3)	—	—	—
3'''	—	2.93 d(12.9)	—	—	—
—	—	2.36 d(13.7)	—	—	—
6'''	1.80 d(6.1)	—	—	—	—
7'''	—	1.90 s	—	—	—
OH	—	7.43 br(5'''-OH)	7.42 br(5'''-OH)	7.42 br(5'''-OH)	7.44 br(5'''-OH)
2''''	—	—	5.37 d(3.3)	5.37 d(3.3)	5.39 d(3.3)
3''''	—	—	2.93 d(19.5)	2.93 d(13.4)	2.93 d(16.5)
—	—	—	2.34 d(15.1)	2.35 d(14.3)	2.36 d(14.0)
7''''	—	—	1.89 s	1.89 s	1.90 s

Table 3-5-16: ^1H NMR spectroscopic data of oleanane-type saponins 3-5-52~3-5-55.

H	3-5-52	3-5-53	3-5-54	3-5-55
3	3.45 dd(5.5, 9.5)	3.2 dd(5.5, 9.0)	3.39 dd(4.4, 11.4)	3.40 dd(4.7, 11.8)
12	5.22 t(3.9)	5.22 t(3.9)	5.27 br s	5.24 t(3.6)
21	—	—	—	2.15 mb
—	—	—	—	2.58 dd(13.9)
22	3.19 dd(4.3, 11.0)	3.15 dd(4.3, 11.0)	—	—
23	—	—	0.69 s	0.70 s
24	3.65 d(11.8)	4.10 d(11.8)	3.32 d(11.2)	3.33 d(11.4)
—	4.10 d(11.8)	3.65 d(11.8)	4.24 d(11.2)	4.23 d(11.4)
25	—	—	0.87 s ^①	0.85 s ^①
26	—	—	0.89 s ^①	0.86 s ^①
27	—	—	1.10 s ^①	0.96 s ^①
28	—	—	1.14 s ^①	1.17 s ^①
29	—	—	1.19 s ^①	1.27 s ^①
30	—	—	1.46 s ^①	1.47 s ^①
1'	4.2 d(7.9)	4.25 d(1.4)	4.94 dd(7.6)	4.97 dd(7.8)
2'	—	3.85 t(3.7)	—	—

Table 3-5-16 (continued)

H	3-5-52	3-5-53	3-5-54	3-5-55
3'	—	3.65 t(10)	—	—
4'	3.15~3.65	—	—	—
5'	—	3.3 t(9.7)	—	—
6'	—	3.5 m, 0.95 d(6)	—	—
OMe			3.76 s(6'-OMe)	3.77 s(6'-OMe)
1''			5.87 d(7.8)	5.86 d(7.8)
1'''			6.40 br s	6.40 d(1.2)
6'''			1.78 d(6.4)	1.78 d(6.3)
1''''			4.97 d(8.0)	
1'''''			5.32 d(7.8)	

① The data of methyls in the literature were not assigned, and here, the deployments are only to display the data.

Table 3-5-17: ¹H NMR spectroscopic data of oleanane-type saponins 3-5-56~3-5-59.

H	3-5-56	3-5-57	3-5-58	3-5-59
1	0.96, 1.65	1.40 m, 0.83 m	1.32 m, 0.84 m	1.33 m, 0.81 m
2	2.95	1.90, 2.08 m	1.89 (ov), 2.32 m	1.93 m, 2.19 m
3	α 3.23 dd(10.9, 4.0)	3.38 dd(3.6, 12.7)	3.37 dd(3.7, 11.8)	3.38 dd(3.7, 11.9)
5	—	0.88	0.88 t(12.8)	0.87 t(13.0)
6	—	1.26 m, 1.55 m	1.25 (ov), 1.57 m	1.25 (ov), 1.54 m
7	—	1.47 m, 1.30 m	1.25 (ov), 1.49 m	1.26 (ov), 1.48 m
9	1.50	1.59	1.62 d(6.0)	1.60 d(6.1)
11	1.85	1.88	1.81 d(6.1)	1.80 dd(6.1, 0.7)
12	5.25	5.31	5.26 t-like	5.26 t(0.7)
15	—	1.86, 1.05	1.86 (ov), 0.93 m	1.83 m, 0.99 (ov)
16	α 4.18	4.68	1.10 m, 1.95 m	1.09 m, 1.95 m
18	—	2.40 d(13.0)	2.37 dd(13.1, 2.0)	2.53 dd(13.5, 1.9)
19	—	1.13 d(13.0), 1.93	1.44 t(13.1)	2.01 t(13.5)
			1.52 dd(13.1, 2.0)	1.26 dd(13.5, 1.9)
21	1.42	1.80, 1.64	4.07 d(3.1)	3.82 d(2.8)
22	3.40 m	3.76	3.62 d(3.1)	3.91 d(2.8)
23	1.43 s	1.44 s	1.47 s	1.44 s
24	4.48 d(11.5)	4.27 d(4.4)	4.32 d(11.5)	4.26 d(11.5)
	3.68 d(11.5)	4.43 d(4.4)	3.35 d(11.5)	3.26 d(11.5)
25	0.93 s	0.72 s	0.65 s	0.67 s
26	1.20 s	0.96 s	0.91 s	0.92 s
27	1.27 s	1.28 s	1.29 s	1.29 s
28	1.25 s	1.94 s	1.28 s	1.27 s
29	0.97 s	1.00 s	1.01 s	1.01 s
30	0.73 s	1.23 s	1.36 s	1.36 s
1'	5.35 d(1)	4.96 d(6.0)	5.02 d(7.2)	4.99 d(7.2)

Table 3-5-17 (continued)

H	3-5-56	3-5-57	3-5-58	3-5-59
2'	4.79	4.37	4.64 dd(8.6, 7.2)	4.65 dd(8.2, 7.2)
3'	4.34	4.10 dd(3.2, 9.6)	4.38 t(8.6)	4.40 t(8.2)
4'	4.20	4.35	4.51 dd(8.6, 8.0)	4.47 dd(9.0, 7.2)
5'	4.62	4.55	4.60 d(8.0)	4.59 d(9.0)
6'	1.62 d(6.2)			
OMe		3.78 s(6'-OMe)		
1''	4.87 d(7.2)	5.77 d(7.6)	5.86 d(7.6)	5.77 d(7.6)
2''	3.92	4.25	4.50 dd(9.0, 7.6)	4.54 dd(9.0, 7.6)
3''	4.08	4.58	4.26 dd(9.0, 1.6)	4.24 dd(9.0, 1.4)
4''	4.18	4.39	3.62 dd(3.4, 1.6)	3.60 dd(3.1, 1.4)
5''	4.31	4.54	4.08 td(6.2, 3.4)	4.09 td(6.1, 3.1)
6''	4.10 dd(12.0, 2.4)	3.25 d(11.6)	4.30 dd(11, 6.2)	4.34 dd(12, 6.1)
	4.76 dd(12.0, 6.2)	4.26	4.43 dd(11, 6.2)	4.42 dd(12, 6.1)
1'''		6.28 s	6.26 br s	6.26 br s
2'''		4.80	4.70 d(3.1)	4.70 d(3.2)
3'''		4.67	4.81 dd(9.5, 3.1)	4.78 dd(9.6, 3.2)
4'''		4.32	4.32 dd(9.5, 9.5)	4.34 dd(9.7, 9.6)
5'''		4.96	5.01 dq(9.5, 6.8)	5.02 dq(9.7, 6.9)
6'''		1.78 d(6.4)	1.80 d(6.8)	1.79 d(6.9)
1''''			6.38	6.38 br s
2''''			4.69 d(3.1)	4.68 d(3.2)
3''''			4.79 dd(9.5, 3.1)	4.76 dd(9.6, 3.2)
4''''			4.32 dd(9.5, 9.5)	4.35 dd(9.7, 9.6)
5''''			5.01 dq(9.5, 6.8)	5.02 dq(9.7, 6.9)
6''''			1.80 d(6.8)	1.79 d(6.9)
1'''''				5.50 br s
2'''''				4.69 d(3.1)
3'''''				4.61 dd(9.3, 3.1)
4'''''				4.32 dd(9.4, 9.3)
5'''''				4.52 dq(9.4, 6.0)
6'''''				1.65 d(6.0)

Table 3-5-18: ¹H NMR spectroscopic data of oleanane-type saponins 3-5-60~3-5-62.

H	3-5-60	3-5-61	3-5-62
1	1.33, 0.79	1.06 (ov), 1.70 (ov)	1.08 (ov), 1.68 (ov)
2	2.15 m, 1.83	1.74 (ov), 2.05 m	1.72 (ov), 2.07 m
3	3.35 dd(11.5, 4.0)	3.20 dd(12.0, 3.5)	3.29 dd(12.0, 3.5)
5	0.88 br d(12.0)	0.83 br d(11.0)	0.98 br d(11.0)
6	1.52, 1.32	1.48 (ov), 1.68 (ov)	1.50 (ov), 1.60 (ov)

Table 3-5-18 (continued)

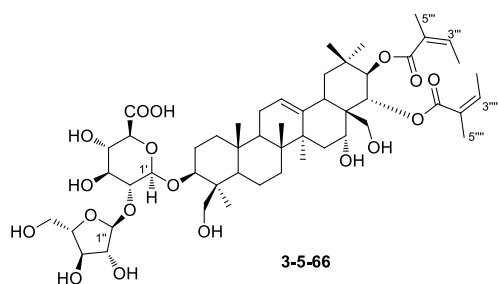
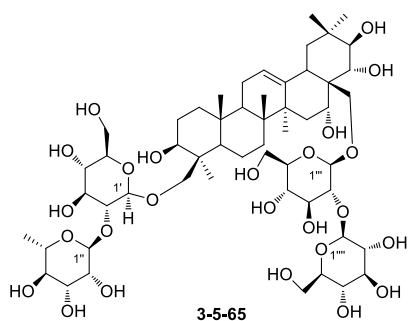
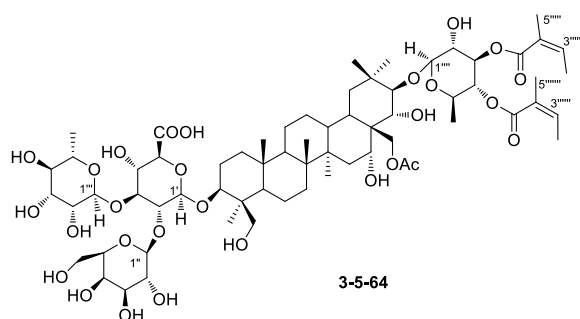
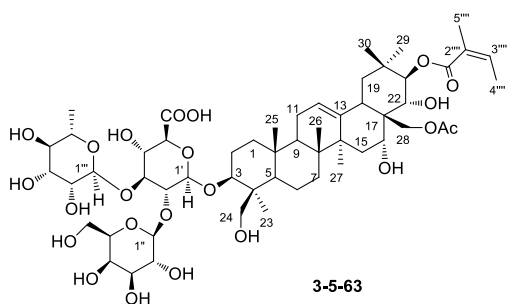
H	3-5-60	3-5-61	3-5-62
7	2.60 br d(13.5), 1.78	1.36 (ov), 1.53 (ov)	1.56 (ov), 1.97 (ov)
9	1.51 dd(11.5, 6.5)	1.57 br d(12.0)	1.57 br d(12.0)
11	1.72~1.85	2.04 m	2.01 m
12	5.53 t-like	5.55 t(3.5)	5.55 t(3.5)
15	—	1.94 d(13.0)	1.93 d(13.0)
		2.88 d(13.0)	2.88 d(13.0)
16	3.00 d(15.5), 2.03 d(15.5)		
18	2.72 br d(12.0)	2.55 dd(13.0, 4.5)	2.58 dd(13.0, 4.0)
19	1.91 br t(13.5), 1.33	1.18 (ov), 1.55 (ov)	1.18 (ov), 1.55 (ov)
21	1.73, 1.62 dd(14.0, 2.5)	1.40 (ov), 1.50 (ov)	1.42 (ov), 1.48 (ov)
22	3.62 t-like(3.5)	4.18 dd(11.0, 4.0)	4.16 dd(11.0, 4.0)
23	1.38 s	1.12 s	1.18 s
24	4.21 d(11.0), 3.19 d(11.0)	0.90 s	0.92 s
25	0.65 s	1.02 s	1.04 s
26	1.03 s	1.07 s	1.14 s
27	1.55 s	1.17 s	3.25 d(12.0), 4.15 d(12.0)
28	1.27 s	1.18 s	1.16 s
29	0.96 s	0.94 s	0.93 s
30	1.36 s	1.04 s	1.02 s
1'	4.95 d(7.5)	4.46 d(7.8)	4.46 d(7.8)
2'	4.59	3.74 dd(9.0, 7.8)	3.74 dd(9.0, 7.8)
3'	4.60	3.64 t(9.0)	3.64 t(9.0)
4'	4.45 br t(9.0)	3.43 t(9.0)	3.43 t(9.0)
5'	4.61	3.57 d(9.0)	3.57 d(9.0)
1''	5.77 d(7.5)	4.92 d(7.8)	4.92 d(7.8)
2''	4.53 dd(9.5, 7.5)	3.42 dd(9.0, 7.8)	3.42 dd(9.0, 7.8)
3''	4.08 dd(9.5, 3.5)	3.48 t(9.0)	3.48 t(9.0)
4''	4.37	3.08 t(9.0)	3.08 t(9.0)
5''	3.91 t(6.0)	3.28 m	3.28 m
6''	4.39	3.85 dd(12.0, 3.0)	3.85 dd(12.0, 3.0)
	4.28 dd(11.5, 6.0)	3.57 dd(12.0, 5.0)	3.57 dd(12.0, 5.0)
1'''	6.28 br s	5.22 d(1.8)	5.22 d(1.8)
2'''	4.79 br s	3.95 dd(3.0, 1.8)	3.95 dd(3.0, 1.8)
3'''	4.65 dd(9.5, 3.5)	3.77 dd(9.0, 3.0)	3.77 dd(9.0, 3.0)
4'''	4.32 t(9.5)	3.47 t(9.0)	3.47 t(9.0)
5'''	4.97	4.16 m	4.16 m
6'''	1.75 d(6.5)	1.28 d(6.5)	1.28 d(6.5)

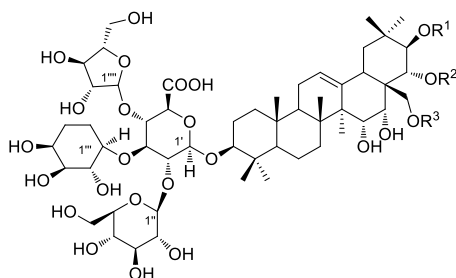
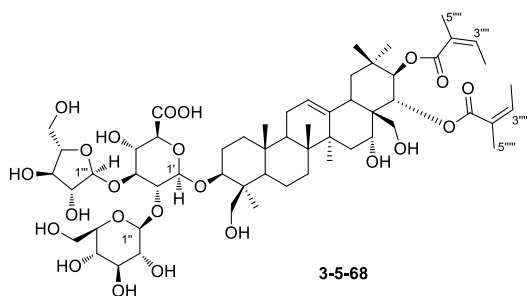
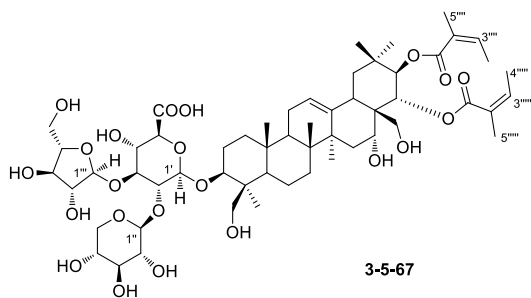
Table 3-5-19: Cos, MFs, and TSs of oleanane-type saponins **3-5-63~3-5-105**.

No.	Compounds	MFs	Test solvents	References
3-5-63	assamicin I	C ₅₅ H ₈₆ O ₂₃	C ₅ D ₅ N	[98]
3-5-64	assamicin II	C ₆₆ H ₁₀₂ O ₂₈	C ₅ D ₅ N	[98]
3-5-65	24- <i>O</i> -[α -L-rhamnopyranosyl-(1 $\rightarrow$ 2)- β -D-glucopyranosyl]-28- <i>O</i> -[β -D-glucopyranosyl-(1 $\rightarrow$ 2)- β -D-glucopyranosyl]-protoaescigenin	C ₅₄ H ₉₀ O ₂₅	C ₅ D ₅ N	[99]
3-5-66	3- <i>O</i> - α -L-arabinopyranosyl-(1 $\rightarrow$ 2)- β -D-glucuronopyranosyl-21 β ,22 α -di- <i>O</i> -angeloylprotoaescigenin	C ₅₁ H ₇₈ O ₁₈	CD ₃ OD	[100]
3-5-67	3- <i>O</i> - α -L-arabinofuranosyl-(1 $\rightarrow$ 3)-[β -D-xylopyranosyl-(1 $\rightarrow$ 2)]- β -D-glucopyranosyl-21 β ,22 α -di- <i>O</i> -angeloylprotoaescigenin	C ₅₆ H ₈₆ O ₂₂	CD ₃ OD	[100]
3-5-68	3- <i>O</i> - α -L-arabinofuranosyl-(1 $\rightarrow$ 3)-[β -D-glucopyranosyl-(1 $\rightarrow$ 2)]- β -D-glucopyranosyl-21 β ,22 α -di- <i>O</i> -angeloylprotoaescigenin	C ₅₇ H ₈₈ O ₂₃	CD ₃ OD	[100]
3-5-69	saponin III A ₂	C ₆₁ H ₉₆ O ₂₉	CD ₃ OD-D ₂ O (1:1)	[101]
3-5-70	saponin III A ₃	C ₅₉ H ₉₂ O ₂₇	CD ₃ OD-D ₂ O (1:1)	[101]
3-5-71	saponin III B ₂	C ₅₉ H ₉₂ O ₂₇	CD ₃ OD-D ₂ O (1:1)	[101]
3-5-72	saponin III C ₄	C ₆₂ H ₉₆ O ₂₇	CD ₃ OD-D ₂ O (1:1)	[101]
3-5-73	saniculasaponin I	C ₅₅ H ₈₆ O ₂₄	C ₅ D ₅ N	[102]
3-5-74	saniculasaponin II	C ₅₄ H ₈₄ O ₂₃	C ₅ D ₅ N	[102]
3-5-75	saniculasaponin III	C ₅₄ H ₈₄ O ₂₃	C ₅ D ₅ N	[102]
3-5-76	saniculasaponin IV	C ₅₄ H ₈₄ O ₂₄	C ₅ D ₅ N	[102]
3-5-77	3- <i>O</i> - β -D-galactopyranosyl-(1 $\rightarrow$ 2)- β -D-glucuronopyranosyl-21 β ,22 α -di- <i>O</i> -angeloylbarringtogenol C	C ₅₂ H ₈₀ O ₁₈	CD ₃ OD	[100]
3-5-78	3- <i>O</i> - α -L-rhamnopyranosyl-(1 $\rightarrow$ 3)-[β -D-galactopyranosyl-(1 $\rightarrow$ 2)]- β -D-glucuronopyranosyl-21 β ,22 α -di- <i>O</i> -angeloylbarringtogenol C	C ₅₈ H ₉₀ O ₂₂	CD ₃ OD	[100]
3-5-79	3- <i>O</i> - α -L-arabinopyranosyl-(1 $\rightarrow$ 3)-[β -D-galactopyranosyl-(1 $\rightarrow$ 2)]- β -D-glucuronopyranosyl-21 β ,22 α -di- <i>O</i> -angeloylbarringtogenol C	C ₅₇ H ₈₈ O ₂₂	CD ₃ OD	[100]
3-5-80	hydrocosisaponin A	C ₅₁ H ₈₂ O ₂₁	CD ₃ OD	[103]
3-5-81	hydrocosisaponin B	C ₅₁ H ₈₂ O ₂₁	CD ₃ OD	[103]
3-5-82	hydrocosisaponin C	C ₅₁ H ₈₂ O ₂₁	CD ₃ OD	[103]
3-5-83	hydrocosisaponin D	C ₅₇ H ₉₂ O ₂₆	CD ₃ OD	[103]
3-5-84	hydrocosisaponin E	C ₅₅ H ₉₀ O ₂₅	CD ₃ OD	[103]

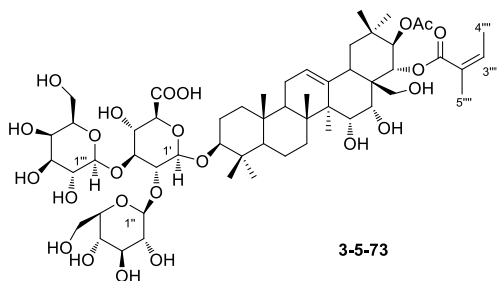
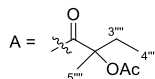
Table 3-5-19 (continued)

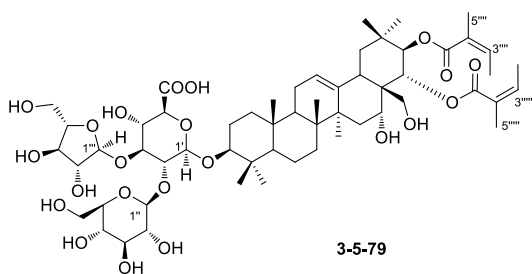
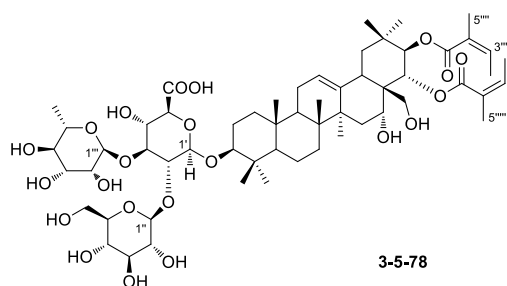
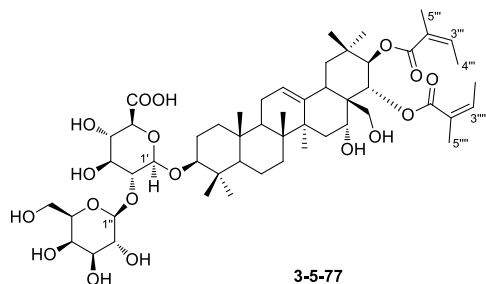
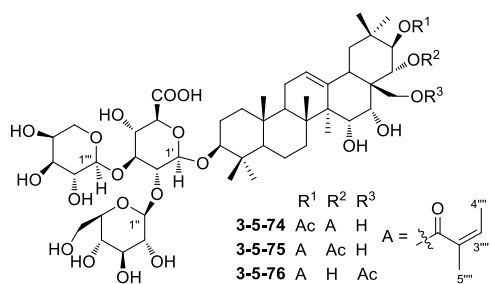
No.	Compounds	MFs	Test solvents	References
3-5-85	hydrocosisaponin F	C ₅₅ H ₉₀ O ₂₅	CD ₃ OD	[103]
3-5-86	24- <i>O</i> -[α -L-rhamnopyranosyl-(1 $\rightarrow$ 2)- β -D-glucopyranosyl]-28- <i>O</i> -[β -D-glucopyranosyl-(1 $\rightarrow$ 2)- β -D-glucopyranosyl]-16-desoxy-protoaescigenin	C ₅₄ H ₉₀ O ₂₄	CD ₃ OD	[99]
3-5-87	3- <i>O</i> - β -D-glucopyranosyl-(1 $\rightarrow$ 2)[α -L-rhamnopyranosyl(1 $\rightarrow$ 3)]- β -D-glucuronopyranosyl 22- <i>O</i> -angeloyl-A1-barrigenol	C ₅₃ H ₈₄ O ₂₁	CD ₃ OD	[104]
3-5-88	3- <i>O</i> - β -D-glucopyranosyl(1 $\rightarrow$ 2)[α -L-rhamnopyranosyl(1 $\rightarrow$ 3)]- β -D-glucuronopyranosyl 28- <i>O</i> -angeloyl-A1-barrigenol	C ₅₃ H ₈₄ O ₂₁	CD ₃ OD	[104]
3-5-89	saniculasaponin V	C ₆₃ H ₉₈ O ₂₉	C ₅ D ₅ N	[102]
3-5-90	saniculasaponin VI	C ₆₂ H ₉₆ O ₂₈	C ₅ D ₅ N	[102]
3-5-91	saniculasaponin VII	C ₆₃ H ₉₈ O ₂₉	C ₅ D ₅ N	[102]
3-5-92	saniculasaponin VIII	C ₆₂ H ₉₆ O ₂₈	C ₅ D ₅ N	[102]
3-5-93	3- <i>O</i> - β -D-galactopyranosyl-(1 $\rightarrow$ 2)[α -L-rhamnopyranosyl(1 $\rightarrow$ 3)] β -D-glucuronopyranosyl 28- <i>O</i> -angeloyl-A1-barrigenol	C ₅₃ H ₈₄ O ₂₁	CD ₃ OD	[104]
3-5-94	3- <i>O</i> - β -D-galactopyranosyl-(1 $\rightarrow$ 2)[α -L-rhamnopyranosyl(1 $\rightarrow$ 3)] β -D-glucuronopyranosyl 16- <i>O</i> - β , β -dimethyla-cryloyl-camelliagenin A	C ₅₃ H ₈₄ O ₂₀	CD ₃ OD	[104]
3-5-95	3- <i>O</i> - β -D-glucopyranosyl-(1 $\rightarrow$ 2)[α -L-rhamnopyranosyl(1 $\rightarrow$ 3)] β -D-glucuronopyranosyl 28- <i>O</i> -angeloyl-camelliagenin A	C ₅₃ H ₈₄ O ₂₀	CD ₃ OD	[104]
3-5-96	21 β - <i>O</i> -benzoylsitakisogenin-3- <i>O</i> - β -D-glucopyranosyl(1 $\rightarrow$ 3)- β -D-glucuronopyranoside	C ₄₉ H ₇₂ O ₁₆	C ₅ D ₅ N	[105]
3-5-97	3- <i>O</i> - β -D-glucopyranosyl(1 $\rightarrow$ 3)- β -D-glucuronopyranoside	C ₄₂ H ₆₇ KO ₁₄	C ₅ D ₅ N	[105]
3-5-98	the potassium salt of 29-hydroxylongispinogenin 3- <i>O</i> - β -D-glucopyranosyl(1 $\rightarrow$ 3)- β -D-glucuronopyranoside	C ₄₂ H ₆₇ KO ₁₅	C ₅ D ₅ N	[105]
3-5-99	3 β - <i>O</i> -[α -L-rhamnopyranosyl-(1 $\rightarrow$ 3)]- β -D-xylopyranosyl-(1-2)]- β -D-glucopyranosyl-(1 $\rightarrow$ 4)-[β -D-glucopyranosyl-(1 $\rightarrow$ 2)]- α -L-arabinopyranoside)-16,28-dihydroxy-30-acetoxyoleana-12-en	C ₆₀ H ₉₈ O ₂₇	C ₅ D ₅ N	[75]
3-5-100	saniculasaponin XI	C ₆₀ H ₉₄ O ₂₇	C ₅ D ₅ N	[102]
3-5-101	sorbifoliaside	C ₅₉ H ₉₆ O ₂₄	C ₅ D ₅ N	[106]
3-5-102	saniculasaponin IX	C ₄₁ H ₆₂ O ₁₃	C ₅ D ₅ N	[102]
3-5-103	saniculasaponin X	C ₄₁ H ₆₂ O ₁₃	C ₅ D ₅ N	[102]
3-5-104	gamboukokoenside B	C ₃₅ H ₅₄ O ₁₀	DMSO- <i>d</i> ₆	[107]
3-5-105	gamboukokoenside A	C ₃₅ H ₅₆ O ₁₁	DMSO- <i>d</i> ₆	[107]

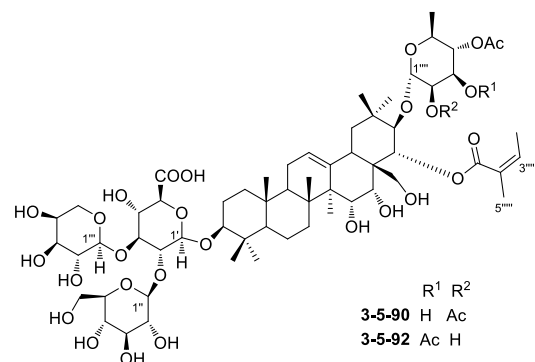
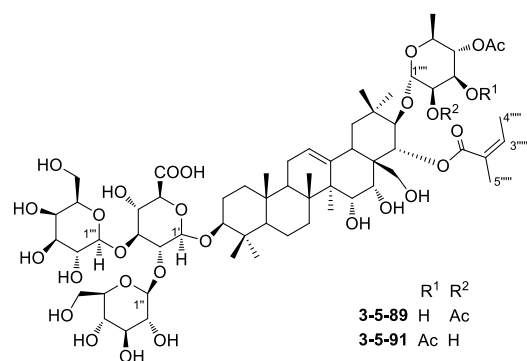
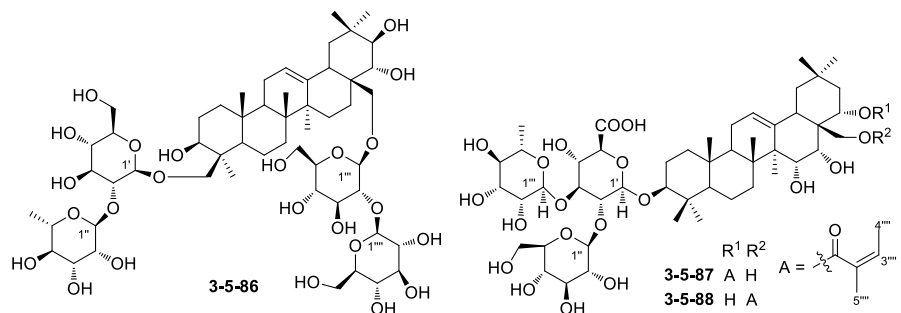
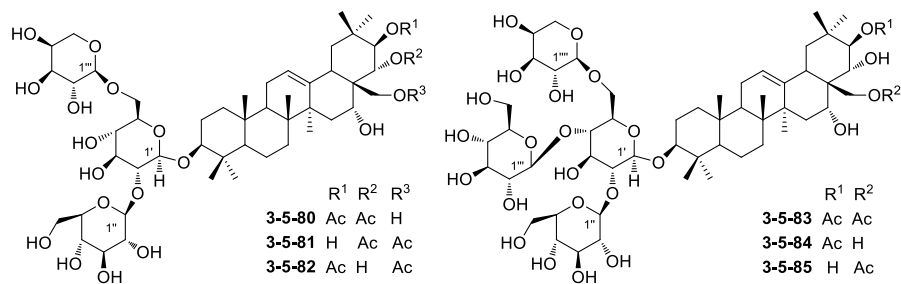


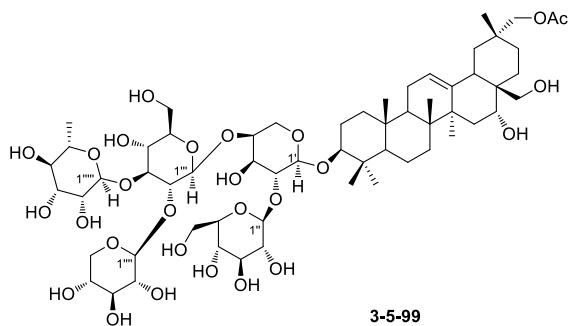
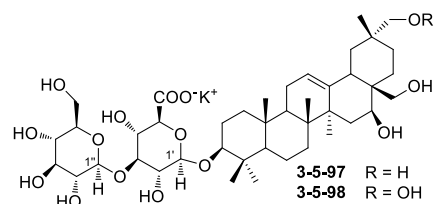
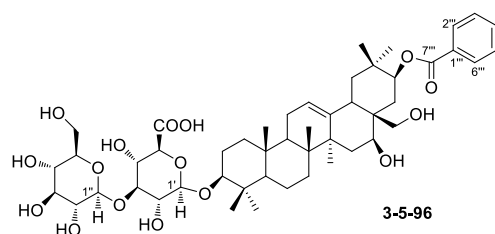
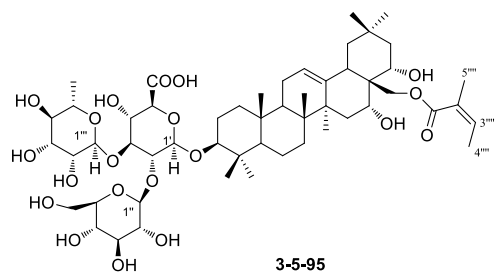
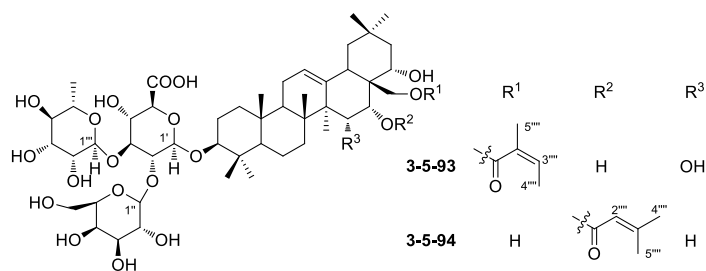


	R ¹	R ²	R ³
3-5-69	A	Ac	H
3-5-70	Ang	Ac	H
3-5-71	Ang	H	Ac
3-5-72	Ang	Ang	H









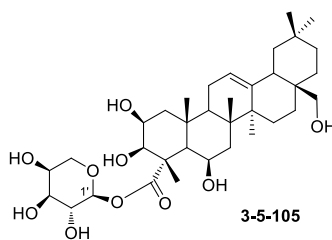
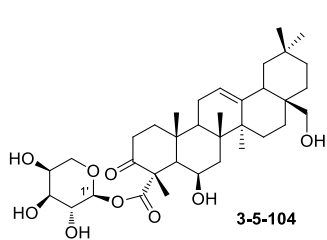
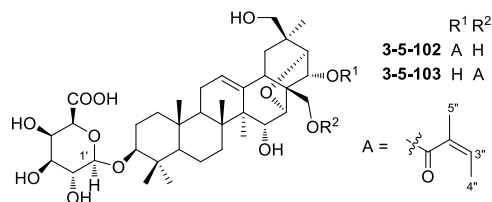
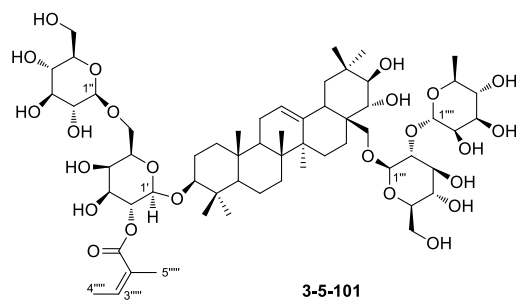
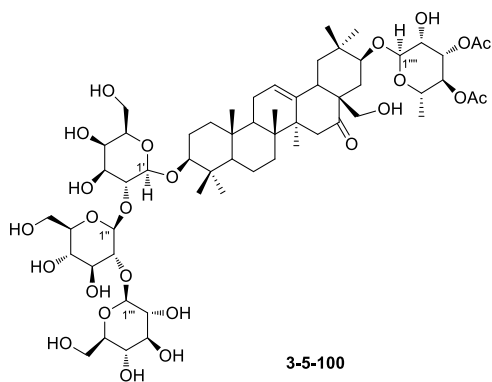


Table 3-5-20: ^1H NMR spectroscopic data of oleanane-type saponins **3-5-63**, **3-5-64**, and **3-5-66-3-5-68**.

H	3-5-63	3-5-64	3-5-66	3-5-67	3-5-68
3	3.35	3.37	3.45 m	3.34 m	3.42 m
12	5.41	5.40	5.42 m(11.5)	5.41 br t(3.4)	5.41 m(11.5)
15	—	—	1.38 dd(11, 3.8)	1.39 br d(15.2)	1.39 br d(15)
			1.71 dm(11)	1.72 m	1.72 m
16	4.74	4.85	4.01 m(7.6)	4.01 m(6.7)	4.02 m(6.6)
18	2.82	2.79	2.66 dm(11.8)	2.66 dd(13.7, 2.8)	2.66 dd(12, 4.2)
19	3.08	3.10	1.22 dm(11.8)	1.22 m	1.22 m
			2.72 t(11.8)	2.72 t(13.3)	2.72 t(12)
21	6.50 d(9.5)	4.81 d(9)	6.02 d(10.1)	6.03 d(10.2)	6.02 d(10.1)
22	—	4.39 d(9.5)	5.61 d(10.1)	5.60 d(10.2)	5.60 d(10.1)
23	1.19 s	1.17 s	1.26 s	1.21 s	1.21 s
24	3.21 d(11)	3.17 d(6)	3.37 d(11.7)	3.23 d(11.4)	3.24 d(11.1)
	4.21 d(11)	4.21 d(6)	4.09 d(11.7)	4.09 d(11.4)	4.09 d(11.1)
25	0.63 s	0.61 s	0.96 s	0.90 s	0.91 s
26	0.90 s	0.90 s	0.96 s	0.95 s	0.96 s
27	1.82 s	1.83 s	1.52 s	1.52 s	1.52 s
28	4.24	4.27 d(10)	2.98 d(11.2)	2.98 d(11.1)	2.98 d(11.2)
		4.45 d(10)	3.29 d(11.2)	3.29 d(11.1)	3.29 d(11.2)
29	1.10 s	1.47 s	0.90 s	0.90 s	0.90 s
30	1.28 s	1.30 s	1.12 s	1.11 s	1.11 s
OAc	1.97(28-OAc)	2.04(28-OAc)			
1'	4.83 d(8)	4.78 d(7.5)	4.53 d(7.2)	4.51 d(7.6)	4.49 d(7.8)
2'	4.41	4.40	3.44 m	3.64 dd(8.9, 7.7)	3.70 m
3'	4.35	4.32	3.58 m	3.72 t(8.7)	3.70 m
4'	4.47	4.33 t(9)	3.50 m	3.69 m	3.58 t(9)
5'	4.61 d(9)	4.44	3.89 m	3.59 m	3.61 d(9)
1''	5.28 d(7.5)	5.26 d(7.5)	5.42 br s	4.65 d(7.8)	4.81 d(7.9)
2''	4.37	4.35	4.05 m	3.19 dd(9.2, 7.8)	3.19 t(8.1)
3''	3.91 dd(3.5, 10)	3.90 dd(3.5, 10)	3.85 t(6.1)	3.30 t(9.2)	3.38 t(8.7)
4''	4.46	4.45	4.08 m	3.53 ddd (10.7, 9.2, 5.5)	3.53 t(8.9)
5''	3.86 br t(6)	3.86 br t(6)	3.59 dd(11.8, 4.8) 3.75 dd(11.8, 2.4)	3.17 t(11.1) 3.84 dd(11.5, 5.5)	3.23 m
6''	4.46, 4.35	4.46 dd(5, 11), 4.35			3.78 m, 3.80 m
1'''	6.16 br s	6.22 br s		5.28 d(2.2)	5.24 d(2.2)
2'''	4.95 br s	4.93 br s		4.13 dd(4.6, 2.2)	4.13 dd(4.5, 2.2)
3'''	4.55 dd(3, 9)	4.57 dd(3, 9)	6.07 qq(7.3, 1.5)	3.86 dd(6.7, 4.6)	3.85 dd(7, 4)
4'''	4.36	4.36 t(9)	1.93 dq(7.3, 1.5)	4.12 m	4.09 m
5'''	5.02	5.10	1.84 q(1.5)	3.80 dd(11.7, 2.3) 3.62 dd(11.7, 6.3)	3.78 dd(12, 2.5) 3.63 dd(12, 4)
6'''	1.68 d(6.5)	1.71 d(6.5)			

Table 3-5-20 (continued)

H	3-5-63	3-5-64	3-5-66	3-5-67	3-5-68
1 ^{''''}		4.91 d(8)			
2 ^{''''}		4.11			
3 ^{''''}	5.88	5.78 t(9.5)	6.10 qq(7.3, 1.5)	6.08 qq(7.3, 1.5)	6.08 qq(7.3, 1.5)
4 ^{''''}	2.09 d(7.5)	5.27 t(9.5)	1.95 dq(7.3, 1.5)	1.93 dq(7.3, 1.5)	1.93 dq(7.3, 1.5)
5 ^{''''}	1.96	3.65 dq(6.0, 9.5)	1.86 q(1.5)	1.84 q(1.5)	1.84 q(1.5)
6 ^{''''}		1.19 d(6)			
3 ^{'''''}		5.86		6.10 qq(7.3, 1.5)	6.10 qq(7.3, 1.5)
4 ^{'''''}		1.93		1.95 dq(7.3, 1.5)	1.95 dq(7.3, 1.5)
5 ^{'''''}		1.85		1.86 q(1.5)	1.86 q(1.5)
3 ^{''''''}		5.96			
4 ^{''''''}		1.96			
5 ^{''''''}		1.88			

Table 3-5-21: ¹H NMR spectroscopic data of oleanane-type saponins 3-5-65 and 3-5-69~3-5-72.

H	3-5-65	3-5-69	3-5-70	3-5-71	3-5-72
1	eq 1.70 m ax 1.03 m	0.98, 1.67	0.98, 1.68	0.97, 1.68	0.98, 1.68
2	eq 1.64 m ax 1.76 m	1.79, 1.87	1.79, 1.87	1.76, 1.97	1.80, 1.80
3	3.27 dd(12, 4.8)	3.22	3.22	3.18	3.20
5	0.86 d(8.3)	0.79 d(11.4)	0.79 d(11.4)	0.84 d(11.6)	0.80 d(11.4)
6	ax 1.61 m eq 1.75 m	1.43 br d(11.4) 1.58	1.41, 1.56	1.45 dd(11.6, 4.1) 1.60	1.40 br d(11.4) 1.60
7	eq 1.42 m ax 1.59 m	1.70 1.75	1.70 br d(12.5) 1.75 br d(12.5)	1.80 1.80	1.70 1.75
9	1.68 m	1.57	1.57	1.60	1.60
11	1.93 m	1.90, 1.97	1.90, 1.96	1.94, 1.94	1.95, 1.95
12	5.31 br t(3)	5.50 br t(3.7)	5.50 br t(3.7)	5.44 br t(3.6)	5.52 br t(3.6)
15	ax 1.89 dd(15, 4) eq 1.43 d(15)	3.82 d(4.3)	3.84	3.88 d(3.9)	3.78 d(4.8)
16	4.57 br s(8)	3.88 d(4.3)	3.91	3.98 d(3.9)	3.84 d(4.8)
18	2.18 dd(13.5, 4.5)	2.52 dd(3.9, 13.5)	2.56	2.49 dd(4.2, 13.6)	2.50
19	ax 2.52 t(13.5) eq 1.06 m	1.22 dd(3.9, 13.5) 2.56 t(13.5)	1.21 t(13.6) 2.62 t(13.6)	1.21 dd(4.2, 13.6) 2.64 t(13.6)	1.20, 2.50
21	3.95 d(10)	5.72 d(10.0)	5.78 d(9.9)	5.64 d(9.8)	5.86 d(10.3)
22	3.79 d(10)	5.48 d(10.0)	5.50 d(9.9)	3.96 d(9.8)	5.55 d(10.3)
23	1.22 s	1.09 s	1.09 s	1.08 s	1.08 s
24	4.13 d(10) 3.67 d(10)	0.89 s	0.89 s	0.89 s	0.89 s

Table 3-5-21 (continued)

H	3-5-65	3-5-69	3-5-70	3-5-71	3-5-72
25	1.04 s	1.01 s	1.00 s	1.01 s	1.01 s
26	0.97 s	1.02 s	1.02 s	1.02 s	1.02 s
27	1.44 s	1.40 s	1.40 s	1.38 s	1.43 s
28	3.66 d(10)	3.11 d(11.4)	3.14 d(11.1)	3.86 d(10.7)	3.10 d(11.4)
	3.45 d(10)	3.31 d(11.4)	3.31 d(11.1)	3.99 d(10.7)	3.35 d(11.4)
29	0.97 s	0.92 s	0.90 s	0.91 s	0.91 s
30	0.94 s	1.06 s	1.09 s	1.07 s	1.11 s
OAc		2.10 s (21-OAc)	2.04 s (21-OAc)	2.08 s(28-OAc)	
1'	4.32 d(7.7)	4.57 d(5.2)	4.57	4.58 d(6.5)	4.60 d(4.6)
2'	3.41 dd(8.5, 7.7)	3.97	3.97	3.96	3.92
3'	3.5 t(8.5)	3.96	3.96	3.95	3.94
4'	3.32 t(8.5)	3.84	3.84	3.96	3.84
5'	3.28 m	3.84	3.84	3.89	3.84
6'	3.69 dd(11.5, 5.3)				
	3.89 dd(11.5, 1.6)				
1''	5.38 d(1.3)	5.02 d(7.9)	5.02 d(7.9)	5.02 d(8.1)	4.95 d(8.1)
2''	3.95 dd(3.2, 1.8)	3.27 dd(7.9, 9.7)	3.27	3.24 dd(8.1, 9.2)	3.21
3''	3.76 dd(3.2, 9.3)	3.48 t(9.2)	3.48 t(9.2)	3.41 t(9.2)	3.46 t(9.2)
4''	3.38 t(9.3)	3.19 t(9.2)	3.19	3.19 t(9.2)	3.20
5''	3.98 m	3.38 ddd	3.38	3.34	3.38
		(1.8, 7.5, 9.2)			
6''	1.29 d(6)	3.62, 3.89	3.62, 3.89	3.64, 3.87	3.62, 3.87
1'''	4.23 d(7.7)	4.85	4.85 d(5.5)	4.93 d(7.9)	4.80 d(7.5)
2'''	3.47 dd(9.1, 7.7)	3.63	3.63	3.61	3.59
3'''	3.58 t(9.1)	3.64	3.64	3.54	3.61
4'''	3.35 t(9.1)	3.90	3.90	3.80	3.90
5'''	3.23 m	3.62, 3.92	3.62, 3.92	3.53, 3.89	3.64, 3.86
6'''	3.69 dd(11.7, 5.3)				
	3.86 dd(11.7, 1.9)				
1''''	4.66 d(7.8)	5.10 br s	5.10 br s	5.15 br s	5.03 br s
2''''	3.24 t(7.8)	4.09 br d(1.7)	4.09 br s	3.99	4.05 br s
3''''	3.40 m	3.86	3.86	3.82	3.84
4''''	3.41 m	4.43 q(4.8)	4.43 q(4.2)	4.47	4.39 q(4.3)
5''''	3.27 m	3.71 dd(5.7, 12.5)	3.71 dd(5.1, 12.0)	3.68 dd(4.9, 12.5)	3.69
		3.79 dd(3.7, 12.5)	3.79 dd(3.7, 12.0)	3.72 dd(3.7, 12.5)	3.77
3'''''	3.92 dd(10.6, 1.6)	1.97, 1.80	6.18 q(7.2)	6.11 q(7.1)	6.14 q(7.2)
	3.76 dd(11, 5)				
4'''''		0.95 t(7.5)	1.95	2.01	1.90
5'''''		1.57 s	1.87	1.98	1.85
3''''''					6.14 q(7.2)
4''''''					1.90
5''''''					1.85

Table 3-5-22: ^1H NMR spectroscopic data of oleanane-type saponins **3-5-73~3-5-77**.

H	3-5-73	3-5-74	3-5-75	3-5-76	3-5-77
3	3.32 dd(12, 4)	3.32 dd(12, 4)	3.32 dd(12, 4)	3.32 dd(12, 4)	3.22 dd(9.4, 5.4)
5	0.83 (ov)	0.83 (ov)	0.84 (ov)	0.84 (ov)	
12	5.52 dd(3, 3)	5.52 dd(3, 3)	5.50 dd(3, 3)	5.54 dd(3, 3)	5.42 m(10.3)
15	4.22 (ov)	4.22 (ov)	4.19 (ov)	4.29 (ov)	1.39 m, 1.72 m
16	4.44 (ov)	4.44 (ov)	4.40 (ov)	4.65 d(4)	4.02 m(6.6)
18	3.06 (ov)	3.09 (ov)	3.07 (ov)	2.81 dd(14, 4)	2.66 dm(12.4)
19	—	—	—	—	1.22 dm(12.4)
					2.72 t(12.4)
21	6.58 d(10)	6.58 d(10)	6.59 d(10)	6.50 d(10)	6.03 d(10.3)
22	6.24 d(10)	6.24 d(10)	6.18 d(10)	4.44 (ov)	5.61 d(10.1)
23	1.25 s	1.24 s	—	1.23 s	1.11 s
24	1.11 s	1.10 s	1.10 s	1.09 s	0.90 s
25	0.85 s	0.85 s	0.85 s	0.87 s	1.01 s
26	1.02 s	1.02 s	1.02 s	1.16 s	0.97 s
27	1.86 s	1.85 s	1.84 s	1.85 s	1.52 s
28	3.51 d(11)	3.51 d(11)	3.45 d(11)	4.35 (ov)	2.98 d(11.2)
	3.76 d(11)	3.76 d(11)	3.70 d(11)		3.30 d(11.2)
29	1.09 s	1.09 s	1.10 s	1.13 s	0.90 s
30	1.31 s	1.32 s	1.30 s	1.30 s	1.12 s
OAc	2.10 s(21-OAc)	2.10 s(21-OAc)	1.78 s(22-OAc)	1.96 s(22-OAc)	
1'	4.95 d(8)	4.98 d(8)	4.98 d(8)	4.98 d(8)	4.50 d(7.1)
2'	4.42 (ov)	4.48 (ov)	4.48 (ov)	4.47 (ov)	3.57 t(7.1)
3'	4.33 (ov)	4.38 (ov)	4.37 (ov)	4.37 (ov)	3.63 m
4'	4.52 (ov)	4.48 (ov)	4.48 (ov)	4.47 (ov)	3.51 m
5'	4.54 (ov)	4.58 (ov)	4.58 d(10)	4.58 d(10)	3.85 m
1''	5.66 d(8)	5.68 d(8)	5.68 d(8)	5.68 d(8)	4.56 d(7.6)
2''	4.06 dd(8, 8)	4.08 (ov)	4.08 (ov)	4.08 (ov)	3.63 t(7.7)
3''	4.22 (ov)	4.24 (ov)	4.24 (ov)	4.24 (ov)	3.51 dd(7.8, 5)
4''	4.13 (ov)	4.16 dd(9, 9)	4.16 (ov)	4.16 dd(9, 9)	3.89 m
5''	3.82 m	3.84 m	3.83 m	3.85 m	3.49 m
6''	4.33 (ov)	4.33 (ov)	4.33 (ov)	4.33 (ov)	3.72 br d(12.2)
	4.46 (ov)	4.45 (ov)	4.44 (ov)	4.46 (ov)	3.75 br d(12.2)
1'''	5.29 d(8)	5.30 d(8)	5.30 d(8)	5.30 d(8)	
2'''	4.48 (ov)	4.45 (ov)	4.45 (ov)	4.46 (ov)	
3'''	4.13 (ov)	4.09 (ov)	4.10 (ov)	4.10 (ov)	6.08 qq(7.3, 1.4)
4'''	4.46 (ov)	4.23 (ov)	4.24 (ov)	4.24 (ov)	1.93 dq(7.3, 1.4)
5'''	4.13 (ov)	3.79 br d(12)	3.79 br d(12)	3.79 br d(12)	1.84 q(1.4)
		4.28 (ov)	4.28 (ov)	4.28 (ov)	
6'''	4.33 (ov)				
	4.48 (ov)				
3''''	5.83 dq(7, 1.5)	5.83 dq(7, 1.5)	5.98 dq(7, 1.5)	5.90 dq(7, 1.5)	6.10 qq(7.3, 1.5)
4''''	2.01 dq(7, 1.5)	2.01 dq(7, 1.5)	2.11 dq(7, 1.5)	2.19 dq(7, 1.5)	1.95 dq(7.3, 1.5)
5''''	1.79 br s	1.79 br s	2.02 br s	1.98 br s	1.86 q(1.5)

Table 3-5-23: ^1H NMR spectroscopic data of oleanane-type saponins **3-5-78~3-5-82**.

H	3-5-78	3-5-79	3-5-80	3-5-81	3-5-82
1	—	—	1.66 m, 1.05 m	1.62 m, 1.08 m	1.65 m, 1.07 m
2	—	—	1.74 m, 2.02 m	1.75 m, 2.03 m	1.75 m, 2.02 m
3	3.22 dd(11.2, 4.7)	3.22 dd(11.5, 3.8)	3.23 m	3.24 m	3.23 m
5	—	—	0.82 d(7.2)	0.84 d(7.2)	0.81 d(7.2)
6	—	—	1.59 m, 1.44 m	1.63 m, 1.46 m	1.67 m, 1.45 m
7	—	—	1.75 m, 1.43 m	1.71 m, 1.46 m	1.73 m, 1.44 m
9	—	—	1.72 m	1.72 m	1.65 m
11	—	—	1.95 m	1.94 m	1.91 m
12	5.41 brt(3.5)	5.41 brt(3)	5.35 br s	5.33 br s	5.33 br s
15	1.39 dd(15, 1) 1.72 dd(15, 3.7)	1.39 br d(12.5) 1.72 br d(12.5)	1.65 m, 1.37 m	1.66 m, 1.40 m	1.66 m, 1.39 m
16	4.02 m(6.9)	4.01 m(6.6)	4.00 br s	4.08 br s	4.08 br s
18	2.66 dm(11.8)	2.66 dd(12.3, 3.6)	2.58 dd(14.0, 3.2)	2.59 dd(14.0, 3.2)	2.56 dd(14.0, 3.2)
19	1.21 dd(11.8, 3.1) 2.72 t(11.8)	1.22 dd(12.3, 3.6) 2.72 t(12.3)	2.65 dd (14.0, 14.0)	2.66 dd (14.0, 14.0)	2.63 dd (14.0, 14.0)
20			1.18 m	1.18 dd(14.0, 3.2)	1.19 dd(14.0, 3.2)
21	6.02 d(10.1)	6.03 d(10.1)	5.80 d(10.0)	4.12 d(10.0)	5.51 d(10.0)
22	5.60 d(10.1)	5.61 d(10.1)	5.50 d(10.0)	5.20 d(10.0)	3.87 d(10.0)
23	1.10 s	1.12 s	1.12 s	1.12 s	1.08 s
24	0.90 s	0.90 s	0.89 s	0.88 s	0.85 s
25	1.01 s	1.00 s	1.03 s	1.03 s	0.96 s
26	0.97 s	0.97 s	0.99 s	0.95 s	0.93 s
27	1.52 s	1.43 s	1.51 s	1.49 s	1.45 s
28	2.98 d(11.2) 3.29 d(11.2)	2.98 d(11.1) 3.30 d(11.1)	2.95 d(11.2) 3.23 d(11.2)	3.78 d(11.2) 3.90 d(11.2)	3.75 d(11.2) 3.89 d(11.2)
29	0.90 s	0.90 s	0.88 s	0.88 s	0.84 s
30	1.11 s	1.12 s	1.05 s	1.05 s	1.01 s
OAc			2.02 s(21-OAc) 2.02 s(22-OAc)	2.01 s(22-OAc) 2.08 s(28-OAc)	2.08 s(21-OAc) 2.05 s(28-OAc)
1'	4.58 d(7.4)	4.51 d(7.5)	4.45 d(7.2)	4.45 d(7.2)	4.45 d(7.2)
2'	3.80 dd(8.7, 7.4)	3.77 m	3.72 dd(8.8, 7.2)	3.74 dd(8.8, 7.2)	3.72 dd(8.8, 7.2)
3'	3.72 t(8.7)	3.7 t(7.5)	3.44 m	3.44 m	3.45 (ov)
4'	3.66 t(8.7)	3.60 m	3.37 t(9.0)	3.40 t(9.2)	3.38 t(9.6)
5'	3.78 d(8.7)	3.60 m	3.41 m	3.43 m	3.42 m
6'			4.18 br d(11.2) 3.94 m	4.16 br d(11.2) 3.98 m	4.24 br d(11.2) 3.95 m
1''	4.58 d(7.4)	4.69 d(7.6)	4.68 d(7.6)	4.63 d(7.6)	4.66 d(7.2)
2''	3.57 dd(9.8, 7.4)	3.56 dd(9.8, 7.7)	3.74 dd(8.8, 7.6)	3.76 dd(8.8, 7.6)	3.76 dd(8.8, 7.2)
3''	3.51 dd(9.8, 3.3)	3.50 dd(9.8, 3.3)	3.43 m	3.45 m	3.40 t(8.8)

Table 3-5-23 (continued)

H	3-5-78	3-5-79	3-5-80	3-5-81	3-5-82
4''	3.83 dm(3.3)	3.85 m	3.33 t(8.8)	3.34 t(9.2)	3.32 t(9.2)
5''	3.47 ddm(7.5, 5)	3.49 m	3.45 m	3.46 m	3.45 (ov)
6''	3.66 dd(11.7, 5)	3.67 dd(11.6, 5.2)	3.87 m	3.86 m	3.85 m
	3.80 dd(11.7, 7.5)	3.77 brd(11.6)	3.68 m	3.71 m	3.69 m
1'''	5.09 br d(1.8)	5.29 d(2.3)	4.38 d(6.4)	4.35 d(6.4)	4.33 d(6.4)
2'''	4.08 dd(3.3, 1.8)	4.13 m	3.53 dd(8.8, 6.4)	3.52 dd(8.8, 6.4)	3.53 dd(8.8, 6.4)
3'''	3.70 dd(9.5, 3.5)	3.85 m	3.68 dd(8.8, 3.0)	3.66 dd(8.8, 3.0)	3.64 dd(8.8, 2.4)
4'''	3.44 t(9.5)	4.13 m	3.83 m	3.80 m	3.82 m
5'''	3.99 dq(9.5, 6.2)	3.78 dd(12.3, 4.2)	3.91 m, 3.50 m	3.91 m, 3.52 m	3.91 m, 3.52 m
		3.63 dd(12.3, 6)			
6'''	1.27 d(6.2)				
3''''	6.08 qq(7.3, 1.5)	6.08 qq(7.2, 1.2)			
4''''	1.93 dq(7.3, 1.5)	1.93 dq(7.2, 1.2)			
5''''	1.84 q(1.5)	1.84 q(1.2)			
3'''''	6.10 qq(7.3, 1.5)	6.10 qq(7.2, 1.2)			
4'''''	1.95 dq(7.3, 1.5)	1.95 dq(7.2, 1.2)			
5'''''	1.86 q(1.5)	1.86 q(1.2)			

Table 3-5-24: ¹H NMR spectroscopic data of oleanane-type saponins 3-5-83~3-5-87.

H	3-5-83	3-5-84	3-5-85	3-5-86	3-5-87
1	1.69 m, 1.08 m	1.66 m, 1.03 m	1.62 m, 1.07 m	eq 1.69 m, ax 1.03 m	1.02 m, 1.62 m
2	1.73 m, 2.02 m	1.79 m, 2.05 m	1.72 m, 2.02 m	eq 1.65 m, ax 1.76 m	1.69 m, 2.02 m
3	3.25 m	3.24 m	3.25 m	3.27 m	3.2 m
5	0.79 d(7.2)	0.85 d(7.2)	0.87 d(7.2)	0.93 d(12)	0.78 br d(12)
6	1.65 m, 1.45 m	1.62 m, 1.47 m	1.59 m, 1.46 m	ax 1.62 m, eq 1.76 m	1.54 m
7	1.71 m, 1.42 m	1.77 m, 1.45 m	1.76 m, 1.43 m	eq 1.40 m, ax 1.54 m	1.72 m
9	1.65 m	1.68 m	1.76 m	1.62 m	1.58 m
11	1.91 m	1.95 m	1.96 m	1.94 m	1.92 m

Table 3-5-24 (continued)

H	3-5-83	3-5-84	3-5-85	3-5-86	3-5-87
12	5.30 br s	5.34 br s	5.35 br s	5.27 brt(3.5)	5.42 brt(3)
15	1.66 m, 1.39 m	1.67 m, 1.36 m	1.63 m, 1.38 m	—	3.78 m
16	4.09 br s	4.09 br s	4.04 br s	—	3.92 d(4.3)
18	2.56 dd(14.0, 3.6)	2.54 dd(14.0, 3.2)	2.63 dd(14.0, 3.2)	2.16 dd(15, 4.1)	2.43 br s
19	2.64 dd(14.0, 14.0)	2.63 dd(14.0, 14.0)	2.67 dd(14.0, 14.0)	ax 1.98 m eq 1.15 dd(14, 4.1)	1.06 m, 2.48 m
20	1.17 dd(14.0, 3.6)	1.19 dd(14.0, 3.2)	1.22 dd(14.0, 3.2)		
21	5.51 d(10.0)	5.50 d(10.0)	3.99 d(10.0)	3.29 d(10)	1.56 br d(12) 2.22 t(12)
22	3.87 d(10.0)	3.95 d(10.0)	3.92 d(10.0)	3.74 d(10)	5.45 dd(12, 5)
23	1.09 s	1.10 s	1.12 s	1.22 s	1.07 s
24	0.84 s	0.87 s	0.88 s	4.14 d(10) 3.67 d(10)	0.86 s
25	0.96 s	0.99 s	1.03 s	1.03 s	0.98 s
26	0.92 s	0.95 s	0.95 s	1.01 s	1.02 s
27	1.44 s	1.48 s	1.51 s	1.21 s	1.39 s
28	3.73 d(11.2) 3.94 d(11.2)	2.85 d(11.2) 3.20 d(11.2)	3.78 d(11.2) 3.97 d(11.2)	3.75 d(10) 3.66 d(10)	3.12 d(11) 3.32
29	0.82 s	0.86 s	0.88 s	0.98 s	0.9 s
30	1.00 s	1.04 s	1.05 s	0.92 s	0.98 s
OAc	2.08 s(21-OAc) 2.05 s(28-OAc)	2.06 s(21-OAc)	2.08 s(28-OAc)		
1'	4.46 d(7.2)	4.49 d(7.2)	4.52 d(7.2)	4.32 d(7.7)	4.47 d(7.4)
2'	3.76 m	3.73 m	3.74 m	3.42 dd(8.4, 7.7)	3.75 dd(8.7, 7.4)
3'	3.31 (ov)	3.31 (ov)	3.32 (ov)	3.5 t(8.4)	3.67 t(8.5)
4'	3.78 (ov)	3.74 m	3.75 m	3.31 t(8.4)	3.57 m
5'	3.30 (ov)	3.30 (ov)	3.31 m	3.29 m	3.56 m
6'	4.24 br d(11.2)	4.14 br d(11.2)	4.15 br d(11.2)	3.7 dd(11.5, 6.9)	
	3.95 m	3.95 m	3.96 m	3.89 dd(11.5, 2)	
1''	4.54 d(8.0)	4.59 d(8.0)	4.62 d(8.0)	5.38 d(1.3)	4.61 d(7.7)
2''	3.78 (ov)	3.75 m	3.80 dd(8.8, 8.0)	3.93 dd(1.8, 3.3)	3.21 dd(9.2, 7.7)
3''	3.44 m	3.42 m	3.42 m	3.77 dd(9.4, 3.3)	3.36 t(9.2)
4''	3.28 t(8.8)	3.26 t(8.8)	3.28 t(9.2)	3.38 t(9.4)	3.09 t(8.9)
5''	3.43 m	3.43 m	3.44 m	3.97 dq(9.4, 6.2)	3.23 ddd(9, 5, 2)
					3.83 dd(12.2, 4.9)
6''	3.84 m, 3.67 m	3.81 m, 3.68 m	3.87 m, 3.67 m	1.29 d(6.2)	
1'''	4.71 d(7.6)	4.77 d(7.6)	4.74 d(7.6)	4.31 d(7.8)	5.06 d(1.6)
2'''	3.30 (ov)	3.31 (ov)	3.32 m	3.5 dd(9.1, 7.8)	4.02 dd(3.4, 1.6)

Table 3-5-24 (continued)

H	3-5-83	3-5-84	3-5-85	3-5-86	3-5-87
3'''	3.32 m	3.30 (ov)	3.35 m	3.59 t(9.1)	3.69 dd(9.5, 3.4)
4'''	3.34 t(9.2)	3.21 t(9.2)	3.25 t(8.8)	3.37 t(9.1)	3.38 t(9.5)
5'''	3.43 m	3.45 m	3.44 m	3.26 m	4.02 dq(9.5, 6)
6'''	3.89 dd(11.6, 2.4)	3.93 dd(11.2, 3.0)	3.91 dd(11.6, 3.0)	3.72 dd(12, 6.2)	1.24 d(6)
	3.60 m	3.71 m	3.71 m	3.87 dd(12, 2)	
1''''	4.33 d(6.8)	4.37 d(6.8)	4.40 d(6.8)	4.68 d(7.8)	
2''''	3.49 dd(8.8, 6.8)	3.52 dd(8.8, 6.4)	3.51 dd(8.8, 6.4)	3.21 dd(10.5, 7.8)	
3''''	3.60 dd(8.8, 2.4)	3.57 dd(8.8, 3.0)	3.55 dd(8.8, 2.4)	3.38 m	6.05 qq(7, 1.5)
4''''	3.86 m	3.84 m	3.86 m	3.32 m	1.97 dq(7.2, 1.5)
5''''	3.90 m	3.91 m	3.92 m	3.26 m	1.9 q(1.5)
	3.48 m	3.50 m	3.51 m		
6''''				3.89 dd(11.5, 6)	
				3.74 dd(11.5, 2)	

Table 3-5-25: ¹H NMR spectroscopic data of oleanane-type saponins 3-5-88~3-5-92.

H	3-5-88	3-5-89	3-5-90	3-5-91	3-5-92
1	1.02 m, 1.65 m	—	—	—	—
2	1.72 m, 2.05 m	—	—	—	—
3	3.22 m	3.30 dd(12, 4)	3.30 dd(12, 4)	3.29 dd(12, 4)	3.29 dd(12, 4)
5	0.77 m	0.81 (ov)	0.80 (ov)	0.84 (ov)	0.82 (ov)
6	1.57 m	—	—	—	—
9	1.6 m	—	—	—	—
11	1.94 m	—	—	—	—
12	5.35 m(8)	5.51 dd(3, 3)	5.51 dd(3, 3)	5.50 dd(3, 3)	5.50 dd(3, 3)
15	3.87 d(4.7)	4.21 (ov)	4.22 (ov)	4.22 (ov)	4.22 (ov)
16	3.93 d(4.7)	4.44 (ov)	4.40 (ov)	4.53 (ov)	4.38 (ov)
18	2.43 br s	2.98 (ov)	2.98 (ov)	3.00 (ov)	3.02 (ov)
19	1.05 m, 2.45 m	—	—	—	—
21	1.48 br d(12)	5.01 d(10)	5.01 d(10)	4.98 d(10)	4.96 d(10)
	2.16 t(12)				
22	4.04 dd(11, 6.5)	6.15 d(10)	6.15 d(10)	6.17 d(10)	6.17 d(10)
23	1.07 s	1.24 s	1.23 s	1.24 s	1.23 s
24	0.86 s	1.10 s	1.09 s	1.10 s	1.09 s
25	0.98 s	0.84 s	0.85 s	0.85 s	0.85 s

Table 3-5-25 (continued)

H	3-5-88	3-5-89	3-5-90	3-5-91	3-5-92
26	1.03 s	1.02 s	1.02 s	1.02 s	1.03 s
27	1.37 s	1.84 s	1.84 s	1.85 s	1.85 s
28	3.23 d(10.7)	3.41 d(11)	3.41 d(11)	3.41 d(11)	3.41 d(11)
	3.52 d(10.7)	3.71 d(11)	3.71 d(11)	3.71 d(11)	3.71 d(11)
29	0.89 s	1.22 s	1.23 s	1.23 s	1.24 s
30	0.98 s	1.22 s	1.23 s	1.35 s	1.35 s
1'	4.47 d(7.7)	4.94 d(8)	4.97 d(8)	4.93 d(8)	4.96 d(8)
2'	3.74 dd(9, 7.7)	4.42 (ov)	4.48 (ov)	4.43 (ov)	4.46 (ov)
3'	3.68 m	4.33 (ov)	4.37 (ov)	4.33 (ov)	4.38 (ov)
4'	3.58 m	4.52 (ov)	4.48 (ov)	4.50 (ov)	4.48 (ov)
5'	3.58 m	4.54 (ov)	4.45 d(10)	4.52 (ov)	4.58 d(9)
1''	4.6 d(7.8)	5.66 d(8)	5.68 d(8)	5.66 d(8)	5.68 d(8)
2''	3.2 dd(9.2, 7.8)	4.06 dd(8, 8)	4.08 (ov)	4.06 (ov)	4.08 (ov)
3''	3.36 t(8.7)	4.23 (ov)	4.24 (ov)	4.23 (ov)	4.25 (ov)
4''	3.09 dd(9.8, 8.4)	4.14 (ov)	4.16 dd(9, 9)	4.13 (ov)	4.16 dd(9, 9)
5''	3.25 ddd (9.8, 7.7, 2) 3.82 dd(11.6, 2)	3.83 (ov)	3.84 m	3.82 (ov)	3.84 m
6''		4.32 (ov)	4.33 (ov)	4.32 (ov)	4.33 (ov)
		4.45 (ov)	4.45 (ov)	4.45 (ov)	4.44 (ov)
1'''	5.07 d(1.7)	5.29 d(8)	5.30 d(8)	5.29 d(8)	5.30 d(8)
2'''	4.04 dd(4, 1)	4.45 (ov)	4.46 (ov)	4.50 (ov)	4.46 (ov)
3'''	3.69 dd(9.1, 3.8)	4.12 (ov)	4.10 (ov)	4.12 (ov)	4.10 (ov)
4'''	3.38 t(9.1)	4.45 (ov)	4.22 (ov)	4.45 (ov)	4.23 (ov)
5'''	4.03 dq(9.1, 6.3)	4.13 (ov)	3.79 br d(11) 4.27 (ov)	4.14 (ov)	3.79 br d(12) 4.28 (ov)
6'''	1.24 d(6.3)	— 4.33 (ov)		4.30 (ov) 4.48 (ov)	
1''''		5.38 d(1.5)	5.38 d(1.5)	5.41 d(1.5)	5.44 d(1.5)
2''''		5.78 dd(3, 1.5)	5.77 dd(3, 1.5)	4.81 dd(3, 1.5)	4.81 dd(3, 1.5)
3''''	6.11 qq(7.3, 1.7)	4.70 dd(10, 3)	4.70 dd(10, 3)	5.76 dd(10, 3)	5.75 dd(10, 3)
4''''	1.96 dq(7, 1.6)	5.62 dd(10, 10)	5.61 dd(10, 10)	5.87 dd(10, 10)	5.86 dd(10, 10)
5''''	1.92 q(1.6)	4.25 (ov)	4.24 (ov)	4.35 (ov)	4.35 (ov)
6''''		1.36 d(6)	1.36 d(6)	1.33 d(6)	1.33 d(6)
3'''''		6.06 dq(7, 1.5)	6.06 dq(7, 1.5)	6.06 dq(7, 1.5)	6.06 dq(7, 1.5)
4'''''		2.19 dq(7, 1.5)	2.19 dq(7, 1.5)	2.19 dq(7, 1.5)	2.19 dq(7, 1.5)
5'''''		1.96 br s	1.96 br s	1.99 br s	2.00 br s
OAc		2.03(2''''-OAc)	2.03(2''''-OAc)	1.93(3''''-OAc)	1.93(3''''-OAc)
		1.90 s(4''''-OAc)	1.90 s(4''''-OAc)	2.07 s(4''''-OAc)	2.07 s(4''''-OAc)

Table 3-5-26: ^1H NMR spectroscopic data of oleanane-type saponins **3-5-93**~**3-5-95**, **3-5-99**, and **3-5-101**.

H	3-5-93	3-5-94	3-5-95	3-5-99	3-5-101
1	1.02 m 1.65 m	1.03 m 1.64 m	—	0.86 (ov) 1.47 (ov)	0.99 t(13.2) 1.52 dt(13.2, 3.7)
2	1.72 m 2.05 m	1.73 dd(12, 9) 2.03 dd(12, 3)	1.74 t(12) 2.04 dd(12, 6)	1.76 (ov) 1.93 (ov)	1.85 (ov) 2.34 ddd (13.2, 4.6, 3.7)
3	3.22 m	3.21 dd(11, 3.6)	3.2 dd(12, 4)	3.12 (ov)	3.25 dd(11.7, 4.6)
5	0.77 m	0.79 br d(11)	0.78 br d(11)	0.71 d(11.8)	0.71 d(11.5)
6	1.57 m	1.41 m, 1.56 m	—	1.30 (ov) 1.44 (ov)	1.32 m 1.47 br d(11.6)
7	—	1.35 m, 1.54 m	—	1.33 (ov) 1.57 (ov)	1.31 m 1.47 br d(11.6)
9	1.6 m	1.67 dd(15, 7)	1.64 m	1.73 (ov)	1.60 dd(11.2, 6.4)
11	1.94 m	1.94 m	1.88 m	1.84 (ov) 2.23 (ov)	1.99 m 1.85 (ov)
12	5.35 m(8)	5.37 br t(3.5)	5.26 m	5.35 br s	5.41 t like(3.4)
15	3.87 d(4.7)	1.47 br d(16) 1.98 dd(16, 6)	1.83 br d(15.4) 1.4 dd(15.4, 4.6)	1.62 (ov) 2.16 (ov)	1.12 dt(13.3, 2.5) 1.74 td(13.3, 5.3)
16	3.93 d(4.7)	5.51 m(8)	4.15 m(8)	4.31 (ov)	1.98 td(13.3, 2.5) 2.17 m
18	2.43 br s	2.19 m	2.42 dd(12, 6)	2.48 (ov)	2.79 dd(13.5, 3.6)
19	1.05 m, 2.45 m	1.12 m, 2.3 m	—	1.61 (ov) 2.69 t(13.3)	1.31 dd(13.5, 4.8) 2.11 t(13.5)
21	1.48 br d(12) 2.16 t(12)	1.42 dd(12, 4) 1.71 t(12)	1.46 m, 2.1 t(12)	1.66 (ov), 2.31 m	3.74 d(9.9)
22	4.04 dd(11, 6.5)	4.06 m	4.03 dd(11, 6.5)	2.28 (ov)	4.31 d(9.9)
23	1.07 s	1.09 s	1.07 s	1.17 s	1.05 s
24	0.86 s	0.9 s	0.86 s	1.03 s	0.92 s
25	0.98 s	1.01 s	0.98 s	0.84 s	0.84 s
26	1.03 s	1 s	0.96 s	0.92 s	1.09 s
27	1.37 s	1.31 s	1.44 s	1.80 s	1.25 s
28	3.23 d(10.7) 3.52 d(10.7)	3.32 d(12) 3.64 d(12)	3.85 d(11) 3.91 d(11)	3.62 (ov) 3.68 (ov)	4.05 br d(14.9) 4.30 br d(14.9)
29	0.89 s	0.99 s	0.9 s	1.10 s	1.24 s
30	0.98 s	1 s	0.97 s	4.28 (ov) 4.50 (ov)	1.21 s
OAc				2.07 s(21-OAc)	
1'	4.47 d(7.7)	4.5 d(7.6)	4.47 d(7.4)	4.80 (ov)	4.95 d(8.0)
2'	3.74 dd(9, 7.7)	3.77 dd(8.9, 7.7)	3.75 t(8)	4.53 (ov)	5.66 dd(9.4, 8.0)
3'	3.68 m	3.69 t(8.7)	3.67 t(8)	4.30 (ov)	4.26 t(9.4)
4'	3.58 m	3.61 dd(9, 5)	3.58 t(8)	4.02 (ov)	4.09 t(9.2)
5'	3.58 m	3.59 d(6.4)	3.56 d(8)	3.64 (ov) 4.53 (ov)	4.18 ddd (9.2, 5.4, 2.3)

Table 3-5-26 (continued)

H	3-5-93	3-5-94	3-5-95	3-5-99	3-5-101
6'					4.88 (ov) 4.27 dd(11.2, 2.3)
1''	4.55 d(7.5)	4.58 d(7.4)	4.6 d(7.7)	5.41 d(7.6)	5.10 d(7.8)
2''	3.55 dd(9.9, 7.6)	3.56 dd(9.8, 7.4)	3.21 dd(9.5, 7.5)	4.04 (ov)	4.05 t(9.2)
3''	3.48 dd(9.9, 3)	3.51 dd(10, 3.3)	3.37 t(9)	4.22 (ov)	4.22 t(9.0)
4''	3.8 dd(3, 1.4)	3.83 dd(1.2, 3.2)	3.09 t(9.5)	4.23 (ov)	4.21 t(9.4)
5''	3.44 br s	3.47 ddd(7.2, 5, 1)	3.25 m	4.02 (ov)	3.94 ddd (9.4, 5.3, 2.5)
6''	3.62 dd(11.6, 4.9) 3.80 dd(11.6, 7.1)	3.65 dd(11.8, 5) 3.79 dd(11.6, 7.2)	3.55 dd(12, 7) 3.83 dd(12, 2)	4.38 m 4.53 (ov)	4.52 dd(11.7, 2.5) 4.35 dd(11.7, 5.3)
1'''	5.07 d(1.7)	5.1 d(2.4)	5.06 br s(4)	4.87 d(7.7)	4.74 d(7.8)
2'''	4.04 dd(4, 1)	4.07 dd(3.8, 2.4)	4.03 br d(4)	3.99 (ov)	4.34 t(9.0)
3'''	3.69 dd(9.1, 3.8)	3.71 dd(9.6, 3.8)	3.69 dd(9.5, 2.6)	4.09 (ov)	4.35 t(9.2)
4'''	3.38 t(9.1)	3.41 t(9.8)	3.38 t(9.5)	4.27 (ov)	4.20 t(9.4)
5'''	4.03 dq(9.1, 6.3)	4.05 m	4.03 dq(9, 6)	3.67 (ov)	3.79 ddd (9.4, 5.5, 2.4)
6'''	1.24 d(6.3)	1.27 d(6.2)	1.24 d(6.1)	4.28 (ov) 4.34 (ov)	4.39 dd(11.9, 2.4) 4.26 dd(11.9, 5.5)
1''''				5.02 d(6.8)	6.60 d(1.2)
2''''				4.01 (ov)	4.71 dd(3.2, 1.3)
3''''	6.11 qq(7.3, 1.7)	5.69 br s	6.1 qq(7, 1.3)	4.23 (ov)	4.68 dd(9.1, 3.4)
4''''	1.96 dq(7, 16)	2.22 d(0.8)	1.96 dq(7, 1.3)	4.26 (ov)	4.32 t(5.8)
5''''	1.92 q(1.6)	1.95 d(0.7)	1.91 br d(1.3)	3.56 (ov) 4.45 (ov)	4.89 (ov)
6''''					1.85 d(6.2)
1'''''				5.94 br s	
2'''''				4.97 (ov)	
3'''''				4.49 (ov)	6.01 qq(7.4, 1.4)
4'''''				4.30 (ov)	2.11 dd(7.1, 1.4)
5'''''				4.79 (ov)	2.03 t(1.4)
6'''''				1.64 d(6.1)	

Table 3-5-27: ¹H NMR spectroscopic data of oleanane-type saponins 3-5-96~3-5-98, 3-5-100, and 3-5-102.

H	3-5-96	3-5-97	3-5-98	3-5-100	3-5-102
3	α 3.17 dd (4.5, 13.3)	α 3.30 dd (4.0, 12.1)	α 3.28 m	3.32 dd(12, 4)	3.32 dd(12, 4.5)
5	—	—	—	0.72 br d(11)	0.92 (ov)
12	5.37 br s	5.30 br s	5.30 br s	5.44 dd(3, 3)	5.44 dd(3, 3)
15	—	—	—	3.11 d(13), 1.93 (ov)	4.20 d(5)

Table 3-5-27 (continued)

H	3-5-96	3-5-97	3-5-98	3-5-100	3-5-102
16	α 4.66 m	α 4.69 m	α 4.79 m		4.75 d(5)
18	—	—	—	3.05 dd(15, 3.5)	3.31 dd(11, 6)
21	α 5.70 dd(4.6, 12.2)	—	—	4.61 d(10)	4.38 s
22	—	—	—	5.80 d(10)	6.15 s
23	1.30 s	1.26 s	1.24 s	1.30 s	1.30 s
24	0.97 s	0.97 s	0.96 s	1.10 s	1.03 s
25	0.84 s	0.80 s	0.80 s	0.83 s	0.89 s
26	0.98 s	0.98 s	0.99 s	0.99 s	1.00 s
27	1.37 s	1.38 s	1.46 s	1.33 s	1.99 s
28	3.37 d(10.0)	3.70 d(10.4)	3.73 d(10.4)	4.24 (ov)	3.81 d(11.0)
	4.40 d(10.0)	4.56 d(10.4)	4.45 d(10.4)		4.00 d(11.0)
29	1.32 s	0.95 s	4.01 d(7.6)	1.17 s	1.39 s
			4.06 d(7.6)		
30	1.01 s	1.01 s	1.21 s	1.19 s	3.78 d(11)
					4.00 d(11)
OAc				2.28 s(21-OAc)	
				1.94 s(3'''-OAc)	
				2.07 s(4'''-OAc)	
1'	4.84 d(7.2)	4.82 d(7.2)	4.80 d(7.2)	4.95 d(8)	5.03 d(8)
2'	4.05 (ov)	4.03 (ov)	4.02 (ov)	4.08 (ov)	4.14 dd(8, 9)
3'	4.26 (ov)	4.28 (ov)	4.27 (ov)	4.51 (ov)	4.32 dd(9, 9)
4'	4.27 (ov)	4.30 (ov)	4.26 (ov)	4.11 (ov)	4.60 dd(10, 9)
5'	4.46 (ov)	4.41 (ov)	4.40 (ov)	3.95 (ov)	4.70 d(10)
6'				4.32 (ov)	
				4.45 (ov)	
1''	5.25 d(7.2)	5.29 d(7.2)	5.24 d(7.2)	5.50 d(8)	5.96 dq(7, 1.5)
2''	4.01 (ov)	4.05 (ov)	4.01 (ov)	4.18 (ov)	1.98 dq(7, 1.5)
3''	4.21 (ov)	4.22 (ov)	4.20 (ov)	4.29 (ov)	1.85 br s
4''	4.10 (ov)	4.12 (ov)	4.06 (ov)	4.18 (ov)	
5''	4.05 (ov)	4.05 (ov)	4.01 (ov)	3.86 m	
6''	4.27 (ov)	4.28 (ov)	4.28 (ov)	4.35 (ov)	
	4.57 dd(10.4, 4.0)	4.56 dd(10.4, 4.0)	4.56 dd(10.4, 4.0)	4.46 (ov)	
1'''	8.26 dd (1.3, 7.2)			5.36 d(8)	
2'''	8.26 dd (1.3, 7.2)			4.08 (ov)	
3'''	7.49 (ov)			4.18 (ov)	
4'''				4.10 (ov)	
5'''				3.97 (ov)	
6'''	8.26 dd (1.3, 7.2)			4.30 (ov)	
				4.57 (ov)	
1''''				5.58 d(1.5)	
2''''				4.71 dd(3, 1.5)	
3''''				5.74 dd(10, 3)	
4''''				5.88 dd(10, 10)	
5''''				4.44 (ov)	
6''''				1.40 d(6)	

Table 3-5-28: ^1H NMR spectroscopic data of oleanane-type saponins **3-5-103~3-5-105**.

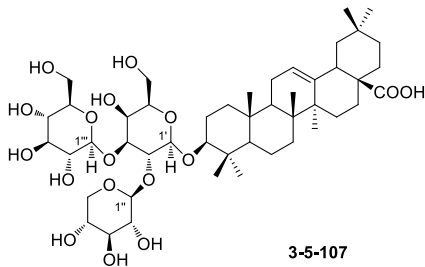
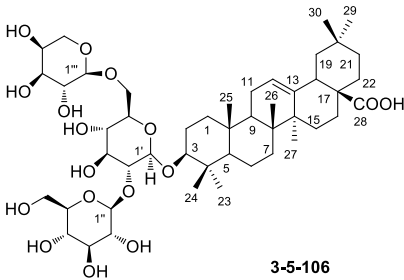
H	3-5-103	3-5-104	3-5-105
2	—	—	α 4.36 br s
3	3.41 dd(12, 4)	—	α 4.10 d(4.0)
5	—	—	—
6	—	—	5.00 br s
12	5.46 dd(3, 3)	5.24 t(2.48)	5.12 t(2.48)
15	4.28 d(4)	—	—
16	5.05 (ov)	—	—
18	3.00 dd(12, 5.5)	—	—
21	4.45 s	—	—
22	5.12 s	—	—
23	1.29 s	—	—
24	1.01 s	1.26 s	1.50 s
25	0.88 s	1.22 s	1.10 s
26	1.08 s	0.67 s	0.98 s
27	2.01 s	0.68 s	1.04 s
28	4.46 d(11), 4.85 d(11)	—	—
29	1.41 s	0.88 s	0.86 s
30	3.72 d(11), 3.90 d(11)	0.89 s	0.87 s
1'	5.00 d(8)	6.40 d(3.0)	6.43 d(3.0)
2'	4.12 (ov)	4.50 dd(3.0, 4.0)	4.52 dd(3.0, 4.0)
3'	4.31 (ov)	4.46 m	4.48 m
4'	4.60 (ov)	4.40 m	4.41 m
5'	4.70 (ov)	3.90 m	3.92 m
3''	5.93 dq(7, 1.5)	—	—
4''	2.04 dq(7, 1.5)	—	—
5''	1.90 br s	—	—

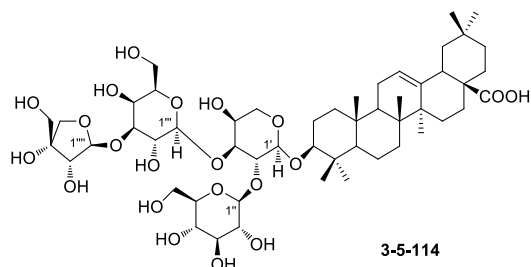
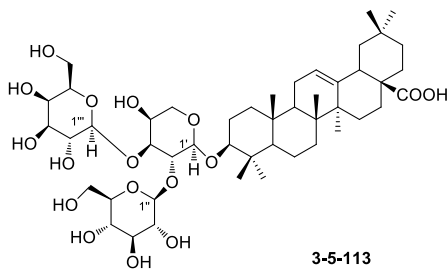
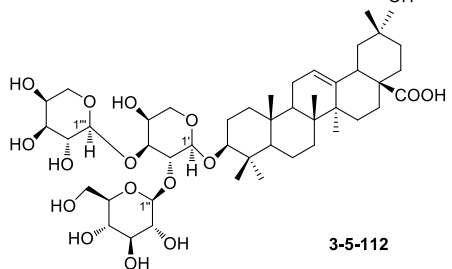
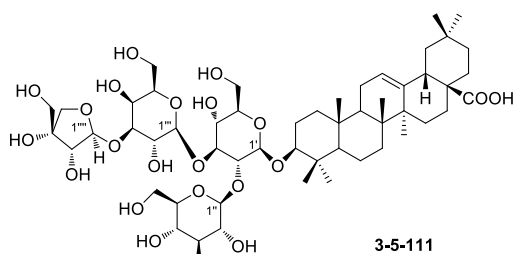
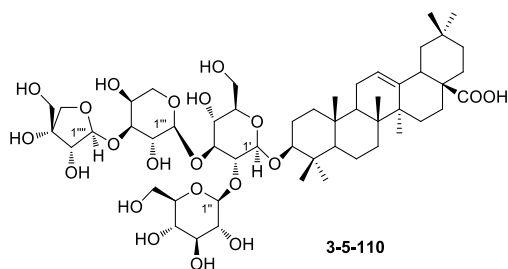
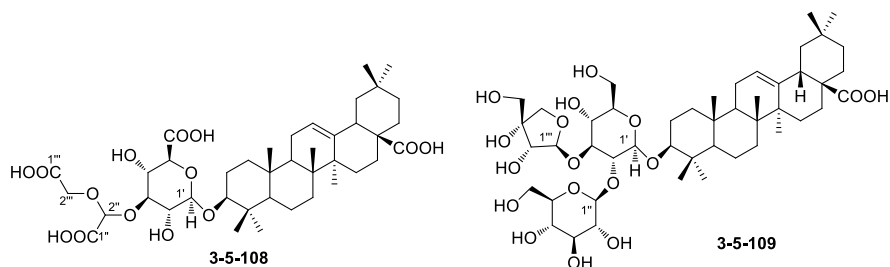
Table 3-5-29: Cos, MFs, and TSs of oleanane-type saponins **3-5-106~3-5-126**.

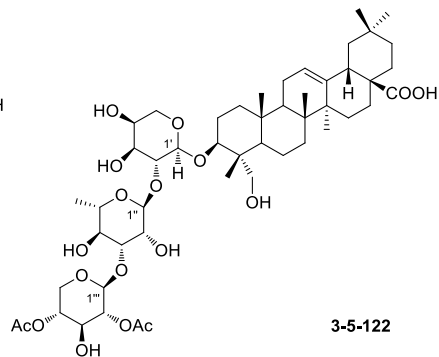
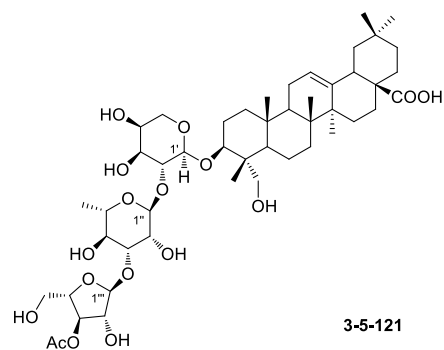
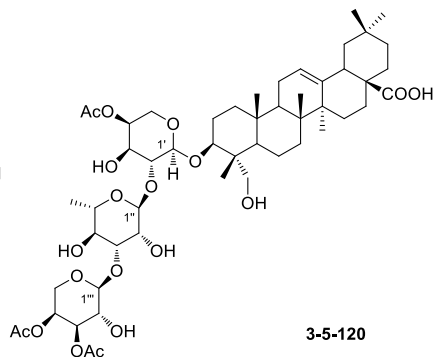
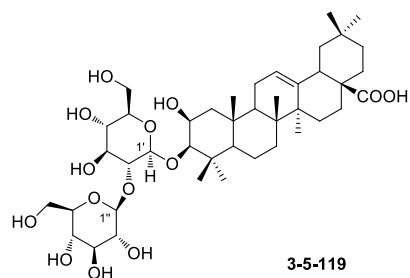
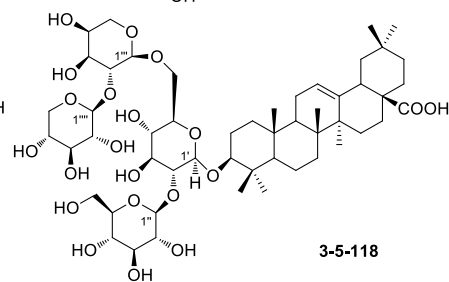
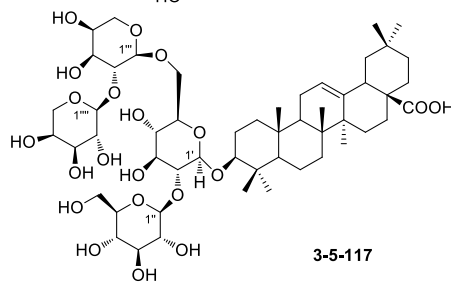
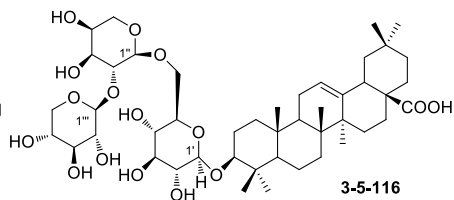
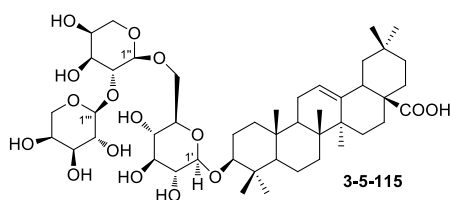
No.	Compounds	MFs	Test solvents	References
3-5-106	3- <i>O</i> -{ β -D-glucopyranosyl(1 $\rightarrow$ 2)-[α -L-arabinopyranosyl-(1 $\rightarrow$ 6)]- β -D-glucopyranosyl}oleanolic acid	$\text{C}_{47}\text{H}_{76}\text{O}_{17}$	$\text{C}_5\text{D}_5\text{N}$	[108]
3-5-107	araliasaponins V	$\text{C}_{47}\text{H}_{76}\text{O}_{17}$	$\text{C}_5\text{D}_5\text{N}$	[109]
3-5-108	3- <i>O</i> -{2'- <i>O</i> -glycolyl)-glyoxylyl- β -D-glucuronopyranosyl}-olean-12-en-3 β -ol-28-oic acid	$\text{C}_{40}\text{H}_{60}\text{O}_{14}$	CD_3OD	[110]
3-5-109	3- <i>O</i> - β -D-apiofuranosyl(1 $\rightarrow$ 3)-[β -D-glucopyranosyl-(1 $\rightarrow$ 2)]- β -D-glucopyranosyl-oleanolic acid	$\text{C}_{47}\text{H}_{76}\text{O}_{17}$	CD_3OD	[111]

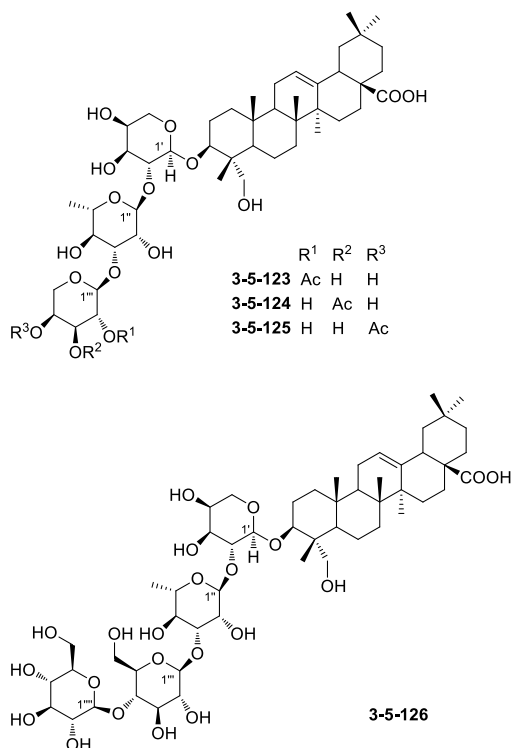
Table 3-5-29 (continued)

No.	Compounds	MFs	Test solvents	References
3-5-110	3- <i>O</i> - β -D-apiofuranosyl(1 $\rightarrow$ 3)- α -L-arabinopyranosyl-(1 $\rightarrow$ 3)-[β -D-glucopyranosyl-(1-2)]- β -D-glucopyranosyl-oleanolic acid	C ₅₂ H ₈₄ O ₂₁	CD ₃ OD	[111]
3-5-111	3- <i>O</i> - β -D-apiofuranosyl(1 $\rightarrow$ 3)- β -D-galactopyranosyl-(1 $\rightarrow$ 3)-[β -D-glucopyranosyl-(1 $\rightarrow$ 2)]- β -D-glucopyranosyl-oleanolic acid	C ₅₃ H ₈₆ O ₂₂	CD ₃ OD	[111]
3-5-112	3- <i>O</i> - α -L-arabinopyranosyl(1 $\rightarrow$ 3)-[β -D-glucopyranosyl-(1 $\rightarrow$ 2)]- α -L-arabinopyranosyl-oleanolic acid	C ₄₆ H ₇₄ O ₁₆	CD ₃ OD	[111]
3-5-113	3- <i>O</i> - β -D-galactopyranosyl-(1 $\rightarrow$ 3)-[β -D-glucopyranosyl-(1 $\rightarrow$ 2)]- α -L-arabinopyranosyl-oleanolic acid	C ₄₇ H ₇₆ O ₁₇	CD ₃ OD	[111]
3-5-114	3- <i>O</i> - β -D-apiofuranosyl-(1 $\rightarrow$ 3)- β -D-galactopyranosyl-(1 $\rightarrow$ 3)-[β -D-glucopyranosyl-(1 $\rightarrow$ 2)]- α -L-arabinopyranosyl-oleanolic acid	C ₅₂ H ₈₄ O ₂₁	CD ₃ OD	[111]
3-5-115	pitheduloside B	C ₄₆ H ₇₄ O ₁₆	C ₅ D ₅ N	[112]
3-5-116	pitheduloside C	C ₄₆ H ₇₆ O ₁₆	C ₅ D ₅ N	[112]
3-5-117	pitheduloside F	C ₅₂ H ₈₄ O ₂₁	C ₅ D ₅ N	[112]
3-5-118	pitheduloside G	C ₅₂ H ₈₄ O ₂₁	C ₅ D ₅ N	[112]
3-5-119	polygalasaponin XX	C ₄₂ H ₆₈ O ₁₄	C ₅ D ₅ N	[87]
3-5-120	rarasaponin IV	C ₅₂ H ₈₀ O ₁₉	C ₅ D ₅ N	[113]
3-5-121	rarasaponin V	C ₄₈ H ₇₆ O ₁₇	C ₅ D ₅ N	[113]
3-5-122	rarasaponin VI	C ₅₀ H ₇₈ O ₁₈	C ₅ D ₅ N	[113]
3-5-123	rarasaponin I	C ₄₈ H ₇₆ O ₁₇	C ₅ D ₅ N	[114]
3-5-124	rarasaponin II	C ₄₈ H ₇₆ O ₁₇	C ₅ D ₅ N	[114]
3-5-125	rarasaponin III	C ₄₈ H ₇₆ O ₁₇	C ₅ D ₅ N	[114]
3-5-126	hederagenin 3- <i>O</i> - β -D-glucopyranosyl-(1 $\rightarrow$ 4)- β -D-glucopyranosyl-(1 $\rightarrow$ 3)- α -L-rhamnopyranosyl-(1 $\rightarrow$ 2)- α -L-arabinopyranoside	C ₅₃ H ₈₆ O ₂₂	C ₅ D ₅ N	[115]







**Table 3-5-30:** ^1H NMR spectroscopic data of oleanane-type saponins **3-5-106**, **3-5-120**, and **3-5-121**.

H	3-5-106	3-5-120	3-5-121
1	1.57, 1.03	1.08 br dd(<i>ca.</i> 4.14), 1.58 m	1.08 m, 1.58 m
2	2.32, 1.88	2.02 m, 2.24 m	1.98 m, 2.20 m
3	3.24 dd(11.5, 4.6)	4.27 dd(4.8, 12.1)	4.21 dd(4.9, 12.1)
5	0.74 d(11.9)	1.76 br d(<i>ca.</i> 8)	1.70 m
6	1.50, 1.31	1.38 dd(2.2, 12.4), 1.78 m	1.35 m, 1.74 m
7	1.45, 1.30	1.33 m, 1.67 m	1.30 m, 1.64 m
9	1.64	1.81 m	1.70 m
11	1.91, 1.91	1.94 m	1.80 m, 1.95 m
12	5.45 s	5.47 dd(3.6, 4.4)	5.46 br s
15	2.18, 1.20	1.13 m, 2.15 m	1.14 m, 2.14 m
16	2.12, 1.97	2.06 m	2.06 m, 2.14 m
18	3.30 dd(14.3, 4.6)	3.28 dd(4.3, 13.9)	3.27 dd(4.1, 13.2)
19	1.84, 1.33	1.30 m, 1.78 m	1.28 m, 1.80 m
21	1.48, 1.24	1.20 br d(<i>ca.</i> 12), 1.43 m	1.20 m, 1.46 m
22	2.06, 1.83	1.81 m, 2.04 m	1.80 m, 2.06 m
23	1.25 s	3.92 d(10.8), 4.27 d(10.8)	3.86 d(10.9), 4.18 d(10.9)

Table 3-5-30 (continued)

H	3-5-106	3-5-120	3-5-121
24	1.10 s	1.15 s	1.07 s
25	0.87 s	0.95 s	0.95 s
26	1.00 s	1.04 s	1.02 s
27	1.28 s	1.26 s	1.24 s
29	0.98 s	0.93 s	0.93 s
30	1.03 s	1.01 s	1.00 s
1'	4.82 d(7.8)	5.02 d(7.0)	5.03 d(7.2)
2'	4.11	4.51 dd(7.0, 8.8)	4.50 dd(7.2, 7.2)
3'	4.22	4.10 dd(3.8, 8.8)	4.61 dd(3.8, 8.1)
4'	4.02	5.36 br s	4.11 m
5'	3.99	3.66 dd(1.6, 11.9)	3.65 dd(1.7, 11.7)
		4.18 dd(2.7, 11.9)	4.22 dd(8.6, 11.7)
6'	4.74 dd(11.6, 2.2)		
	4.20		
1''	5.28 d(7.7)	6.31 br s	6.18 br s
2''	4.06	4.88 m	4.84 br s
3''	4.19	4.78 m	4.68 dd(2.9, 9.8)
4''	4.26	4.44 dd(9.3, 9.8)	4.30 dd(9.5, 9.8)
5''	3.88	4.75 m	4.66 m
6''	4.42, 4.42	1.64 d(6.2)	1.57 d(6.3)
1'''	4.92 d(6.5)	5.42 d(7.4)	6.13 br s
2'''	4.42	4.44 dd(7.4, 9.6)	4.78 br s
3'''	4.15	5.49 dd(3.8, 9.6)	5.57 br d(ca. 4)
4'''	4.31	5.58 br s	4.75 dd(4.0, 8.3)
5'''	4.29	3.81 dd(1.1, 13.1)	4.14 m
	3.77	4.07 dd(2.4, 13.1)	
OAc		1.96 s(4'-OAc)	1.93 s(3'''-OAc)
		1.87 s(3'''-OAc)	
		2.05 s(4'''-OAc)	

Table 3-5-31: ¹H NMR spectroscopic data of oleanane-type saponins 3-5-107~3-5-110, and 3-5-119.

H	3-5-107	3-5-108	3-5-109	3-5-110	3-5-119
3	3.27 dd(12, 4)	3.2 dd(11.5, 4)	3.23 dd(11.4, 4.4)	3.24 dd(11.7, 4.2)	3.30 d(3)
12	5.46 t-like	5.2 br t(3.4)	5.23 br t(7.6)	5.26 br t(7.5)	5.49 t-like
18	3.30 br dd(14, 4)	2.91 dd(14, 4)	2.93 dd(13.3, 3.1)	2.88 dm(12.8)	3.30 (ov)
23	1.30 s	1.05 s	1.10 s	1.10 s	1.35 s
24	1.09 s	0.87 s	0.87 s	0.89 s	1.45 s
25	0.83 s	0.94 s	0.97 s	0.98 s	1.45 s
26	0.98 s	0.83 s	0.89 s	0.84 s	1.05 s
27	1.32 s	1.12 s	1.15 s	1.18 s	1.31 s
29	0.96 s	0.87 s	0.89 s	0.93 s	0.96 s
30	1.02 s	0.94 s	0.97 s	0.96 s	1.02 s

Table 3-5-31 (continued)

H	3-5-107	3-5-108	3-5-109	3-5-110	3-5-119
1'	4.81 d(8)	4.40 d(7.9)	4.50 d(7.8)	4.50 d(7.7)	4.93 d(8)
2'	4.71 dd(9.5, 8)	3.40 t(7.7)	3.72 dd(8.9, 8.2)	3.78 dd(8.3, 7.7)	4.10 dd(8, 8.5)
3'	4.30 (ov)	3.56 m	3.63 t(8.8)	3.73 t(8.3)	4.27 (ov)
4'	—	3.56 m	3.36 t(8.8)	3.38 t(8.5)	4.12 (ov)
5'	4.00 (ov)	3.56 m	3.31 m	3.32 m	3.91 m
6'	—		3.68 dd(11.4, 5.5)	3.68 dd(11.7, 5.5)	4.25 (ov)
			3.88 dd(11.4, 2.1)	3.88 d(11.7)	4.46 (ov)
1''	5.45 d(8)		4.81 d(7.8)	5.01 d(7.8)	5.31 d(8)
2''	4.03 dd(8.5, 8)	5.02 s	3.19 dd(9.2, 8)	3.16 dd(9.2, 8.0)	4.09 dd(8, 8.5)
3''	—		3.37 t(9.2)	3.36 t(9.2)	4.20 (ov)
4''	—		3.10 t(9.3)	3.09 t(9.2)	4.28 (ov)
5''	3.43 t(11)		3.29 m	3.31 ddd (9.2, 8.0, 1.8)	3.91 m
6''	—		3.55 dd(12.1, 6.6)	3.56 dd(11.5, 8.0)	4.42 (ov)
			3.86 dd(12.1, 2.1)	3.85 dd(11.5, 1.8)	4.47 (ov)
1'''	5.33 d(8)		5.29 d(4.2)	4.63 d(7.7)	
2'''	3.98 (ov)	4.02 d(14.7) 4.40 d(14.7)	4.08 d(4.2)	3.74 dd(8.8, 8.2)	
3'''	4.21 (ov)			3.57 dd(8.8, 3.3)	
4'''	—		4.18 d(9.6) 3.82 d(9.6)	3.98 m	
5'''	3.98 m		3.56 d(11.2) 3.60 d(11.2)	3.93 dd(12.4, 1.4) 3.65 br d(12.4)	
1''''				5.23 d(2.7)	
2''''				4.06 d(2.7)	
4''''				4.11 d(9.7)	
				3.79 d(9.7)	
5''''				3.63 s	

Table 3-5-32: ¹H NMR spectroscopic data of oleanane-type saponins **3-5-111~3-5-114**.

H	3-5-111	3-5-112	3-5-113	3-5-114
3	3.24 dd(11.4, 4.3)	3.19 dd(11.7, 4.5)	3.20 dd(11.5, 4.3)	3.19 dd(11.7, 4)
12	5.26 br t(7)	5.26 br t(7.5)	5.25 br t(7.2)	5.26 m
18	2.88 dd(13, 2.4)	2.87 dm(13)	2.89 dm(13)	2.90 dm(12.4)
23	1.10 s	1.09 s	1.09 s	1.09 s
24	0.90 s	0.89 s	0.89 s	0.89 s
25	0.98 s	0.98 s	0.97 s	0.98 s
26	0.85 s	0.84 s	0.86 s	0.87 s
27	1.18 s	1.18 s	1.17 s	1.18 s
29	0.92 s	0.93 s	0.92 s	0.91 s
30	0.97 s	0.96 s	0.97 s	0.98 s

Table 3-5-32 (continued)

H	3-5-111	3-5-112	3-5-113	3-5-114
1'	4.50 d(7.1)	4.43 d(7.6)	4.42 d(7.7)	4.42 d(7.7)
2'	3.78 m	4.01 dd(8.9, 7.8)	4.00 dd(9.6, 7.5)	4.00 dd(10.0, 7.7)
3'	3.77 m	3.80 dd(9.2, 3.1)	3.84 br d(9.2)	3.85 dd(10.0, 3.6)
4'	3.41 t(9.2)	4.03 m	4.09 m	4.09 m
5'	3.35 m	3.88 dd(12.3, 2.3) 3.58 br d(12.3)	3.87 dd(12.7, 2.2) 3.59 dd(12.7, 0.9)	3.89 dd(12.6, 3) 3.59 br d(12.6)
6'	3.69 dd(12, 7.6) 3.89 dd(12, 1.6)			
1''	5.00 d(7.8)	4.86 d(7.7)	4.88 d(7.9)	4.87 d(7.9)
2''	3.16 dd(7.8, 8.6)	3.13 dd(9.5, 7.7)	3.12 dd(9.2, 8)	3.13 dd(9.2, 8.2)
3''	3.37 t(9)	3.34 m	3.36 dd(9.3, 9.2)	3.35 m
4''	3.09 t(9.3)	3.09 t(9.5)	3.08 t(9.3)	3.90 t(9.3)
5''	3.31 ddd (9.3, 7.4, 1.8)	3.31 ddd (9.3, 8, 2.3)	3.31 ddd (9.3, 7.1, 2.2)	3.30 m
6''	3.57 dd(12.3, 7.1) 3.85 dd(12.3, 1.8)	3.57 dd(11, 8) 3.84 dd(11, 2.3)	3.56 dd(11.8, 7.1) 3.83 dd(11.8, 2.2)	3.56 dd(12.2, 7) 3.84 dd(12.2, 3)
1'''	4.71 d(7.8)	4.55 d(7.2)	4.58 d(7.8)	4.63 d(7.8)
2'''	3.74 dd(10, 8.2)	3.66 dd(9.2, 7.2)	3.32 dd(9.2, 7.5)	3.76 dd(10.0, 7.8)
3'''	3.55 dd(10, 3)	3.52 dd(9.2, 3.3)	3.30 dd(9.3, 3.3)	3.52 dd(10.0, 3.0)
4'''	4.00 d(3)	3.83 m	3.86 d(3.3)	4.00 d(3.0)
5'''	3.80 dd(8, 4.7)	3.88 dd(12.3, 2.3) 3.58 br d(12.3)	3.55 m	3.57 m
6'''	3.70 dd(11.4, 4.7) 3.78 dd(11.4, 8)		3.74 dd(11.4, 4) 3.72 dd(11.4, 5.5)	3.72 m, 3.73 m
1''''	5.22 d(2.7)			5.22 d(2.6)
2''''	4.06 d(2.7)			4.05 d(2.6)
4''''	4.10 d(9.7)			4.10 d(9.6)
	3.79 d(9.7)			3.79 d(9.6)
5''''	3.63 s			3.63 s

Table 3-5-33: ¹H NMR spectroscopic data of oleanane-type saponins 3-5-115~3-5-118 and 3-5-126.

H	3-5-115	3-5-116	3-5-117	3-5-118	3-5-126
3	3.48 dd(11.7, 4.4)	3.53 dd(11.7, 4.4)	3.40 dd(11.7, 4.4)	3.45 dd(11.7, 4.4)	5.45 br s
12	5.44 m	5.43 m	5.44 m	5.42 m	3.61 d(10.8), 4.25 (ov)
18	3.27 dd(13.0, 4.5)	3.27 dd(13.0, 4.5)	3.28 dd(13.0, 4.5)	3.28 dd(13.0, 4.5)	1.12 s
23	1.34 s	1.33 s	1.31 s	1.31 s	0.94 s
24	0.95 s	0.98 s	0.94 s	0.93 s	1.01 s
25	0.84 s	0.84 s	0.84 s	0.84 s	1.23 s
26	0.99 s	0.99 s	0.98 s	0.98 s	0.91 s

Table 3-5-33 (continued)

H	3-5-115	3-5-116	3-5-117	3-5-118	3-5-126
27	1.32 s	1.33 s	1.31 s	1.28 s	0.99 s
29	0.99 s	0.99 s	1.00 s	0.99 s	5.00 d(6.6)
30	1.01 s	1.00 s	1.11 s	1.10 s	6.27 br s
1'	4.89 d(8.1)	4.91 d(7.3)	4.90 d(7.3)	4.90 d(7.3)	1.53 d(6.0)
1''	5.09 d(5.4)	5.15 d(5.1)	5.42 d(7.6)	5.40 d(7.6)	5.13 d(7.8)
1'''	5.03 d(6.6)	4.99 d(6.6)	5.11 d(5.1)	5.14 d(5.1)	5.37 d(7.8)
1''''			5.07 d(7.1)	4.98 d(7.1)	

Table 3-5-34: ¹H NMR spectroscopic data of oleanane-type saponins 3-5-122~3-5-125.

H	3-5-122	3-5-123	3-5-124	3-5-125
1	1.08 m, 1.57 m	1.06 m, 1.56 m	1.10 m, 1.56 m	1.08 m, 1.58 m
2	2.00 m, 2.22 m	1.98 m 2.21 dd(3.5, 9.2)	2.04 m, 2.36 m	2.00 m, 2.22 m
3	4.23 m	4.23 dd-like	4.31 dd(4.4, 12.0)	4.26 m
5	1.78 m	1.73 m	1.78 m	1.77 m
6	1.38 m, 1.78 m	1.39 m, 1.79 m	1.38 dd(2.4, 12.7) 1.80 br d(ca. 13)	1.35 m, 1.78 m
7	1.28 m 1.63 ddd(3.8, 12.9, 16.3)	1.30 m 1.63 m	1.30 m 1.66 dd(3.4, 12.4)	1.20 m 1.66 br dd (ca. 10, 12)
9	1.78 m	1.75 m	1.80 m	1.77 m
11	1.78 m, 1.98 m	1.77 m 2.08 dd(3.1, 13.4)	1.80 m, 1.95 m	1.80 m, 1.95 m
12	5.47 dd(3.1, 3.4)	5.47 br s	5.48 br s	5.47 br s
15	1.13 br d(ca. 14) 2.15 ddd(3.1, 13.2, 13.7)	1.13 br d(ca. 15) 2.14 ddd(2.0, 12.9, 15.0)	1.14 m 2.16 ddd(3.8, 13.6, 17.0)	1.14 m 2.16 m
16	2.08 m, 2.12 m	2.06 m, 2.14 m	2.08 m, 2.16 m	2.08 m, 2.12 m
18	3.28 dd(4.1, 13.9)	3.28 dd(13.6, 2.8)	3.29 dd(14.5, 4.1)	3.27 dd(13.8, 3.8)
19	1.28 m, 1.80 m	1.24 m, 1.79 m	1.28 m, 1.76 m	1.28 m, 1.80 m
21	1.20 m, 1.43 m	1.20 m, 1.44 m	1.20 m, 1.43 m	1.20 m 1.43 ddd(3.7, 13.8, 17.2)
22	1.80 m, 2.04 m	1.79 m, 2.02 m	1.81 m, 2.04 m	1.80 m, 2.04 m
23	3.88 d(10.7) 4.20 d(10.7)	3.88 d(10.6) 4.18 d(10.6)	3.94 d(10.7) 4.34 d(10.7)	3.87 d(10.6), 4.22 m
24	1.08 s	1.08 s	1.15 s	1.09 s
25	0.96 s	0.96 s	0.97 s	0.96 s

Table 3-5-34 (continued)

H	3-5-122	3-5-123	3-5-124	3-5-125
26	1.03 s	1.03 s	1.05 s	1.03 s
27	1.24 s	1.24 s	1.25 s	1.25 s
29	0.93 s	0.93 s	0.93 s	0.93 s
30	1.01 s	1.00 s	1.01 s	1.01 s
1'	5.05 d(6.5)	5.05 d(6.3)	5.05 d(6.7)	5.05 d(6.9)
2'	4.51 dd(6.5, 7.7)	4.52 m	4.60 dd(6.7, 8.4)	4.52 dd(6.9, 8.8)
3'	4.05 dd(3.6, 8.1)	4.05 dd(3.6, 9.4)	4.00 dd(3.6, 8.4)	4.03 dd(3.5, 8.8)
4'	4.15 m	4.14 m	4.13 br dd(ca. 3, 4)	4.13 br s
5'	3.67 dd(2.0, 12.0)	3.67 dd(2.1, 12.2)	3.67 br d(ca. 12)	3.67 br d(ca. 11)
	4.25 m	4.24 m	4.26 dd(3.2, 12.2)	4.24 m
1''	6.18 d(1.4)	6.17 br s	6.37 br s	6.22 br s
2''	4.81 dd(1.4, 3.2)	4.83 br s	4.96 br s	4.85 br s
3''	4.62 dd(3.2, 9.5)	4.61 m	4.81 dd(3.1, 9.6)	4.71 dd(2.0, 9.5)
4''	4.30 dd(9.5, 9.6)	4.26 m	4.45 dd(9.5, 9.6)	4.43 dd(9.2, 9.5)
5''	4.60 m	4.61 m	4.74 m	4.67 br dq (ca. 9, 6)
6''	1.53 d(6.2)	1.53 d(6.2)	1.55 d(6.0)	1.55 d(6.0)
1'''	5.37 d(7.4)	5.31 d(6.7)	5.42 d(7.2)	5.26 d(7.5)
2'''	5.52 dd(7.4, 8.9)	5.87 dd(6.7, 8.0)	4.74 m	4.39 dd(7.5, 8.6)
3'''	4.23 m	4.18 m	5.44 dd(3.4, 9.6)	4.24 m
4'''	5.26 ddd(5.1, 8.9, 9.2)	4.23 m	4.49 br s	5.50 br s
5'''	3.47 dd(9.2, 11.5)	3.71 br d(ca. 11)	3.79 br d(ca. 12)	3.75 br d(ca. 13)
	4.17 dd(5.1, 11.5)	4.23 dd(2.4, 10.8)	4.18 dd(2.6, 12.3)	4.13 dd(2.3, 13.2)
OAc	1.99 s(2'''-OAc) 1.91 s(4'''-OAc)	1.98 s(2'''-OAc)	1.89 s(3'''-OAc)	2.02 s(4'''-OAc)

Table 3-5-35: Cos, MFs, and TSs of oleanane-type saponins 3-5-127~3-5-155.

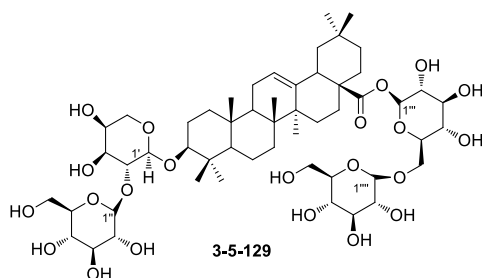
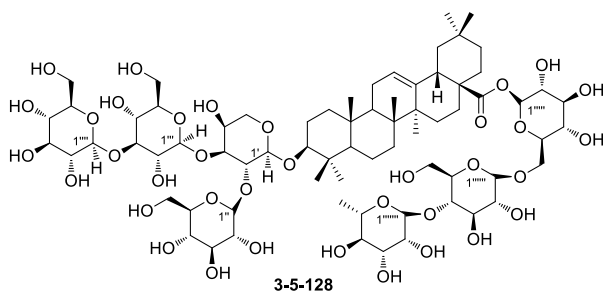
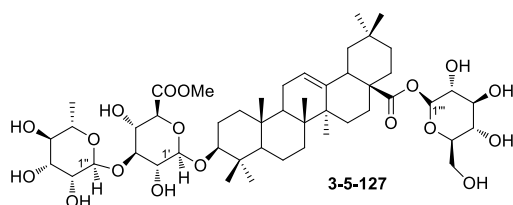
No.	Compounds	MFs	Test solvents	References
3-5-127	oleanolic acid-3-O- α -L-rhamnopyranosyl(1 $\rightarrow$ 3)-6'-O-methyl- β -D-glucopyranosyl-28-O- β -D-glucopyranoside	C ₄₉ H ₇₈ O ₁₈	C ₅ D ₅ N	[116]

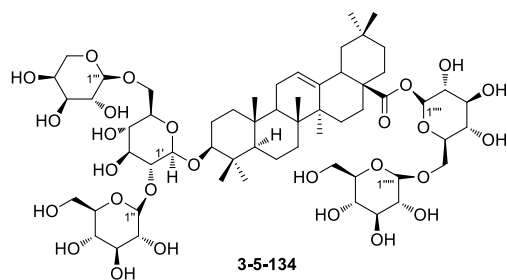
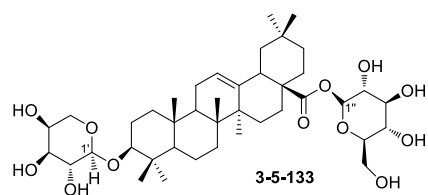
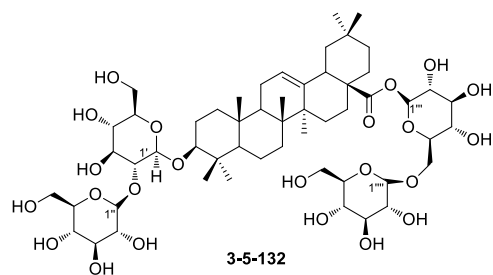
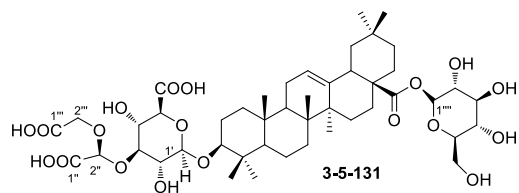
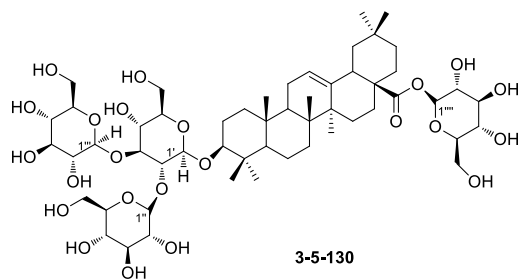
Table 3-5-35 (continued)

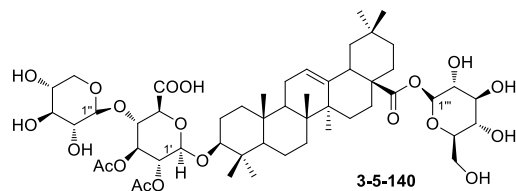
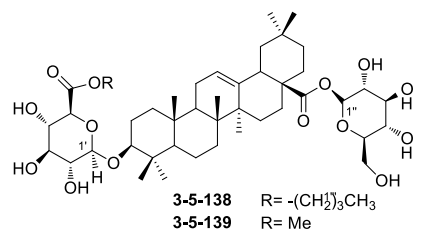
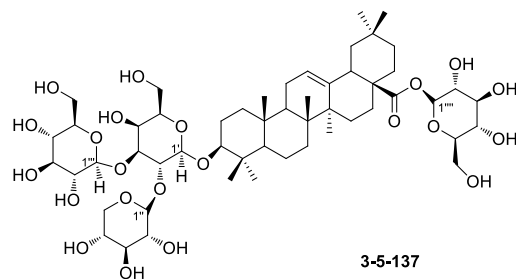
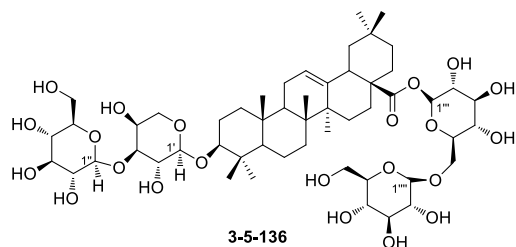
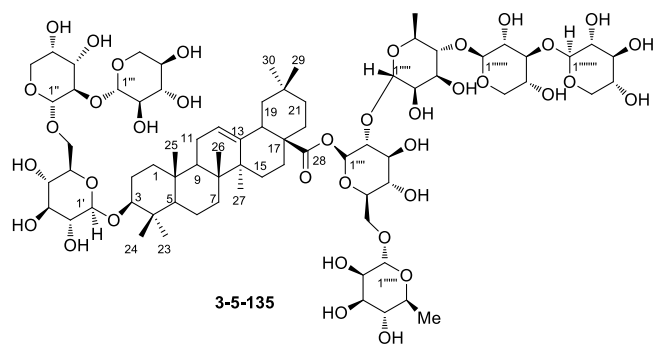
No.	Compounds	MFs	Test solvents	References
3-5-128	3- <i>O</i> -{ β -D-glucopyranosyl-(1 $\rightarrow$ 3)- β -D-glucopyranosyl-(1 $\rightarrow$ 3)-[β -D-glucopyranosyl-(1 $\rightarrow$ 2)]- α -L-arabinopyranosyl}oleanolic acid 28- <i>O</i> -[α -L-rhamnopyranosyl-(1 $\rightarrow$ 4)- β -D-glucopyranosyl-(1 $\rightarrow$ 6)- β -D-glucopyranosyl] ester	C ₇₁ H ₁₁₆ O ₃₆	C ₅ D ₅ N	[117]
3-5-129	3- <i>O</i> -[β -D-glucopyranosyl(1 $\rightarrow$ 2)- α -L-arabinopyranosyl] oleanolic acid 28- <i>O</i> -[β -D-glucopyranosyl (1 $\rightarrow$ 6)- β -D-glucopyranosyl] ester	C ₅₃ H ₈₆ O ₂₂	C ₅ D ₅ N	[118]
3-5-130	aralia-saponin V	C ₅₄ H ₈₈ O ₂₃	C ₅ D ₅ N	[119]
3-5-131	3- <i>O</i> -{2'-(2''- <i>O</i> -glycolyl)-glyoxylyl- β -D-glucuronopyranosyl}28- <i>O</i> - β -D-glucopyranosyl olean-12-en-3 β -ol-28-oic acid	C ₄₆ H ₇₀ O ₁₉	CD ₃ OD	[110]
3-5-132	helixoside B	C ₅₄ H ₈₈ O ₂₃	CD ₃ OD	[120]
3-5-133	3 β - <i>O</i> -L-arabinopyranosyl olean-12-en-28-oic acid 28- <i>O</i> - β -D-glucopyranosyl ester	C ₄₁ H ₆₆ O ₁₂	CD ₃ OD	[121]
3-5-134	β -D-glucopyranosyl(1 $\rightarrow$ 2)- β -D-glucopyranosyl-3- <i>O</i> -{ β -D-glucopyranosyl(1 $\rightarrow$ 2)-[α -L-arabinopyranosyl(1 $\rightarrow$ 6)]- β -D-glucopyranosyl}-oleanolate	C ₅₉ H ₉₆ O ₂₇	C ₅ D ₅ N	[108]
3-5-135	gleditsioside H	C ₇₄ H ₁₂₀ O ₃₇	C ₅ D ₅ N	[122]
3-5-136	araliasaponin II	C ₅₃ H ₈₆ O ₂₂		[109]
3-5-137	araliasaponin VI	C ₅₃ H ₈₆ O ₂₂		[109]
3-5-138	oleanolic acid 3- <i>O</i> -[β -D-glucuronopyranoside-6- <i>O</i> -butyl ester]-28- <i>O</i> - β -D-glucopyranoside	C ₄₂ H ₆₆ O ₁₃	C ₅ D ₅ N	[123]
3-5-139	3- <i>O</i> -(methyl- β -D-glucuronopyranosiduroate)-28- <i>O</i> - β -D-glucopyranosyl oleanolate	C ₄₃ H ₆₈ O ₁₄	CDCl ₃ -DMSO- <i>d</i> ₆	[124]
3-5-140	2',3'- <i>O</i> -diacetylsalsoside C	C ₅₁ H ₇₈ O ₂₀	CD ₃ OD	[125]
3-5-141	3- <i>O</i> -{[β -D-glucopyranosyl-(1 $\rightarrow$ 2)]-[β -D-xylopyranosyl-(1 $\rightarrow$ 4)]-[3- <i>O</i> -acetyl]- β -D-glucuronopyranosyl}-28- <i>O</i> -[β -D-glucopyranosyl]-oleanolic acid	C ₅₅ H ₈₆ O ₂₄	C ₅ D ₅ N	[125]
3-5-142	3- <i>O</i> -{[β -D-glucopyranosyl(1 $\rightarrow$ 2)]-[α -L-arabinofuranosyl-(1 $\rightarrow$ 4)]-[3- <i>O</i> -acetyl]- β -D-glucuronopyranosyl}-28- <i>O</i> -[β -D-glucopyranosyl]-oleanolic acid	C ₅₅ H ₈₆ O ₂₄	CD ₃ OD	[125]
3-5-143	leonticin E	C ₆₅ H ₁₀₆ O ₃₁	C ₅ D ₅ N-CD ₃ OD	[126]
3-5-144	leonticin G	C ₇₀ H ₁₁₄ O ₃₅	C ₅ D ₅ N-CD ₃ OD	[126]
3-5-145	anhuienoside C	C ₅₃ H ₈₆ O ₂₁	C ₅ D ₅ N	[127]
3-5-146	anhuienoside D	C ₅₃ H ₈₆ O ₂₁	C ₅ D ₅ N	[127]
3-5-147	anhuienoside E	C ₆₀ H ₉₈ O ₂₆	C ₅ D ₅ N	[127]

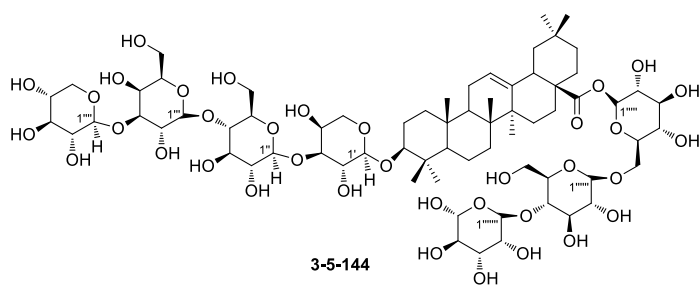
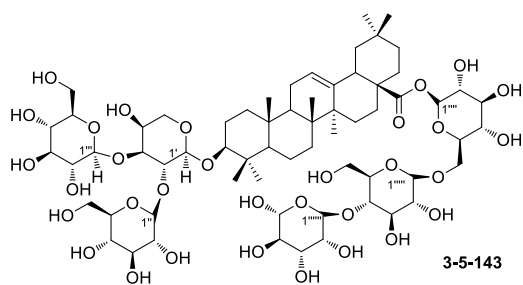
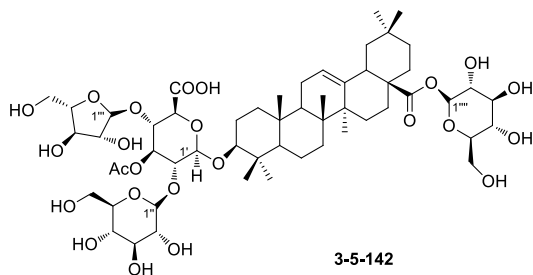
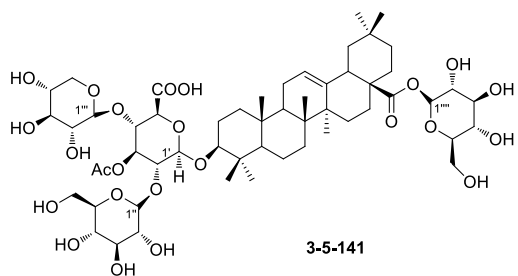
Table 3-5-35 (continued)

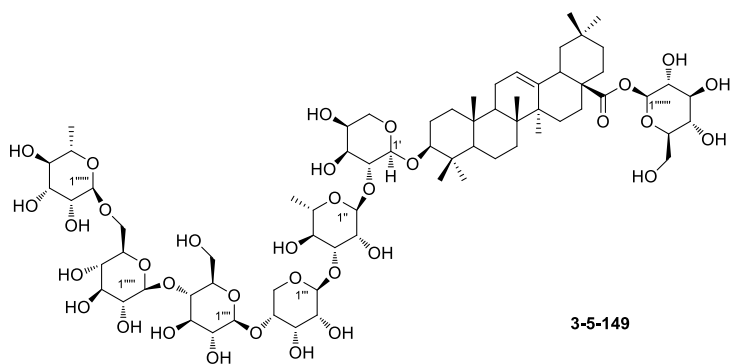
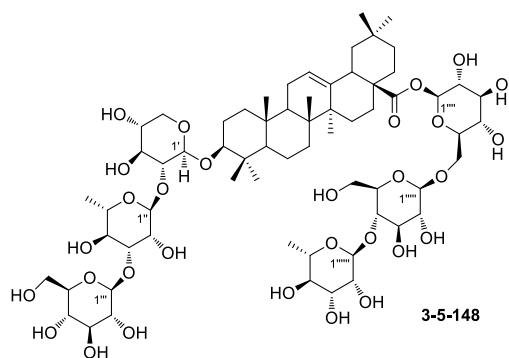
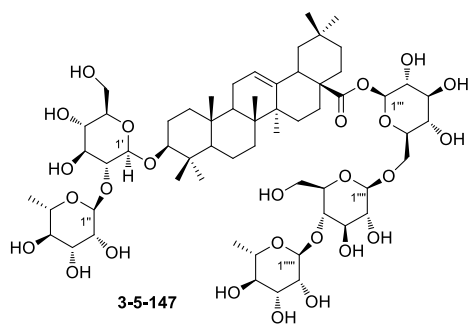
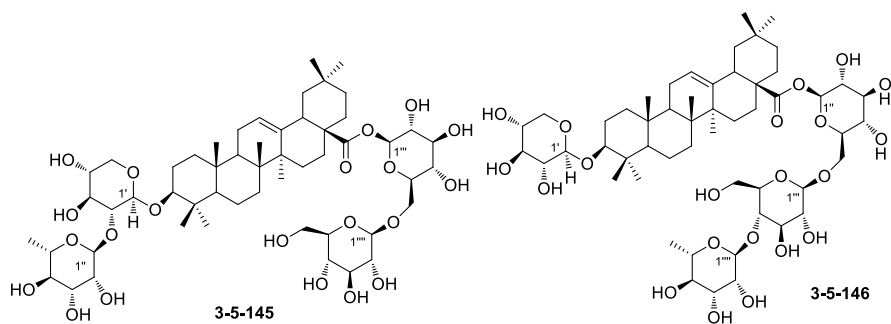
No.	Compounds	MFs	Test solvents	References
3-5-148	anhuienoside F	C ₆₅ H ₁₀₆ O ₃₀	C ₅ D ₅ N	[127]
3-5-149	3β-[(<i>O</i> -α-L-rhamnopyranosyl-(1→6)- <i>O</i> -β-D-glucopyranosyl-(1→4)- <i>O</i> -β-D-glucopyranosyl-(1→4)- <i>O</i> -β-D-ribosepyranosyl-(1→3)- <i>O</i> -α-L-rhamnopyranosyl-(1→2)-α-L-arabinopyranosyl)oxy]olean-12-en-28-oic acid β-D-glucopyranosyl ester	C ₇₀ H ₁₁₄ O ₃₄	C ₅ D ₅ N	[128]
3-5-150	3β-[(<i>O</i> -β-D-glucopyranosyl-(1→4)- <i>O</i> -β-D-ribosepyranosyl-(1→3)- <i>O</i> -α-L-rhamnopyranosyl-(1→2)-α-L-arabinopyranosyl)oxy]olean-12-en-28-oic acid <i>O</i> -β-D-glucopyranosyl ester	C ₅₈ H ₉₄ O ₂₅	C ₅ D ₅ N	[128]
3-5-151	monepaloside G	C ₅₂ H ₈₄ O ₂₁	C ₅ D ₅ N	[129]
3-5-152	monepaloside H	C ₅₂ H ₈₄ O ₂₁	C ₅ D ₅ N	[129]
3-5-153	monepaloside I	C ₅₈ H ₉₄ O ₂₆	C ₅ D ₅ N	[129]
3-5-154	monepaloside J	C ₅₉ H ₉₆ O ₂₇	C ₅ D ₅ N	[129]
3-5-155	ginsenoside-R _{OA}	C ₅₄ H ₈₆ O ₂₄	C ₅ D ₅ N	[130]













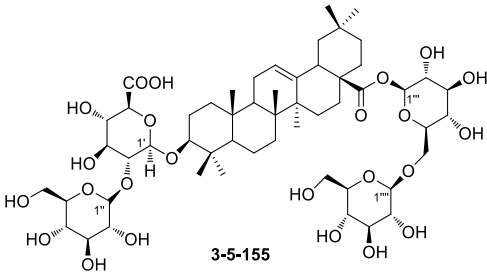
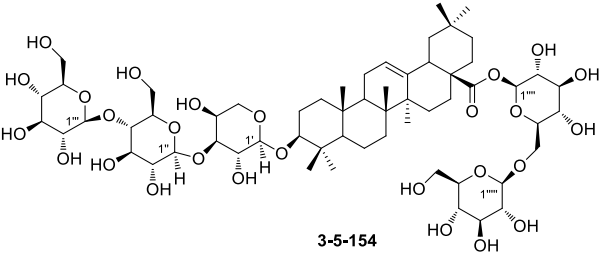


Table 3-5-36: ¹H NMR spectroscopic data of oleanane-type saponins **3-5-127**, **3-5-128**, and **3-5-130~3-5-132**.

H	3-5-127	3-5-130	3-5-131	3-5-132	3-5-128	H	3-5-128
3	3.29 dd(10, 4)	3.24 dd (11.5, 4.0)	3.20 dd (12, 4)	3.18	3.23 dd (12.0, 3.0)	1'''''	6.22 d(8.0)
12	5.4 t(2)	5.39 br s	5.24 br t(3)	5.25 br s	5.42 br s	2'''''	4.13
18	3.19 dd (10, 2.5)	3.56 dd (14.0, 4.5)	2.85 dd (14, 4)	2.86 dd (13.2, 3.2)	3.18 dd (14.0, 3.0)	3'''''	4.20
23	0.83 s ^①	1.23 s	1.05 s	1.08 s	1.24 s	4'''''	4.30
24	0.89 s ^①	1.06 s	0.83 s	0.86 s	1.08 s	5'''''	4.11
25	0.92 s ^①	0.78 s	0.95 s	0.96 s	0.86 s	6'''''	4.32, 4.65
26	0.92 s ^①	1.06 s	0.79 s	0.80 s	1.08 s	1''''''	4.97 d(8.0)
27	1.08 s ^①	1.23 s	1.15 s	1.15 s	1.23 s	2''''''	3.92 t(8.5)
29	1.23 s ^①	0.88 s	0.9 s	0.91 s	0.90 s	3''''''	4.15
30	1.27 s ^①	0.86 s	0.92 s	0.94 s	0.90 s	4''''''	4.37
1'	4.87 d(8)	4.81 d(8.0)	4.39 d(7.8)	4.44 d(7.5)	4.76 d(6.2)	5''''''	3.67
2'	4.02 (ov)	4.34	3.42 t(7.7)	—	4.70 t(8.0)	6''''''	4.07, 4.21
3'	4.26 t(9)	4.24	3.56 m	—	4.30	1'''''''	5.81 br s
4'	—	4.01	3.56 m	—	4.48	2'''''''	4.65
5'	4.53 (ov)	3.80	3.56 m	—	3.65	3'''''''	4.52
					4.14		
6'	3.77 s (CO ₂ Me)	4.45	—	—		4'''''''	4.30

Table 3-5-36 (continued)

H	3-5-127	3-5-130	3-5-131	3-5-132	3-5-128	H	3-5-128
1''	4.73 d(2)	5.70 d(8.0)		4.67 d(7.7)	5.44 d(8.0)	5''''''	4.91 dq(9.0, 6.0)
2''	—	4.06	5.01 s	—	4.02	6''''''	1.69 d(6.0)
3''	—	4.25		—	4.16		
4''	—	4.14		—	4.13		
5''	—	3.87		—	3.71 m		
6''	1.68 d(6)	4.44		—	4.25, 4.33		
1'''	6.3 d(8)	5.36 d(8.0)		5.35 d(7.9)	5.25 d(8.0)		
2'''	4.18 t(8.5)	4.02	4.02 d(15), 4.34 d(15)	—	4.00		
3'''	4.29 (ov)	4.19		—	4.19		
4'''	4.33 (ov)	4.12		—	4.06		
5'''	4.02 (ov)	4.17		—	3.87 m		
6'''	—	4.23		—	4.19		
1''''		6.31 d(8.0)	5.37 d(8)	4.35 d(7.8)	5.15 d(8.0)		
2''''		4.18	3.31 t(8)	—	4.02		
3''''		4.26	3.41 t(9)	—	4.16		
4''''		4.31	3.34 m	—	4.13		
5''''		4.01	3.34 m	—	3.93		
6''''		4.52	3.67 dd(12, 4) 3.81 dd(12, 5)	—	4.26 4.50		

① The data of methyls in the literature were not assigned, and here, the deployments are only to display the data.

Table 3-5-37: ¹H NMR spectroscopic data of oleanane-type saponins **3-5-129** and **3-5-133~3-5-136**.

H	3-5-129	3-5-133	3-5-134	3-5-136	3-5-135
1	0.89, 1.52	—	1.57, 1.00	—	—
2	1.83, 2.08	1.82, 1.64	2.30, 1.88	—	—
3	3.20 dd(12.7, 4.0)	3.18 br d(11.0)	3.24 d(11.4)	3.35 dd(12, 4)	3.50 m
5	0.73 br d(12.0)	0.79 m	0.70	—	—
6	1.32, 1.45	1.35, 1.54	1.46, 1.32	—	—
7	1.31	1.58, 1.74	1.42, 1.32	—	—
9	1.60 dd(12.0, 7.5)		1.61	—	—
11	1.92		1.90, 1.90	—	—
12	5.42 t(3.3)	5.24 br s	5.25 s	5.42 t-like	5.40 br t
15	1.16 br d(14.0) 2.31 dt(14.0, 3.3)	1.82, 1.64	2.28, 1.15	—	—
16	1.97, 2.10	0.88	2.07, 1.94	—	—
17	—	1.88 d(11)			
18	3.20 dd(12.7, 4.0)	2.84 br d(10.0)	3.19	3.20 br dd(14, 4)	
19	1.26, 1.78	1.12, 1.52	1.77, 1.26	—	—
21		1.32, 1.20	1.35, 1.14	—	—

Table 3-5-37 (continued)

H	3-5-129	3-5-133	3-5-134	3-5-136	3-5-135
22	1.75, 1.94	1.48, 1.28	1.92, 1.78	—	—
23	1.22 s	1.03 s	1.24 s	1.29 s	1.37 s
24	1.04 s	0.84 s	1.10 s	0.99 s	0.99 s
25	0.90 s	0.94 s	0.91 s	0.90 s	0.89 s
26	1.10 s	0.79 s	1.08 s	1.10 s	1.10 s
27	1.24 s	0.97 s	1.22 s	1.26 s	1.33 s
29	0.90 s	0.90 s	0.91 s	0.90 s	0.86 s
30	0.90 s	0.92 s	0.91 s	0.90 s	0.98 s
1'	4.96 d(6.0)	4.26 d(7.2)	4.80 d(7.6)	4.74 d(8)	4.88 d(7.6)
2'	4.57 t(6.0)	3.58 br d	4.10	4.57 dd(9, 8)	4.04
3'	4.35	3.50 m	4.21	4.22 (ov)	4.19
4'	4.37	3.80 m	4.02	—	4.11
5'	3.78 d(10.0)	3.57 m	3.98	α 3.74 br d(12)	4.08
	4.28	3.51 dd(8.0, 4.8)			
6'			4.19, 4.73 d(10.4)		4.25, 4.67
1''	5.17 d(8.0)	5.38 d(8.0)	5.27 d(8.6)	5.36 d(8)	5.16 d(4.9)
2''	4.07 t(8.0)	3.31 m	4.05	4.02 t(8)	4.50
3''	4.17 t(9.0)	3.26 m	4.19	4.22 (ov)	4.34
4''	4.30 t(8.5)	3.34 m	4.25	—	4.40
5''	3.8 m	3.34 m	3.87	3.98 (ov)	3.75, 4.31
6''	4.41 d(3.3)	3.80 m	4.41	—	
		3.67 dd(11.6, 3.6)			
1'''	6.24 d(8.5)		4.90 d(6.6)	6.24 d(8)	4.97 d(7.0)
2'''	4.13 t(8.0)		4.41	4.12 dd(8.5, 8)	4.04
3'''	4.20 t(8.5)		4.15	4.20 (ov)	4.06
4'''	4.31 t(8.5)		4.30	—	4.15
5'''	4.11 m		4.28, 3.75 d(12.3)	4.10 m	3.59, 4.38
6'''	4.36 dd(11.0, 3.0)			4.32 (ov)	
	4.70 dd(11.0, 1.5)			4.70 dd(11, 2)	
1''''	5.02 d(8.0)		6.20 d(8.3)	5.02 d(8)	6.11 d(7.6)
2''''	3.99 t(8.7)		4.09	3.98 (ov)	4.34
3''''	4.17 t(8.5)		4.18	4.17 (ov)	4.21
4''''	4.19 t(9.0)		3.25	—	4.13
5''''	3.88 m		4.08	3.87 m	4.03
6''''	4.35 dd(12.0, 3.5)		4.65 d(10.9), 4.32	—	4.13, 4.45
	4.47 dd(12.0, 2.0)				
1'''''			4.99 d(7.3)		6.37 br s
2'''''			3.95		4.83
3'''''			4.15		4.70
4'''''			4.15		4.38
5'''''			3.85		4.50
6'''''			4.30, 4.42		1.78 d(6.1)
1''''''					5.39 br s

Table 3-5-37 (continued)

H	3-5-129	3-5-133	3-5-134	3-5-136	3-5-135
2''''''					4.45
3''''''					4.41
4''''''					4.19
5''''''					4.25
6''''''					1.59 d(5.8)
1''''''					5.07 d(7.3)
2''''''					4.07
3''''''					4.03
4''''''					4.09
5''''''					3.50, 4.25
1''''''					5.18 d(7.7)
2''''''					4.07
3''''''					4.11
4''''''					4.15
5''''''					3.69, 4.30

Table 3-5-38: ¹H NMR spectroscopic data of oleanane-type saponins 3-5-137~3-5-140.

H	3-5-137	3-5-138	3-5-139	3-5-140
3	3.24 dd(12, 4)	3.36 dd(11.4, 4.2)	—	3.20 dd(11.8, 3.7)
11	—	—	—	—
12	5.41 t-like	5.43 br	5.26 br t(3.5)	5.27 t(3.6)
18	3.17 br dd(14, 4)	3.20 dd(4, 13)	2.83 dd(13.5, 4.0)	2.87 dd(13.6, 4.5)
19	—	—	—	1.73 t(13.5) 1.17 br d(13.5)
23	1.27 s	1.29 s ^①	1.02 s	0.97 s
24	1.07 s	1.28 s ^①	0.89 s	0.75 s
25	0.84 s	1.10 s ^①	0.81 s	0.96 s
26	1.07 s	0.98 s ^①	0.71 s	0.81 s
27	1.26 s	0.92 s ^①	0.90 s	1.17 s
29	0.90 s	0.90 s ^①	0.92 s	0.93 s
30	0.88 s	0.86 s ^①	1.11 s	0.95 s
1'	4.79 d(8)	4.99 d(7.3)	4.35 d(7.5)	4.74 d(8.1)
2'	4.68 dd(9, 8)	4.03~4.58 m	3.34 m	4.9 t(9.8)
3'	4.29 (ov)	4.03~4.58 m	3.40 t(8.5)	5.19 t(9.5)
4'	—	4.03~4.58 m	3.63 t(8.5)	3.94 br t(9.6)
5'	3.98 (ov)	4.03~4.58 m	3.46 d(9.0)	4.05 br s
OAc				2.02 s(2'-OAc) 2.01 s(3'-OAc)
OMe			3.74 s	
1''	5.43 d(8)	6.33 d(8.0)	5.43 d(8.0)	4.31 br d(5.2)
2''	4.00 (ov)	—	3.78 t(9.0)	3.1 br t(8)

Table 3-5-38 (continued)

H	3-5-137	3-5-138	3-5-139	3-5-140
3''	4.08 t(9)	—	3.48 t(8.5)	3.28 dd(9.5, 8.5)
4''	—	—	3.44 t(9.0)	3.45 ddd(9.9, 9, 5)
5''	3.40 t(11)	—	3.36 m	3.17 t(11)
6''		—	3.72 dd(11.0, 5.0)	3.83 dd(11.4, 5)
			3.56 dd(11.0, 5.5)	
1'''	5.30 d(8)	0.78 t(7.4)		5.4 d(8.1)
2'''	3.96 (ov)			3.33 dd(9.1, 8.1)
3'''	4.19 (ov)			3.42 t(9.1)
4'''	—			3.37 t(9.1)
5'''	3.87 m			3.36 m
6'''	—			3.7 dd(12.2, 4.6)
				3.84 dd(12.2, 1.7)
1''''	6.28 d(8)			
2''''	4.17 (ov)			
3''''	4.25 (ov)			
4''''	—			
5''''	3.99 (ov)			
6''''	—			

① The data of methyls in the literature were not assigned, and here, the deployments are only to display the data.

Table 3-5-39: ¹H NMR spectroscopic data of oleanane-type saponins 3-5-141~3-5-145.

H	3-5-141	3-5-142	3-5-143	3-5-144	3-5-145
3	3.11 dd(12.3, 4.3)	3.24 dd(12, 4.4)	3.27 dd(12, 3)	3.33 dd(12, 4)	3.29 dd (11.6, 4.0)
12	5.38 t(3.5)	5.27 t(4.6)	5.43 br s	5.41 br s	5.37 br s
18	3.6 dd(13.6, 4)	2.88 dd(13.5, 4)	3.20 dd(13, 4)	3.18 dd(14, 4)	
23	1.09 s	1.07 s	1.26 s	1.30 s	1.24 s
24	1.04 s	0.88 s	1.02 s	1.00 s	1.08 s
25	0.74 s	0.98 s	0.88 s	0.89 s	0.86 s
26	1.04 s	0.82 s	1.10 s	1.09 s	1.17 s
27	1.23 s	1.18 s	1.27 s	1.26 s	1.24 s
29	0.88 s	0.93 s	0.92 s	0.91 s	0.88 s
30	0.85 s	0.95 s	0.92 s	0.91 s	0.88 s
1'	4.85 d(7.5)	4.69 d(7.4)	4.81 d(6.2)	4.74 d(7.4)	4.80 d(7.6)
2'	4.42 dd(9.2, 7.3)	3.86 dd(9.2, 7.6)	4.76 t(9)	4.49 t(8)	—
3'	5.86 t(9)	5.27 t(9.2)	4.36 (ov)	4.26 (ov)	—
4'	4.54 m	3.9 t(9.2)	4.54 br s	4.47 (ov)	—
5'	4.55 m	4.08 br d(9)	3.72 d(11)	3.76 d(12)	—
			4.18 (ov)	4.18 (ov)	

Table 3-5-39 (continued)

H	3-5-141	3-5-142	3-5-143	3-5-144	3-5-145
1''	5.13 d(7.6)	4.46 d(7.7)	5.52 d(7.7)	5.31 d(7.8)	6.50 br s
2''	3.96 dd(8.6, 7.6)	3.14 dd(9.2, 7.7)	4.06 (ov)	4.02 t(9)	—
3''	4.22 t(9)	3.33 t(9.2)	4.20 (ov)	4.17 (ov)	—
4''	4.12 t(8.9)	3.11 t(9.3)	4.16 t(19)	4.28 (ov)	—
5''	4.03 m	3.27 m	3.72 m	3.91 m	—
6''	4.37 dd(11.5, 5.5)	3.58 dd(12, 7.5)	4.29 (ov)	4.46 (ov)	1.69 d(5.6)
	4.62 dd(11.5, 2.5)	3.86 dd(12, 1.9)	4.38 (ov)	4.46 (ov)	
OAc	2.2 s(3'-OAc)	2.18 s(3'-OAc)			
1'''	5.03 d(7.5)	4.96 br s	5.32 d(7.8)	5.13 d(7.7)	6.24 d(8.0)
2'''	3.92 dd(8.3, 7.5)	3.9 m	4.01 t(8)	4.57 t(9)	—
3'''	4.07 t(8.8)	3.83 dd(5.6, 3.4)	4.21 (ov)	4.21 (ov)	—
4'''	4.15 ddd (10.9, 8.8, 5.6)	3.9 m	4.20 t(9)	4.66 br s	—
5'''	3.67 t(10.8)	3.63 dd(12, 4.8)	3.95 m	4.17 (ov)	—
	4.31 dd(10.8, 5)	3.71 dd(12, 3.6)			
6'''			4.35 (ov), 4.49 br d(11)	4.31 (ov) 4.40 dd(12, 4)	—
1''''	6.31 d(8.1)	5.41 d(8.1)	6.25 d(8.2)	5.22 d(7.6)	5.01 d(7.6)
2''''	4.21 t(8.8)	3.34 t(8.4)	4.13 (ov)	3.98 t(9)	—
3''''	4.29 t(8.7)	3.44 t(8.9)	4.21 (ov)	4.16 (ov)	—
4''''	4.36 t(8.8)	3.38 m	4.22 (ov)	4.17 (ov)	—
5''''	4.03 m	3.37 m	4.10 (ov)	3.72 d(12)	—
				4.26 (ov)	
6''''	4.4 dd(12.1, 4.3)	3.7 dd(11.9, 5.3)	4.32 (ov)		—
	4.47 dd(12.1, 2.3)	3.84 dd(11.9, 1.9)	4.68 (ov)		
1'''''			5.01 d(7.8)	6.23 d(8.1)	
2'''''			3.95 (ov)	4.10 (ov)	
3'''''			4.15 (ov)	4.20 (ov)	
4'''''			4.40 t(9)	4.23 (ov)	
5'''''			3.68 m	4.10 m	
6'''''			4.07 (ov)	4.32 dd(12, 4)	
			4.25 (ov)	4.68 d(12)	
1''''''			5.85 br s	4.98 d(7.8)	
2''''''			4.62 br s	3.93 t(9)	
3''''''			4.49 (ov)	4.13 (ov)	
4''''''			4.25 (ov)	4.39 (ov)	
5''''''			4.84 m	3.68 m	
6''''''			1.70 d(6)	4.09 (ov)	
				4.25 (ov)	
1'''''''				5.83 br s	
2'''''''				4.61 br s	
3'''''''				4.51 dd(9, 3)	
4'''''''				4.25 (ov)	
5'''''''				4.85 m	
6'''''''				1.70 d(6)	

Table 3-5-40: ^1H NMR spectroscopic data of oleanane-type saponins **3-5-146~3-5-150**.

H	3-5-146	3-5-147	3-5-148	3-5-149	3-5-150
3	3.33 dd(11.6, 3.6)	3.34 dd(11.6, 4.0)	3.30 dd(10.6, 4.0)	3.27 dd(11.7, 4.1)	3.24 dd(11.7, 4.1)
12	5.40 br s	5.39 br s	5.42 br s	5.42 t-like(3.1)	5.40 t-like(3.1)
18	—	—	—	3.18 dd(13.6, 3.7)	3.16 dd(13.6, 3.8)
23	1.23 s	1.22 s	1.25 s	1.28 s	1.24 s
24	1.08 s	1.06 s	1.07 s	1.13 s	1.09 s
25	0.88 s	0.84 s	0.86 s	0.85 s	0.82 s
26	0.98 s	1.18 s	1.19 s	1.07 s	1.05 s
27	1.28 s	1.23 s	1.37 s	1.25 s	1.24 s
29	0.87 s	0.86 s	0.88 s	0.91 s	0.89 s
30	0.87 s	0.87 s	0.90 s	0.88 s	0.86 s
1'	4.81 d(7.6)	4.85 d(7.6)	4.78 d(5.6)	4.84 d(6.0)	4.81 d(6.0)
1''	6.22 d(8.0)	6.56 br s	6.39 br s	6.24 br s	6.19 br s
6''	—	1.70 d(5.2)	1.63 d(6.0)	1.53 d(6.1)	1.51 d(6.2)
1'''	4.97 d(7.6)	6.14 d(8.0)	5.43 d(8.0)	5.85 d(5.4)	5.83 d(5.5)
1''''	5.83 br s	4.90 d(7.6)	6.21 d(8.0)	4.95 d(7.8)	4.98 d(7.8)
6''''	1.68 d(6.4)	—	—	—	—
1'''''	—	5.76 br s	5.00 d(7.6)	5.10 d(7.8)	6.28 d(8.1)
6'''''	—	1.68 d(6.0)	—	—	—
1''''''	—	—	5.79 br s	5.42 d(1.4)	—
6''''''	—	—	1.68 d(6.0)	1.58 d(5.8)	—
1'''''''	—	—	—	6.31 d(8.1)	—

Table 3-5-41: ^1H NMR spectroscopic data of oleanane-type saponins **3-5-151~3-5-155**.

H	3-5-151	3-5-152	3-5-153	3-5-154	3-5-155
1	1.52, 0.92	1.50, 0.89	1.47, 0.86	1.51, 0.92	0.77 m, 1.30 t-like
2	2.11, 1.84	2.05, 1.82	2.02, 1.82	2.12, 1.85	1.86 (ov), 2.38 (ov)
3	3.33 dd(11.0, 4.3)	3.30 dd(11.0, 4.1)	3.22	3.32 dd(3.9, 12.0)	3.28 br d
5	0.80	0.78	0.73	0.78 d(11.8)	0.66 br d(11.5)
6	1.46, 1.30	1.44, 1.29	1.44, 1.28	1.46, 1.29	1.28 (ov), 1.39 m
7	1.89, 1.76	1.87, 1.74	1.88, 1.75	1.88, 1.76	1.06 (ov), 1.28 (ov)
9	1.63	1.60	1.58	1.61 d(8.4)	1.52 t-like
11	1.91	1.89	1.88	1.90	1.82 m, 1.86 (ov)
12	5.40 t-like	5.41 t-like	5.39 t-like	5.41 t-like	5.37 t-like

Table 3-5-41 (continued)

H	3-5-151	3-5-152	3-5-153	3-5-154	3-5-155
15	2.29 m, 1.15	2.31 brt(12.9) 1.16	2.29 brt(12.7) 1.15	2.30 brt(12.3) 1.16	1.12 t-like 2.28 (ov)
16	2.07, 1.95	2.04, 1.92	2.07, 1.95	2.06, 1.94	1.97 m, 2.04 t-like
18	3.17 brd(13.4)	3.18 dd(13.9, 3.8)	3.17 br d(13.1)	3.17 dd(4.1, 13.5)	3.15 dd(13.5)
19	1.76, 1.24	1.72, 1.21	1.73, 1.23	1.74, 1.23	1.22 (ov) 1.72 t-like
21	1.34, 1.11	1.32, 1.09	1.33, 1.10	1.33, 1.10	1.32 m, 1.85 (ov)
22	1.46, 1.32	1.44, 1.31	1.43, 1.31	1.45, 1.31	1.10 (ov), 1.75 m
23	1.27 s	1.28 s	1.20 s	1.28 s	1.23 s
24	0.95 s	0.97 s	1.05 s	0.97 s	1.05 s
25	0.86 s	0.87 s	0.82 s	0.86 s	0.81 s
26	1.08 s	1.09 s	1.06 s	1.08 s	1.05 s
27	1.24 s	1.24 s	1.22 s	1.24 s	1.21 s
29	0.88 s	0.88 s	0.87 s	0.87 s	0.86 s
30	0.86 s	0.87 s	0.85 s	0.86 s	0.85 s
1'	4.75 d(7.1)	4.75 d(7.3)	4.84 d(5.9)	4.73 d(7.3)	4.84 d(6.5)
2'	4.52	3.98	4.73 t(7.2)	4.55	4.25 m
3'	4.19	4.09	4.32	4.16	4.25 m
4'	4.44	4.05	4.48 br d(6.2)	4.39	4.45 br d(10.5)
5'	4.26, 3.79	4.28 3.68 br d(11.0)	4.25 3.74 br d(10.4)	4.20 3.74 br d(11.7)	4.56 t-like(9)
1''	5.24	5.24 d(6.9)	5.19 d(7.2)	5.33 d(7.9)	5.32 d(7.5)
2''	4.47	4.48 t(7.9)	4.47	4.00	4.07 m
3''	4.17	4.12	4.13	4.26	4.15 m
4''	4.32	4.25	4.32	4.28	4.23 m
5''	4.26, 3.98	4.30 3.78 br d(12.3)	4.28 3.73 br d(10.8)	3.91	3.87 m
6''				4.50, 4.45	4.39 br d(12) 4.45 br d(12)
1'''	6.23 d(8.1)	6.24 d(8.2)	5.44 d(7.8)	5.16 d(7.9)	6.23 d(7.5)
2'''	4.10	4.09	4.00	4.05	4.09 m
3'''	4.20	4.20	4.13	4.14	4.18 m
4'''	4.29	4.28	4.13	4.18	4.23 m
5'''	4.07	4.06	3.60	3.97	4.06 m
6'''	4.68 br d(10.4) 4.31	4.69 br d(11.4) 4.30	4.34, 4.24	4.49, 4.25	4.30 m 4.66 d(10.0)
1''''	5.00 d(7.7)	5.01 d(7.9)	6.25 d(7.7)	6.23 d(8.2)	5.00 d(8.0)
2''''	3.96	3.96	4.12	4.11	3.96 brt(8.5)
3''''	4.15	4.15	4.20	4.21	4.16 m
4''''	4.16	4.17	4.31	4.30	4.18 m
5''''	3.85	3.87	4.08	4.07	3.84 m

Table 3-5-41 (continued)

H	3-5-151	3-5-152	3-5-153	3-5-154	3-5-155
6''''	4.43, 4.31	4.43 br d(11.0) 4.31	4.68 br d(10.4) 4.31	4.69 d(10.7) 4.32	4.30 m 4.39 br d(12)
1''''			5.02 d(7.8)	5.01 d(7.6)	
2''''			3.97	3.97	
3''''			4.15	4.15	
4''''			4.16	4.17	
5''''			3.85	3.86	
6''''			4.44 br d(11.4) 4.32	4.44 4.31	

Table 3-5-42: Cos, MFs, and TSs of oleanane-type saponins 3-5-156~3-5-221.

No.	Compounds	MFs	Test solvents	References
3-5-156	arganine A	C ₆₄ H ₁₀₄ O ₃₃	CD ₃ OD	[131]
3-5-157	arganine B	C ₆₃ H ₁₀₂ O ₃₃	CD ₃ OD	[131]
3-5-158	butyroside D	C ₅₇ H ₉₀ O ₂₉	C ₅ D ₅ N	[132]
3-5-159	butyroside B	C ₅₇ H ₉₂ O ₂₈	C ₅ D ₅ N	[133]
3-5-160	3-O-(β-D-glucopyranosyl)-28-O-(α-L-rhamnopyranosyl-(1→3)-β-D-xylopyranosyl-(1→4)-α-L-rhamnopyranosyl(1→2)-α-L-arabinopyranosyl)-16-α-hydroxyprotobassic acid	C ₅₂ H ₈₄ O ₂₁	CD ₃ OD	[134]
3-5-161	platycoside G1	C ₆₄ H ₁₀₄ O ₃₄	C ₅ D ₅ N	[135]
3-5-162	platycoside G2	C ₅₉ H ₉₆ O ₃₀	C ₅ D ₅ N	[135]
3-5-163	beciumecine 2	C ₅₉ H ₉₆ O ₂₈	DMSO- <i>d</i> ₆	[136]
3-5-164	beciumecine 1	C ₆₄ H ₁₀₄ O ₃₂	DMSO- <i>d</i> ₆	[136]
3-5-165	centellasaponin D	C ₄₈ H ₇₈ O ₁₉	C ₅ D ₅ N	[137]
3-5-166	3-O-(β-D-glucopyranosyl)-28-O-(α-L-rhamnopyranosyl-(1→3)-β-D-xylopyranosyl-(1→4)[α-L-rhamnopyranosyl(1→3)]α-L-rhamnopyranosyl(1→2)α-L-arabinopyranosy protobassic acid	C ₆₄ H ₁₀₂ O ₃₂	CD ₃ OD	[134]
3-5-167	3-O-(β-D-glucopyranosyl-(1→3)-β-D-glucopyranosyl)-28-O-(α-L-rhamnopyranosyl-(1→3)-β-D-xylopyranosyl(1→4)-α-L-rhamnopyranosyl(1→2)-α-L-arabinopyranosyl) probassic acid	C ₅₂ H ₈₄ O ₂₁	CD ₃ OD	[134]
3-5-168	combreglucoside	C ₃₆ H ₅₈ O ₁₂	C ₅ D ₅ N	[138]
3-5-169	madlongiside C	C ₃₅ H ₅₆ O ₁₀	C ₅ D ₅ N	[139]
3-5-170	madlongiside D	C ₄₁ H ₆₆ O ₁₄	C ₅ D ₅ N	[139]

Table 3-5-42 (continued)

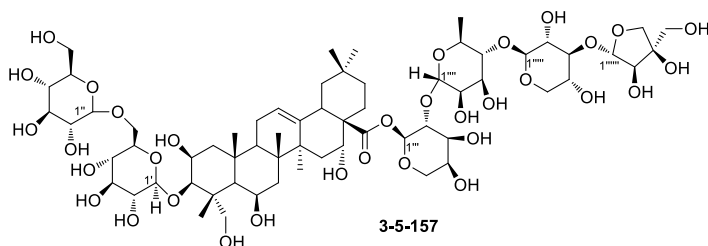
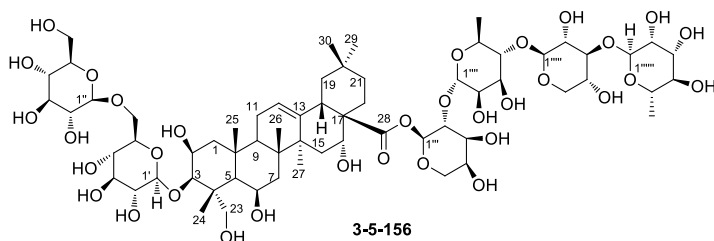
No.	Compounds	MFs	Test solvents	References
3-5-171	sideroxyloside B	C ₆₈ H ₁₁₀ O ₃₅	CD ₃ OD	[140]
3-5-172	platycoside G3	C ₆₃ H ₁₀₂ O ₃₂	C ₅ D ₅ N	[135]
3-5-173	desacylbellidioside B ₄	C ₆₄ H ₁₀₄ O ₃₀	CD ₃ OD	[141]
3-5-174	bellisoside A	C ₆₃ H ₁₀₀ O ₂₉	C ₅ D ₅ N	[142]
3-5-175	bellisoside C	C ₆₃ H ₁₀₂ O ₂₈	C ₅ D ₅ N	[142]
3-5-176	bellisoside D	C ₆₅ H ₁₀₄ O ₂₉	C ₅ D ₅ N	[142]
3-5-177	bellisoside E	C ₆₃ H ₁₀₂ O ₂₈	C ₅ D ₅ N	[142]
3-5-178	conyzasaponin F	C ₆₈ H ₁₁₀ O ₃₆	C ₅ D ₅ N	[143]
3-5-179	masonoside C	C ₈₀ H ₁₃₂ O ₃₆	CD ₃ OD	[144]
3-5-180	2 α ,3 α ,19 α ,23-tetrahydroxyolean-12-ene-28-O- β -D-galactoside	C ₃₆ H ₅₈ O ₁₁	CD ₃ OD	[145]
3-5-181	bellidioside A	C ₅₈ H ₉₂ O ₂₇	CD ₃ OD	[146]
3-5-182	3- β -O-[α -L-rhamnopyranosyl(1 $\rightarrow$ 3)- β -D-glucuronopyranosyl]22 β ,3 β ,23-trihydroxyolean-12-en-28-oic acid-28-O- β -D-glucopyranosyl ester	C ₄₉ H ₇₈ O ₂₀	CD ₃ OD	[147]
3-5-183	mimusin	C ₆₄ H ₁₀₄ O ₃₂	C ₅ D ₅ N	[148]
3-5-184	bellidiastraside B ₃	C ₅₃ H ₈₆ O ₂₃	CD ₃ OD	[149]
3-5-185	bellidiastraside U _{D2}	C ₄₇ H ₇₆ O ₂₀	CD ₃ OD	[149]
3-5-186	asterynnanoside A	C ₄₂ H ₆₈ O ₁₄	C ₅ D ₅ N	[150]
3-5-187	polygalasaponin XI	C ₅₄ H ₈₈ O ₂₅	C ₅ D ₅ N	[151]
3-5-188	julibroside J ₂₈	C ₁₀₄ H ₁₆₅ NO ₄₈	C ₅ D ₅ N	[152]
3-5-189	julibrosides J ₉	C ₁₀₁ H ₁₆₀ O ₄₉	C ₅ D ₅ N	[153]
3-5-190	leonticin D	C ₅₃ H ₈₆ O ₂₃	C ₅ D ₅ N- CD ₃ OD	[126]
3-5-191	aralia-saponin VIII	C ₆₀ H ₉₈ O ₃₀	C ₅ D ₅ N	[119]
3-5-192	leiyemudanaside A	C ₄₇ H ₇₆ O ₁₉	C ₅ D ₅ N	[154]
3-5-193	leiyemudanaside B	C ₅₉ H ₉₆ O ₂₈	C ₅ D ₅ N	[154]
3-5-194	aster saponin G	C ₅₇ H ₉₂ O ₂₆	C ₅ D ₅ N	[155]
3-5-195	rivaloside C	C ₄₄ H ₇₀ O ₁₆	C ₅ D ₅ N	[156]
3-5-196	spinoside C5	C ₄₈ H ₇₈ O ₁₉	C ₅ D ₅ N	[157]
3-5-197	3- β -O-[α -L-rhamnopyranosyl(1 $\rightarrow$ 3)- β -D-glucuronopyranosyl]2 β ,3 β -dihydroxyolean-12-en-28-oic acid 28-O- β -D-glucopyranosyl ester	C ₄₈ H ₇₆ O ₁₉	CD ₃ OD	[147]
3-5-198	3-O- α -L-arabinopyranosyl echinocystic acid-28-O- α -L-rhamnopyranosyl-(1 $\rightarrow$ 4)- β -D-glucopyranosyl-(1 $\rightarrow$ 6)- β -D-glucopyranosyl ester	C ₅₃ H ₈₆ O ₂₂	C ₅ D ₅ N	[85]
3-5-199	3-O-[β -D-glucopyranosyl-(1 $\rightarrow$ 3)]-[β -D-glucopyranosyl-(1 $\rightarrow$ 2)]- α -L-arabinopyranosyl echinocystic acid 28-O-[α -L-rhamnopyranosyl-(1 $\rightarrow$ 4)- β -D-glucopyranosyl-(1 $\rightarrow$ 6)- β -D-glucopyranosyl] ester	C ₆₅ H ₁₀₆ O ₃₂	C ₅ D ₅ N	[158]

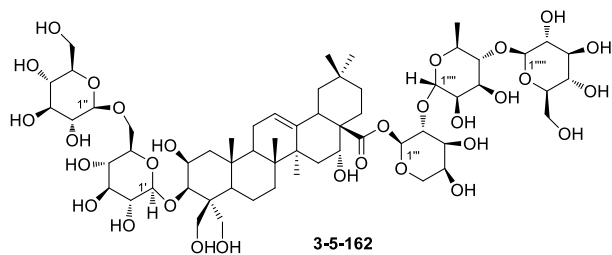
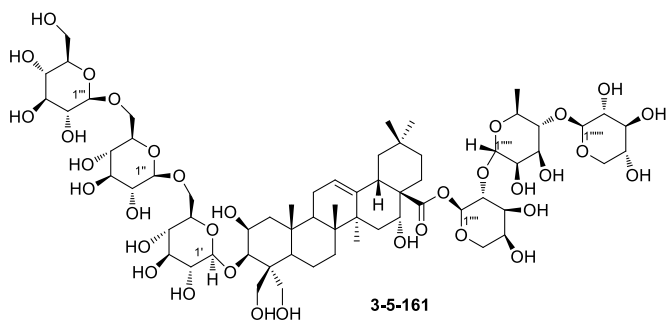
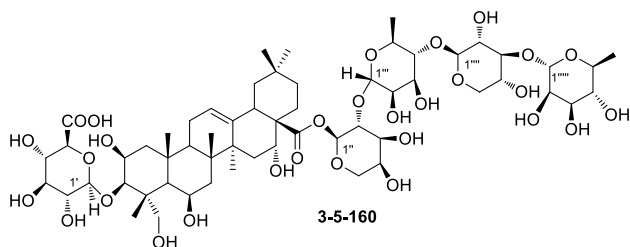
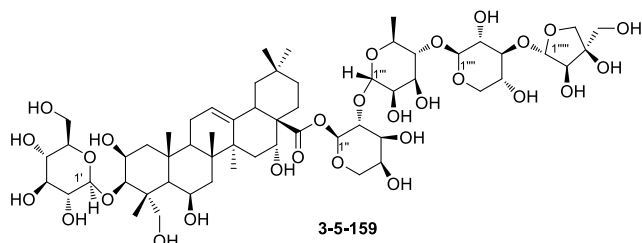
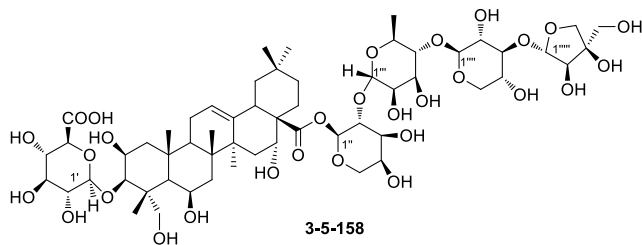
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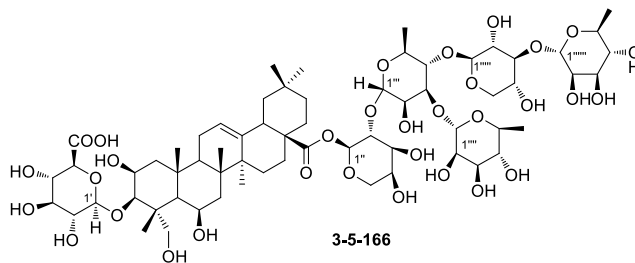
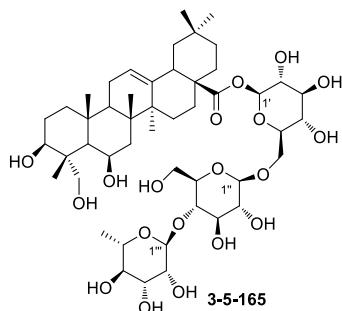
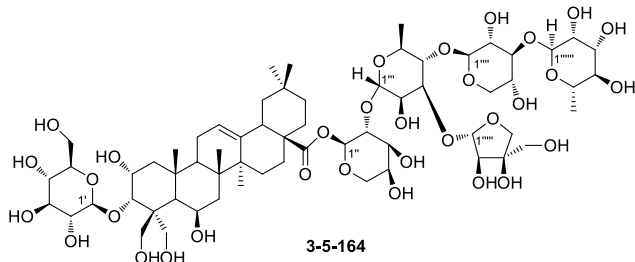
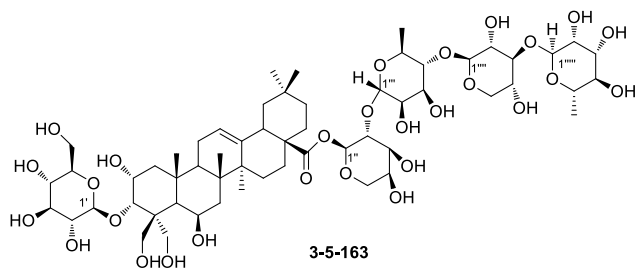
No.	Compounds	MFs	Test solvents	References
3-5-200	3- <i>O</i> -[β -D-3- <i>O</i> - <i>trans</i> -coumaroyl-glucopyranosyl-(1 $\rightarrow$ 3)]- β -D-glucopyranosyl-(1 $\rightarrow$ 2)]- α -L-arabinopyranosyl echinocystic acid-28- <i>O</i> - α -L-rhamnopyranosyl-(1 $\rightarrow$ 4)- β -D-(1 $\rightarrow$ 6)- β -D-glucopyranosyl] ester	C ₇₄ H ₁₁₂ O ₃₄	C ₅ D ₅ N	[158]
3-5-201	shimadoside A	C ₅₇ H ₉₀ O ₂₆	C ₅ D ₅ N	[159]
3-5-202	gleditsioside J	C ₇₄ H ₁₂₀ O ₃₉	C ₅ D ₅ N	[122]
3-5-203	leonticin H	C ₇₀ H ₁₁₄ O ₃₆	C ₅ D ₅ N- CD ₃ OD	[126]
3-5-204	3- <i>O</i> -[β -D-glucopyranosyl-(1 $\rightarrow$ 2)- β -D-glucopyranosyl-(1 $\rightarrow$ 3)- β -D-glucopyranosyl-(1 $\rightarrow$ 3)- α -L-arabinopyranosyl]-echinocystic acid-28- <i>O</i> -[α -L-rhamnopyranosyl-(1 $\rightarrow$ 4)- β -D-glucopyranosyl-(1 $\rightarrow$ 6)- β -D-glucopyranosyl] ester	C ₇₁ H ₁₁₆ O ₃₇	C ₅ D ₅ N	[117]
3-5-205	aralia-saponin VI	C ₅₄ H ₈₈ O ₂₄	C ₅ D ₅ N	[119]
3-5-206	astersedifolioside B	C ₅₈ H ₉₄ O ₂₅	CD ₃ OD	[160]
3-5-207	leiyemudanoside C	C ₅₉ H ₉₆ O ₂₇	C ₅ D ₅ N	[154]
3-5-208	latifolioside B	C ₄₇ H ₇₆ O ₁₇	C ₅ D ₅ N	[161]
3-5-209	latifolioside C	C ₅₃ H ₈₆ O ₂₂	C ₅ D ₅ N	[161]
3-5-210	3- <i>O</i> -[β -D-glucopyranosyl-(1 $\rightarrow$ 2)- α -L-arabinopyranosyl]-hederagenin-28- <i>O</i> - β -D-glucopyranosyl ester	C ₄₇ H ₇₆ O ₁₈	C ₅ D ₅ N	[118]
3-5-211	symphytoxide B	C ₆₅ H ₁₀₆ O ₃₂	CD ₃ OD	[162]
3-5-212	3- <i>O</i> -[α -L-rhamnopyranosyl-(1 $\rightarrow$ 2)- α -L-arabinopyranosyl]-hederagenin 28- <i>O</i> -[α -L-rhamnopyranosyl-(1 $\rightarrow$ 4)- β -D-glucopyranosyl-(1 $\rightarrow$ 6)-[β -D-xylopyranosyl-(1 $\rightarrow$ 2)- β -D-glucopyranosyl] ester	C ₆₄ H ₁₀₄ O ₃₀	C ₅ D ₅ N	[85]
3-5-213	3- <i>O</i> -[α -L-rhamnopyranosyl-(1 $\rightarrow$ 2)- α -L-arabinopyranosyl]-hederagenin 28- <i>O</i> -[α -L-rhamnopyranosyl-(1 $\rightarrow$ 4)- β -D-glucopyranosyl-(1 $\rightarrow$ 6)-[α -L-arabinopyranosyl-(1 $\rightarrow$ 2)- β -D-glucopyranosyl] ester	C ₆₄ H ₁₀₄ O ₃₀	C ₅ D ₅ N	[85]
3-5-214	aralia-saponin IX	C ₅₃ H ₈₆ O ₂₃	C ₅ D ₅ N	[119]
3-5-215	leonticin F	C ₆₅ H ₁₀₆ O ₃₂	C ₅ D ₅ N- CD ₃ OD	[127]
3-5-216	3- <i>O</i> -[α -L-arabinopyranosyl]-hederagenin 28- <i>O</i> -[β -D-glucopyranosyl-(1 $\rightarrow$ 4)- β -D-glucopyranosyl-(1 $\rightarrow$ 6)- β -D-glucopyranosyl] ester	C ₅₃ H ₈₆ O ₂₃	CD ₃ OD	[163]

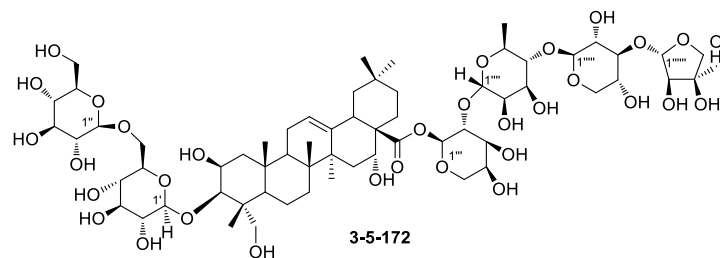
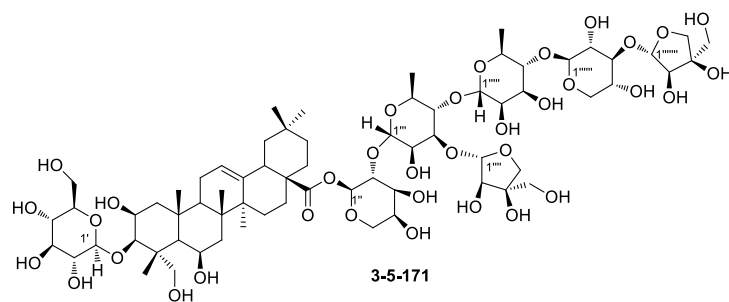
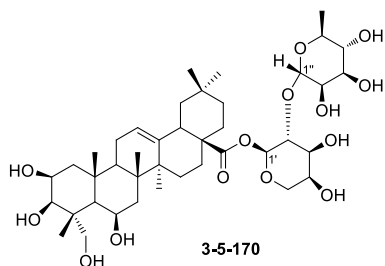
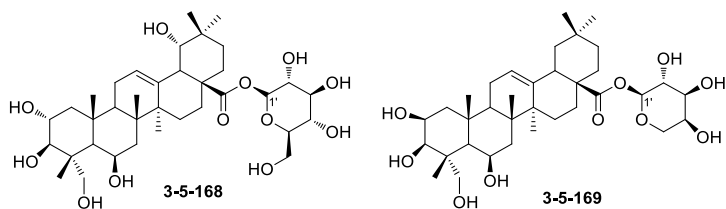
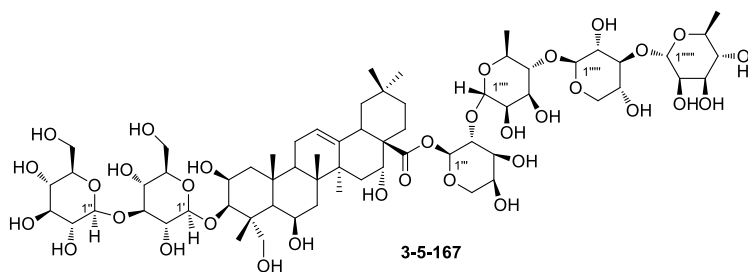
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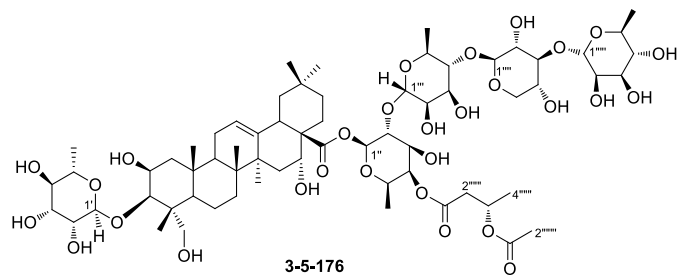
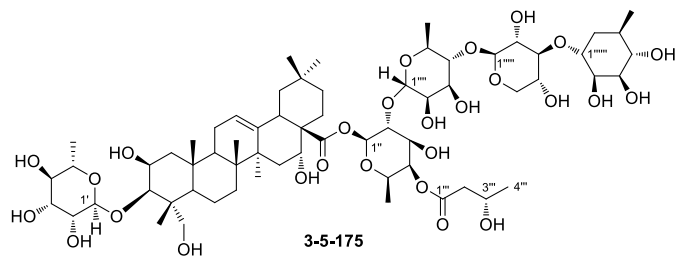
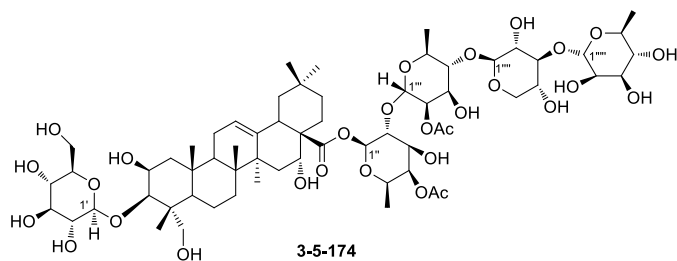
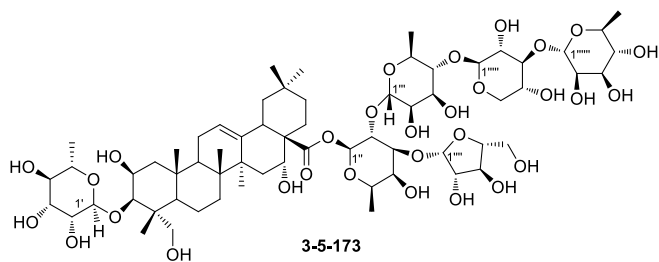
No.	Compounds	MFs	Test solvents	References
3-5-217	3- <i>O</i> -[β -D-glucopyranosyl-(1 $\rightarrow$ 2)- β -D-glucopyranosyl] hederagenin 28- <i>O</i> -[α -L-rhamnopyranosyl-(1 $\rightarrow$ 4)- β -D-glucopyranosyl-(1 $\rightarrow$ 6)- β -D-glucopyranosyl] ester	C ₆₀ H ₉₆ O ₂₉	C ₅ D ₅ N	[164]
3-5-218	3 β - <i>O</i> - β -D-galactopyranosyl-(1 $\rightarrow$ 3)- α -L-rhamnopyranosyl-(1 $\rightarrow$ 2)- α -L-arabinopyranosyl-23-hydroxyolean-12-en-28-oic acid 28- <i>O</i> - α -L-rhamnopyranosyl-(1 $\rightarrow$ 4)- β -D-glucopyranosyl-(1 $\rightarrow$ 6)- β -D-glucopyranosyl ester	C ₆₅ H ₁₀₆ O ₃₁	CD ₃ OD	[165]
3-5-219	hederagenin 3- <i>O</i> -[β -D-glucopyranosyl-(1 $\rightarrow$ 4)- β -D-glucopyranosyl-(1 $\rightarrow$ 4)- β -D-glucopyranosyl]-28- <i>O</i> - β -D-glucopyranoside	C ₅₄ H ₈₈ O ₂₄	CD ₃ OD	[166]
3-5-220	3- <i>O</i> -[β -D-glucopyranosyl-(1 $\rightarrow$ 2)- α -L-arabinopyranosyl]-27-hydroxy oleanoic acid 28- <i>O</i> -[β -D-glucopyranosyl-(1 $\rightarrow$ 6)- β -D-glucopyranosyl] ester	C ₅₃ H ₈₆ O ₂₃	C ₅ D ₅ N	[118]
3-5-221	spinoside C1	C ₄₈ H ₇₈ O ₁₈	C ₅ D ₅ N	[158]

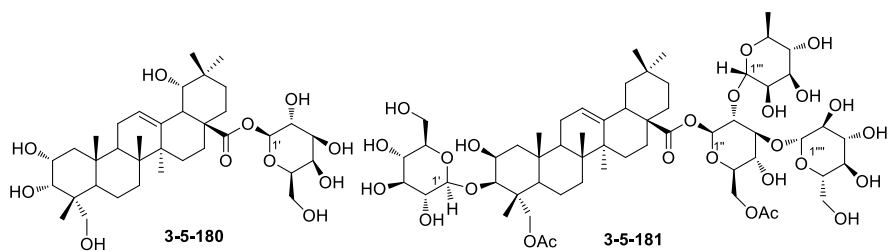
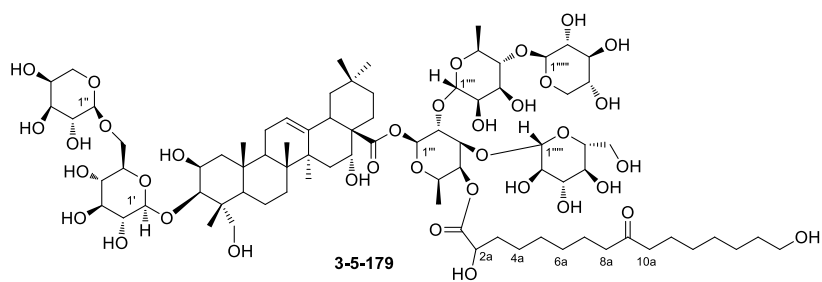
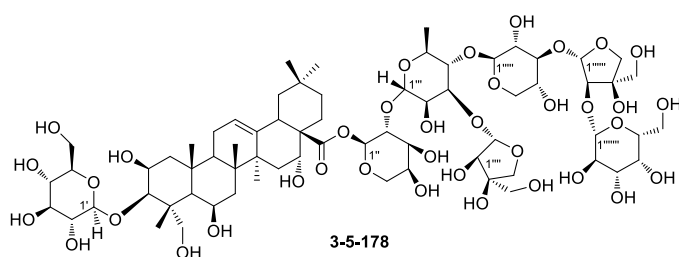
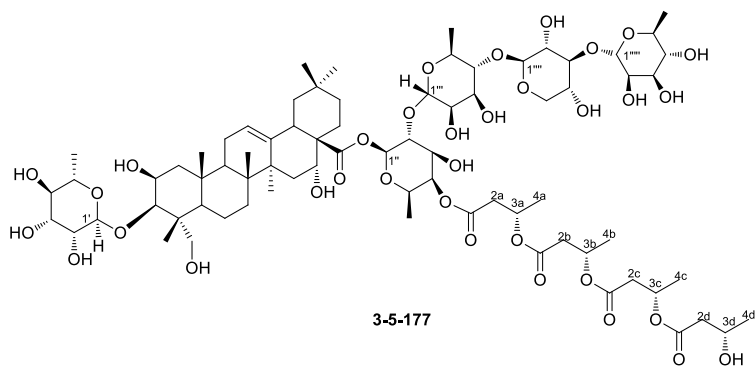


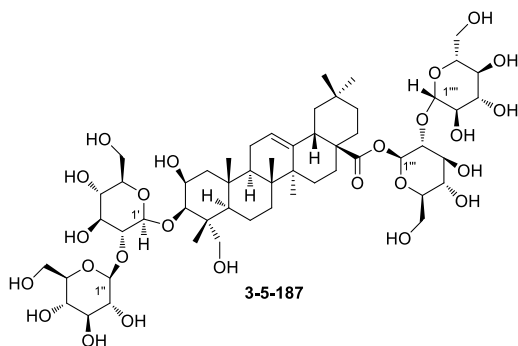
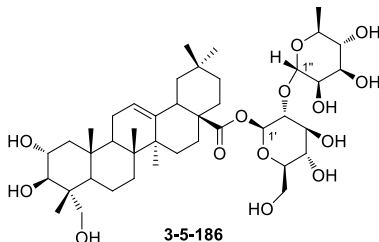
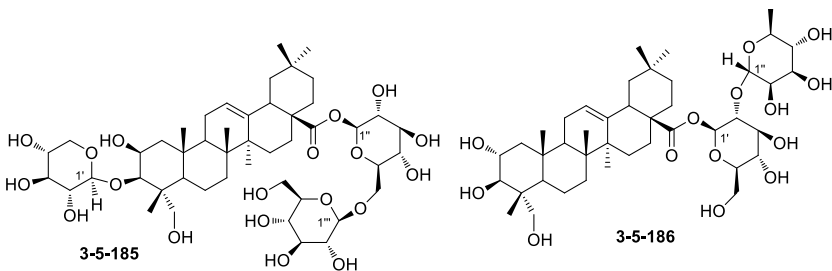
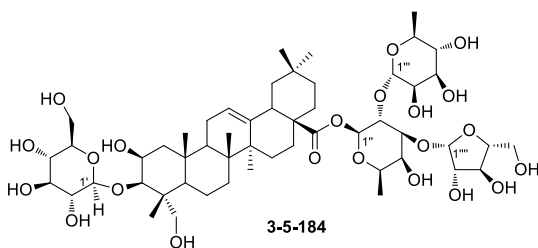
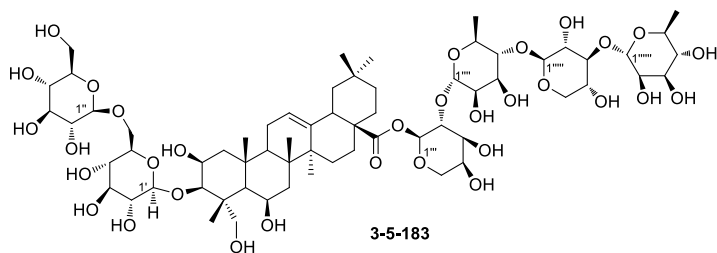
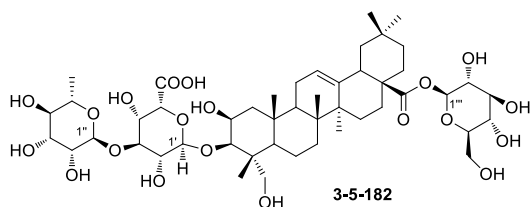


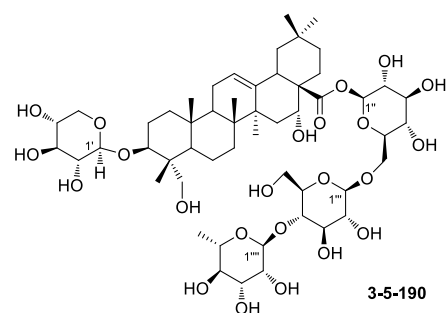
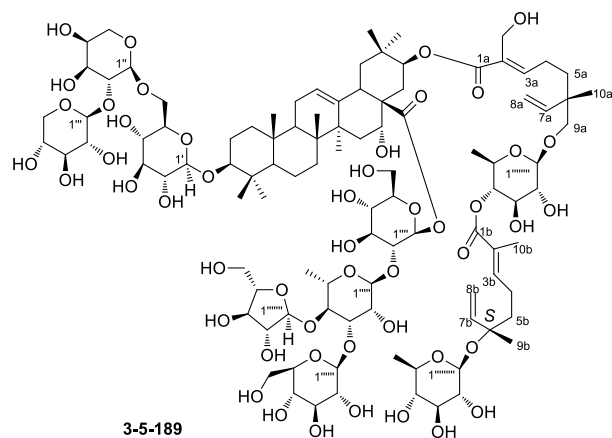
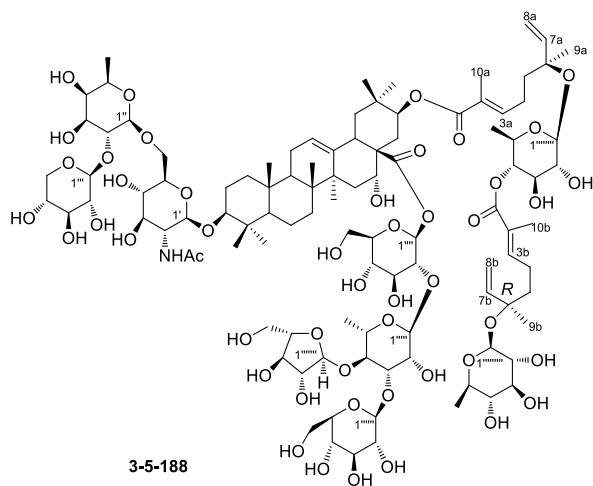


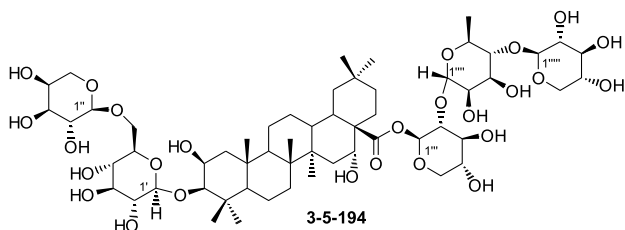
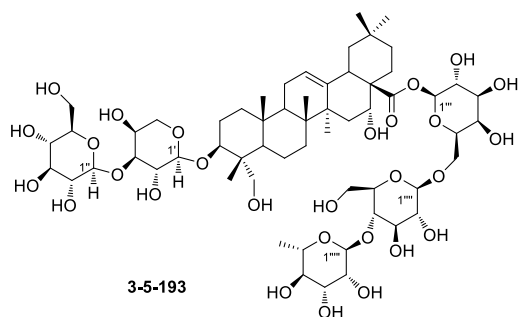
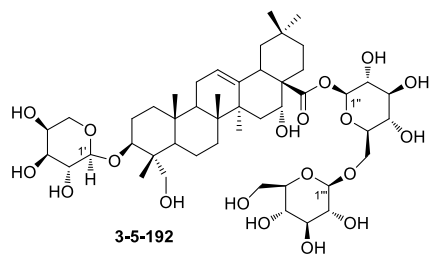
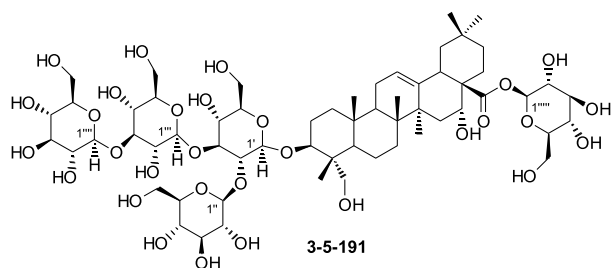


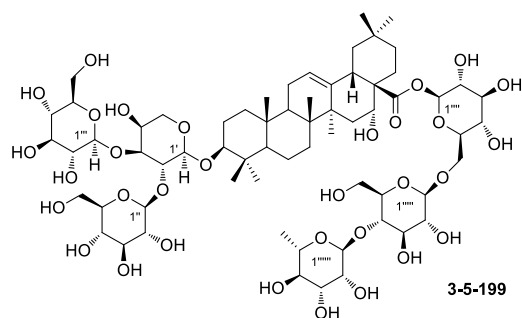
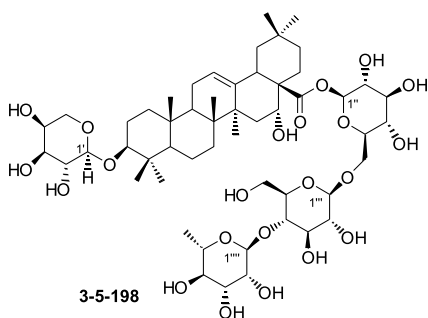
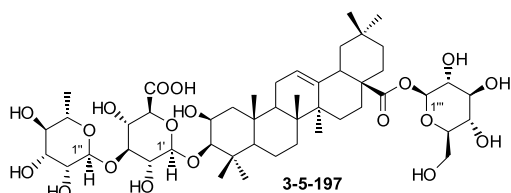
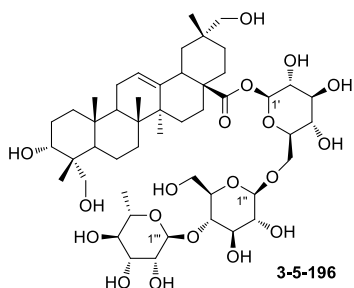
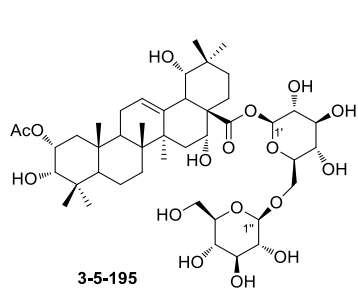


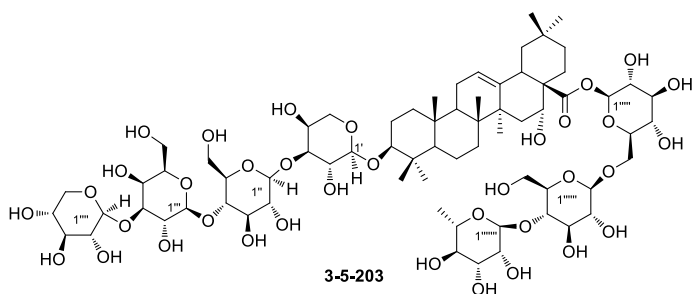
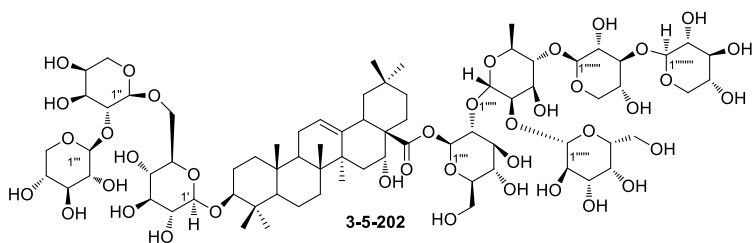
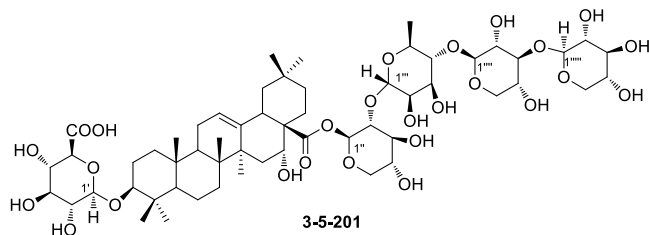
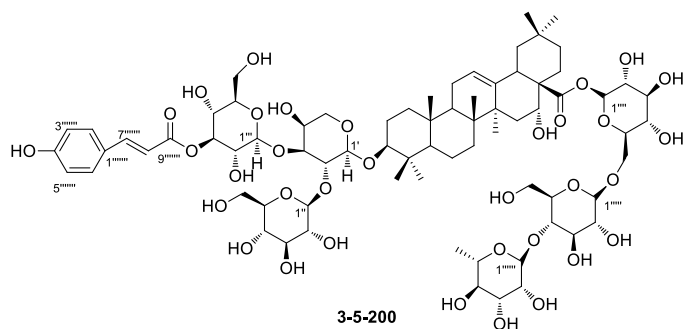


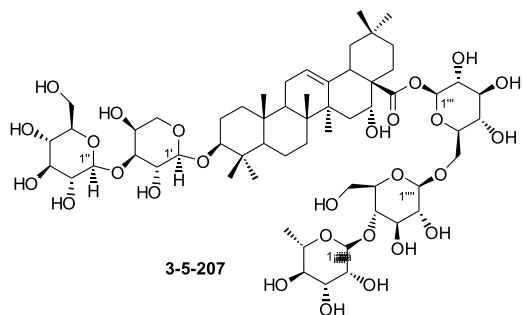
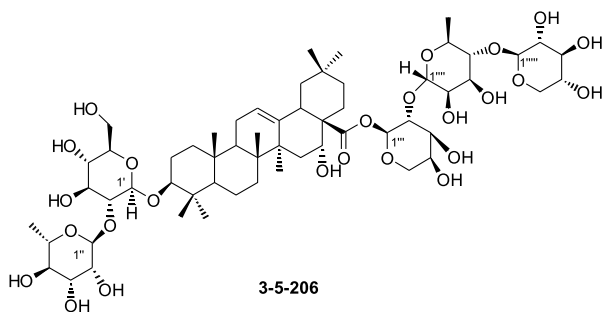
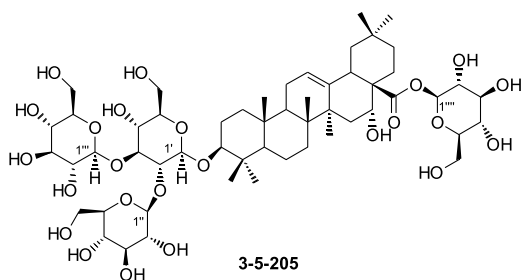
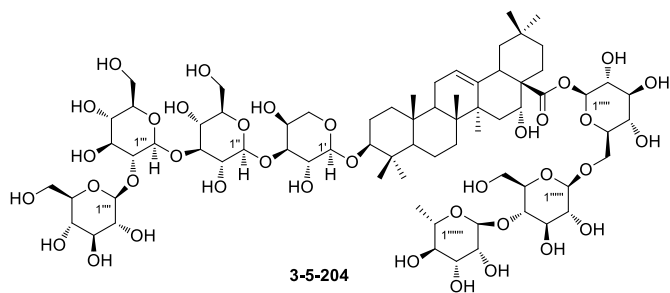


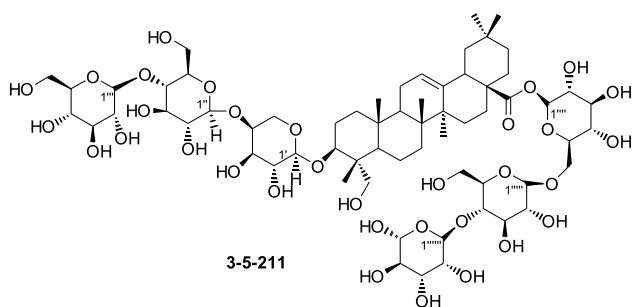
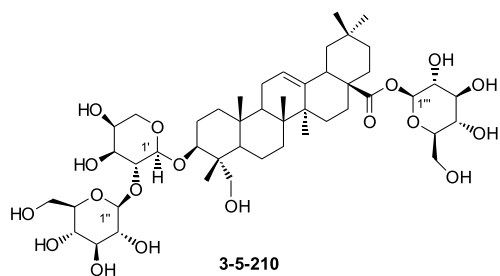
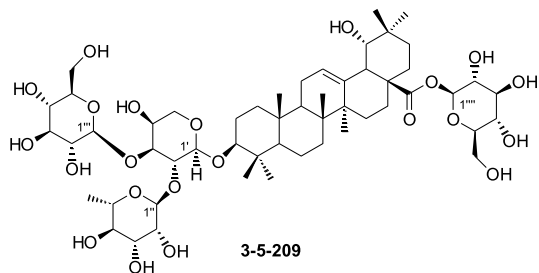
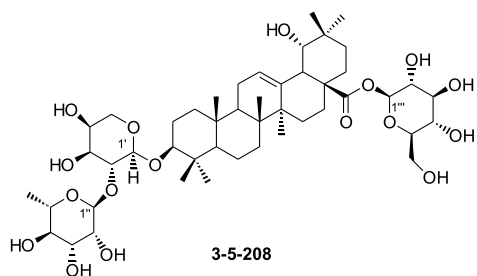


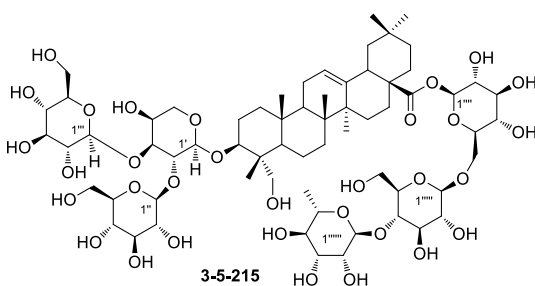
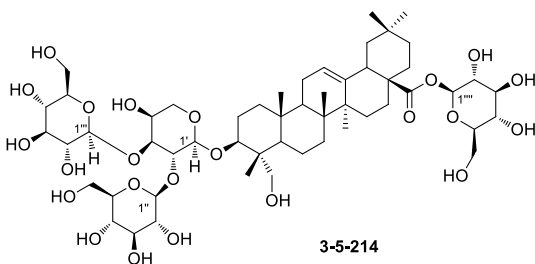
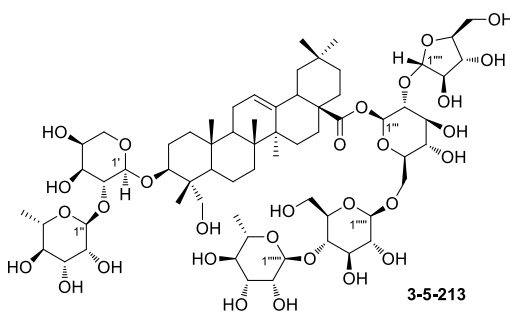
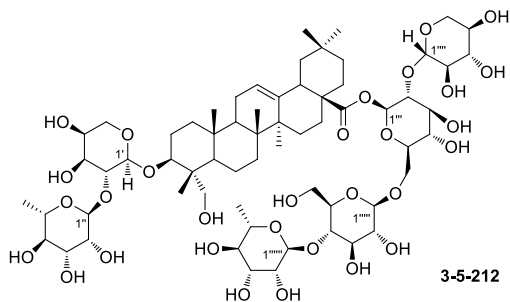


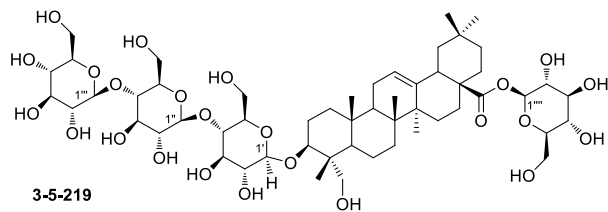
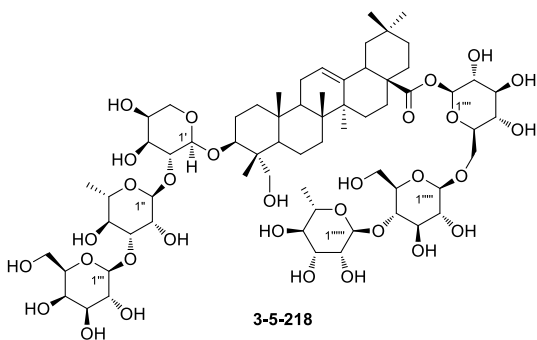
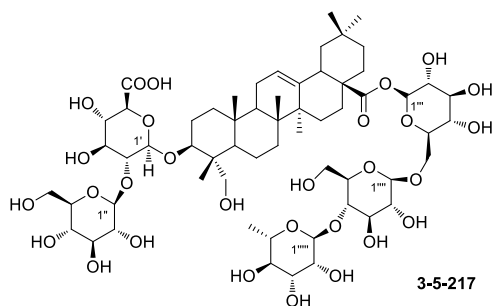
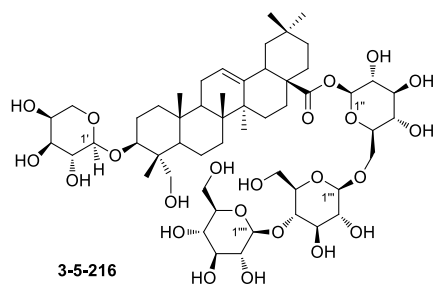












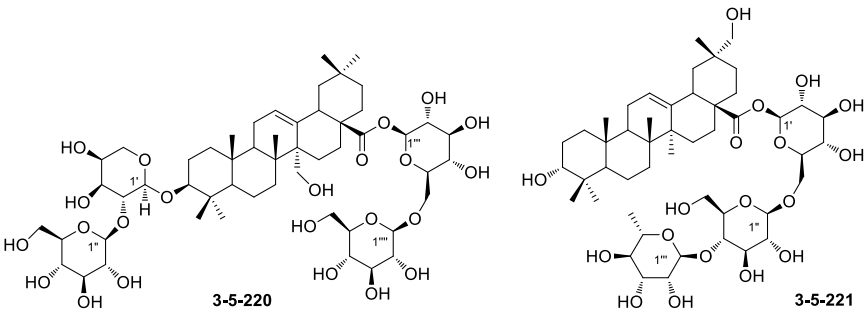


Table 3-5-43: ¹H NMR spectroscopic data of oleanane-type saponins **3-5-156~3-5-159** and **3-5-165**.

H	3-5-156	3-5-157	3-5-158	3-5-159	3-5-165
2	4.33	4.33	—	—	—
3	3.56 d(3.7)	3.56 d(3.7)	—	—	4.20 m
6	4.47 m	4.47 m	α 5.14 br s	α 5.23 m	4.99 br s
12	5.42	5.42	5.72 br s	5.73 br s	5.52 dd(3.4, 3.6)
16	4.47	4.47	β 5.16 br s	β 5.19 br s	—
18	3.09 dd(14.5, 4.0)	3.09 dd(14.5, 4.0)	3.60 m	3.65 m	3.21 dd(4.6, 13.7)
19	2.28	2.28	—	—	—
23	—	—	—	—	4.00 d(10.3) 4.34 d(10.3)
24	0.88 s ^①	0.88 s ^①	1.97 s	2.01 s	1.71 s
25	0.98 s ^①	0.98 s ^①	2.27 s	2.25 s	1.69 s
26	1.06 s ^①	1.06 s ^①	1.65 s	1.69 s	1.68 s
27	1.30 s ^①	1.30 s ^①	1.80 s	1.79 s	1.21 s
29	1.34 s ^①	1.34 s ^①	1.00 s	1.00 s	0.90 s
30	1.60 s ^①	1.60 s ^①	1.16 s	1.18 s	0.88 s
1'	4.31 d(7.7)	4.31 d(7.7)	5.29 d(7.4)	5.24 d(7.5)	6.15 d(8.2)
1''	4.45 d(7.6)	4.45 d(7.6)	6.42 br s	6.48 br s	4.94 d(7.9)
1'''	5.61 d(3.9)	5.61 d(3.9)	5.70 br s	5.68 br s	5.77 br s
6'''	—	—	1.66 d(6.8)	1.68 d(5.3)	1.66 d(6.1)
1''''	5.07 d(1.0)	5.07 d(1.0)	5.04 d(6.4)	5.10 d(7.2)	—
5''''	3.76	3.76 m	—	—	—
6''''	1.30 d(6.1)	1.30 d(6.1)	—	—	—
1'''''	4.55 d(7.7)	4.55 d(7.7)	6.12 d(2.3)	6.23 d(2.2)	—
1''''''	5.14 d(1.6)	5.25 d(2.9)	—	—	—
5''''''	3.99 m	—	—	—	—
6''''''	1.24 d(6.2)	—	—	—	—

^①The data of methyls in the literature were not assigned, and here, the deployments are only to display the data.

Table 3-5-44: ^1H NMR spectroscopic data of oleanane-type saponins **3-5-160~3-5-164**.

H	3-5-160	3-5-161	3-5-162	3-5-163	3-5-164
1	1.20, 2.06	1.71~1.81 m 1.91~2.01 m	1.86~1.94 m	1.78, 1.03	1.82, 0.98
2	4.35 m(9.5)	4.46~4.55 m	4.51~4.44 m	4.09 bm	4.14 bm
3	3.60 d(4)	4.46~4.55 m	4.51~4.44 m	3.57	3.45 d(2.0)
5	1.32	1.91~2.01 m	1.86~1.94 m	1.36	1.17
6	4.48 m	1.41~1.44 m	1.39~1.50 m	4.26 bm	4.32 bm
7	1.81, 1.55	1.41~1.44 m 1.55~1.58 m	1.39~1.50 m 1.68~1.71 m	1.59, 1.47	1.57, 1.35
9		1.91~2.01 m	1.86~1.94 m	1.48	1.45
11	1.98, 2.10	1.91~2.01 m	1.86~1.94 m	1.96, 1.88	1.97, 1.87
12	5.41 t(3)	5.63 brs	5.56 brs	5.27 t(3.6)	5.27 t(3.4)
15	1.81, 1.43	1.34 brd(8.6) 1.71~1.81 m	1.24 brd(8.0)	1.65, 0.98	1.65, 0.96
16	4.48 m	5.26 brs	5.18 brs	1.92, 1.58	1.92, 1.60
18	3.08 dd(14, 3)	3.53 t(13.3)	3.52 t(13.3)	2.86 dd(13.8, 4.3)	2.87 dd(13.6, 4.0)
19	2.28 t(13.5), 1.04	1.41~1.44 m 2.77 t(13.3)	1.39~1.50 m 2.72 t(13.3)	1.65, 1.06	1.64, 1.06
21	—	2.24 brd(10.0) 2.35 t(9.6)	2.19~2.33 m	1.33, 1.14	1.32, 1.16
22	—	2.15 brt(9.6) 2.35 t(9.6)	2.11~2.16 m 2.19~2.33 m	1.66, 1.44	1.68, 1.42
23	3.41 d(12.5) 3.73 d(12.5)	3.82~3.90 m 4.66 d(8.0)	3.85~3.87 m 4.60 d(8.0)	3.78, 3.69	3.55, 3.19
24	1.34 s	4.01~4.04 m	3.95~3.96 m	4.48, 3.55	1.19 bs
25	1.62 s	1.38 s	1.34 s	1.53 bs	1.52 bs
26	1.05 s	1.08 s	1.01 s	0.93 bs	0.93 bs
27	1.31 s	1.68 s	1.63 s	1.06 bs	1.05 bs
29	0.88 s	1.01 s	0.94 s	0.88 bs	0.88 bs
30	0.98 s	1.12 s	1.06 s	0.89 bs	0.90 bs
1'	4.50 d(8)	4.83 d(7.3)	4.80 d(7.6)	4.29 d(7.7)	4.29 d(7.6)
2'	3.35 t(8.5)	4.07 t(7.3)	4.00 t(7.6)	3.04	3.05
3'	3.40 m	4.02~4.04 m	3.95~3.96 m	3.13	3.13 t(8.3)
4'	3.40 m	3.82~3.90 m	3.87~3.87 m	3.04	3.07
5'	3.65 brd(6.5)	4.11 dd(3.8, 7.5)	4.10 dd(3.3, 7.4)	3.05	3.07
6'		5.01 brd(7.5) 3.82~3.90 m	4.80 brd(7.1) 3.73~3.75 m	3.62 3.42	3.62 bd(10.7) 3.41 dd(10.7, 2.4)
1''	5.59 d(4)	4.74 d(8.2)	4.69 d(7.2)	5.64 d(1.8)	5.68 d(1.2)
2''	3.81 m	4.02~4.04 m	3.95~3.96 m	3.62	3.61
3''	3.86 m	4.18~4.21 m	4.08~4.16 m	3.79	3.81
4''	3.86 m	4.18~4.21 m	4.08~4.16 m	3.68	3.70
5''	3.51 brd(12.5) 3.92 d(12.5)	4.18~4.21 m	4.08~4.16 m	3.76 3.32	3.79 3.32
6''		4.74 brd(8.2) 3.82~3.90 m	4.71 brd(7.1) 3.73~3.75 m		

Table 3-5-44 (continued)

H	3-5-160	3-5-161	3-5-162	3-5-163	3-5-164
1'''	5.10 br s	5.15 d(7.5)	6.45 br s	4.77 d(1.4)	4.70 d(1.5)
2'''	3.86 m	4.02~4.04 m	4.38~4.45 m	3.65	3.77 dd(1.5, 2.4)
3'''	3.86 m	4.82~3.90 m	3.87 m	3.66	3.70 dd(2.4, 9.0)
4'''	3.58 t(9.5)	4.18~4.21 m	4.38~4.45 m	3.45	3.58 t(9.0)
5'''	3.72 m	3.48 t(10.1)	4.51~4.55 m 4.38~4.45 m	3.50	3.53 dd(9.0, 5.7)
6'''	1.30 d(6)			1.14 d(6.3)	1.11 d(5.7)
1''''	4.54 d(7.5)	6.43 br s	5.73 br s	4.44 d(7.7)	5.11 d(4.3)
2''''	3.34 t(8.5)	4.48~4.51 m	4.38~4.45 m	3.11	3.90
3''''	3.46 t(9)	4.82~3.90 m		3.32	
4''''	3.53 td(9, 4)	4.36~4.38 m 4.46~4.48 m	4.22~4.28 m	3.33	3.98 d(9.3) 3.58 d(9.3)
5''''	3.22 dd(11, 9) 3.87 dd(11, 5)	4.82~3.90 m	4.22~4.28 m	3.71 3.09	3.37 3.33
6''''			1.61 d(6.0)		
1'''''	5.14 br s	5.76 br s	4.99 d(8.0)	5.01 d(1.8)	4.54 d(7.9)
2'''''	3.95 dd(3, 1.5)	4.02~4.04 m	3.95~3.96 m	3.68	3.06 t(7.9)
3'''''	3.71 dd(9.5, 3.5)	4.02~4.04 m	4.08~4.16 m	3.49	3.33 t(7.9)
4'''''	3.38 t(9.5)	4.36~4.38 m	4.08~4.16 m	3.18	3.34 dd(7.9, 4.4)
5'''''	3.96 dq(9.5, 6)	4.36~4.38 m	3.95~3.96 m	3.88	3.72 dd(4.4, 11.7) 3.05
6'''''	1.24 d(6)	1.71 d(5.2) 4.01 t(7.7)	4.60 br d(6.8) 3.73~3.75 m	1.09 d(6.3)	
1''''''		5.03 d(7.7)			4.93 d(1.6)
2''''''		4.01 t(7.7)			3.67 dd(1.6, 2.9)
3''''''		4.18~4.21 m			3.48 dd(2.9, 9.1)
4''''''					3.18 dd(9.5, 9.1)
5''''''		4.02~4.04 m			3.91 dd(9.5, 6.2)
6''''''		4.65 br d(8.0) 3.82~3.90 m			1.08 d(6.2)

Table 3-5-45: ¹H NMR spectroscopic data of oleanane-type saponins 3-5-166~3-5-170.

H	3-5-166	3-5-167	3-5-168	3-5-169	3-5-170
1	1.16 br d(14) 2.06	1.20, 2.05	ax 1.39 br t(13) eq 2.30 dd(13, 4)	—	α 1.35 m β 2.40 dd(14.5, 2.5)
2	4.32 m(9.5)	4.32 m(9)	ax 4.40 m	4.59 m	4.62 m
3	3.60 d(4)	3.58 d(4)	ax 3.93 m	4.34 d(4.0)	4.32 d(4.0)
5	1.30	1.32	ax 1.93 br s	α 2.41 br s	α 1.92 br s
6	4.46 m	4.46 m	eq 5.01 br s	5.16 br s	5.14 dd(3.0, 3.0)

Table 3-5-45 (continued)

H	3-5-166	3-5-167	3-5-168	3-5-169	3-5-170
7	1.49 br d(14) 1.80 br d(14)	1.80 1.55	eq 2.00 m ax 2.00 m	—	α 2.08 m β 2.00 m
9	—	—	2.16 m	—	α 1.91 dd(12.0, 6.0)
11	2.13, 1.99	1.98, 2.13	2.34 m, 2.15 m	—	α 2.11 ddd(12.0, 6.0, 3.5) β 2.36 ddd(12.0, 12.0, 6.0)
12	5.35 t(3)	5.35 t(3)	5.55 m	5.56 dd(3.0, 3.0)	5.56 dd(3.5, 3.5)
15	—	—	ax 2.45 br t(13) eq 1.25 br d(13)	—	α 1.35 m β 2.26 m
16	—	—	ax 2.78 br t(13) eq 2.10 m	—	
18	2.93 dd(12, 4)	2.93 dd(14, 4)	3.46 br s	3.30 dd(13.0, 4.0)	3.33 dd(15.5, 5.0)
19	—	1.20, 1.75	eq 3.55 d(4)	—	α 1.84 dd(15.5, 15.5) β 1.29 dd(15.5, 5.5)
21	—	—	ax 1.97 m eq 1.00 br t(12)	—	α 1.35 m β 1.14 ddd(11.0, 3.5, 3.5)
22	—	—	2.00 m	—	α 1.73 ddd(11.0, 3.5, 3.5) β 2.00 m
23	3.39 d(12) 3.71 d(12)	3.42 d(12.5) 3.73 d(12.5)	4.35 d(11) 4.03 d(11)	4.05 d(11.0) 4.36 d(11.0)	4.01 d(10.0) 4.34 d(10.0)
24	1.30 s	1.30 s	1.69 s	2.06 s	2.03 s
25	1.61 s	1.61 s	1.75 s	2.29 s	2.27 s
26	1.06 s	1.06 s	1.70 s	1.73 s	1.69 s
27	1.13 s	1.13 s	1.51 s	1.23 s	1.24 s
29	0.90 s	0.90 s	1.10 s	0.89 s	0.89 s
30	0.94 s	0.94 s	0.92 s	0.95 s	0.98 s
1'	4.49 d(7.5)	4.50 d(7)	6.25 d(8)	6.28 d(5.8)	6.43 d(4.0)
2'	3.32 t(8)	3.48 t(8)	4.14 t(9)	4.59 m	4.62 m
3'	3.40 m	3.53 t(8)	4.20 t(9)	4.32 m	4.50 m
4'	3.40 m	3.45 dd(9, 7)	4.29 t(9)	4.42 m	4.38 m
5'	3.61 d(9)	3.32 m	4.20 m	4.39 m 3.91 dd(11.0, 2.0)	3.91 dd(11.0, 3.5) 4.50 m
6'		3.71 dd(12, 4) 3.88 dd(12, 2)	4.35 m 4.35 m		
1''	5.65 d(4)	4.56 d(7.5)			5.96 br s

Table 3-5-45 (continued)

H	3-5-166	3-5-167	3-5-168	3-5-169	3-5-170
2''	3.83 m	3.28 dd(9, 7.5)			4.62 m
3''	3.86 m	3.32 m			4.54 dd(9.5, 3.5)
4''	3.83 m	3.35 t(9)			4.30 dd(9.5, 9.5)
5''	3.51 dd(11, 3)	3.32 m			4.50 m
	3.93 dd(11, 2)				
6''		3.63 dd(12, 6)			
		3.81 dd(12, 2.5)			
1'''	5.06 br s	5.63 d(4)			
2'''	3.94 m	3.83 m			
3'''	3.90 m	3.84 m			
4'''	3.72 t(9)	3.84 m			
5'''	3.80 m	3.50 d(9)			
		3.90 d(9)			
6'''	1.27 d(6)				
1''''	5.13 d(1.5)	5.10 br s			
2''''	3.97 dd(3, 2)	3.86 br s			
3''''	3.70 dd(9, 3)	3.85 d(6)			
4''''	3.39 t(9)	3.56 t(9)			
5''''	3.98 m	3.74 m			
6''''	1.24 d(6)	1.28 d(6)			
1'''''	4.50 d(7.5)	4.51 d(7.5)			
2'''''	3.28 dd(8, 7.5)	3.29 t(8)			
3'''''	3.41 t(8)	3.48 t(8)			
4'''''	3.53 td(9, 3)	3.52 m			
5'''''	3.16 dd(11.5, 9.5)	3.21 dd(12, 10)			
	3.87 dd(11.5, 5)	3.85 dd(12, 2)			
1''''''	5.05 br s	5.13 d(1.5)			
2''''''	4.06 dd(3, 1.5)	3.95 dd(3.5, 1.5)			
3''''''	3.74 dd(9.5, 3)	3.70 dd(9.5, 3)			
4''''''	3.41 t(9)	3.39 t(9.5)			
5''''''	3.80 m	3.99 dq(9.5, 6)			
6''''''	1.25 d(6)	1.23 d(6)			

Table 3-5-46: ¹H NMR spectroscopic data of oleanane-type saponins 3-5-171~3-5-174 and 3-5-180.

H	3-5-171	3-5-172	3-5-173	3-5-174	3-5-180
1	—	1.86~2.11 m	2.07 (3.5, 14.0) 1.24 (4.0, 14.0)	—	1.52 m, 1.90 m
2	4.42 m	4.40~4.45 m	4.25 (ca. 3.5)	4.81 ddd(3.5, 3.5, 3.5)	3.66 ddd(11.0, 3.9, 3.0)
3	—	4.40~4.45 m	3.73 (3.5)	4.35 d(3.5)	3.35 d(3.0)

Table 3-5-46 (continued)

H	3-5-171	3-5-172	3-5-173	3-5-174	3-5-180
5	—	1.86~2.11 m	—	—	1.30 m
6	4.54 m	1.47~1.50 m	1.52	—	1.45 m
7	—	1.47~1.50 m	1.66	—	1.65 m
		1.68~1.76 m	1.47		
9	—	1.86~2.11 m	1.68	—	1.85 m
11	—	1.86~2.11 m	2.03, 1.98	—	2.00 m
12	5.45 br t	5.46 br s	5.38 (3.5, 3.5)	5.63 dd(3.0, 3.0)	5.33 m
15	—	1.27 br d(8.0)	1.76 (3.5, 15.0)	—	1.70 m
		1.86~2.11 m	1.52 (3.0, 15.0)		
16	—	5.15 br s	4.52	5.15 br s	0.89 m
18	3.05 dd (13.5, 3)	3.52 t(13.3)	3.00 (4.0, 14.5)	3.40 dd(13.5, 3.5)	3.05
19	1.82 m	1.47~1.50 m	2.34 (13.6, 14.5)	2.74 dd(13.5, 13.5)	3.26 d(5.8)
		2.67 t(13.2)	1.09 (4.0, 13.6)		
21	—	2.20~2.29 m	1.98, 1.22	—	1.75 m
22	—	2.20~2.29 m	2.00, 1.83	—	2.35 m
23	—	3.88~3.94 m	3.38	4.35 d(11.0)	3.25 dd(9.0, 9.0)
		4.65~4.70 m	3.32	3.74 d(11.0)	3.48 dd(9.0, 9.0)
24	1.40 s	1.45 s	0.94 s	1.39 s	0.67 s
25	1.71 s	1.25 s	1.36 s	1.58 s	1.02 s
26	1.23 s	1.05 s	0.83 s	1.18 s	0.75 s
27	1.16 s	1.63 s	1.43 s	1.78 s	1.30 s
29	1.00 s	0.91 s	0.92 s	0.93 s	0.93 s
30	1.04 s	1.06 s	0.96 s	1.04 s	0.94 s
1'	4.54 m	4.79 d(7.2)	5.18 d(1.8)	5.17 d(7.5)	5.37 d(1.0)
2'	—	4.03~4.06 m	3.99 (3.5, 1.8)	4.03 dd(8.5, 7.5)	3.32 m
3'	—	4.03~4.06 m	3.77	4.19 dd(8.5, 8.0)	3.39 m
4'	—	3.88~3.96 m	3.4	4.24 dd(9.0, 8.0)	3.28 m
5'	—	4.08~4.11 m	4.04 (6.2, 9.5)	3.92 ddd(9.0, 5.0, 2.0)	3.30 m
6'	—	5.01~5.15 m	1.29 d(6.2)	4.33 dd(11.5, 5.0)	3.26 dd(9.8)
		3.88~3.94 m		4.48 dd(11.5, 2.0)	3.82 dd(10.1)
1''	5.76 d(3.3)	4.92 d(7.6)	5.42 d(8.1)	6.03 d(8.0)	
2''	—	3.88~3.94 m	3.97	4.50 dd(9.0, 8.0)	
3''	—	4.15~4.17 m	3.78	4.28 dd(9.0, 3.5)	
4''	—	4.15~4.17 m	3.68	5.52 d(3.5)	
5''	—	3.88~3.94 m	3.77	4.02 (ov)	
6''	—	4.65 br d(7.7)	1.26 d(6.5)	1.25 d(6.0)	
		3.88~3.94 m			
OAc				2.00 s(4''-OAc)	
				1.98 s(2'''-OAc)	
1'''	5.13 br s	6.39 br s	5.20 d(1.5)	6.08 d(1.0)	
2'''	—	4.65~4.70 m	3.96	6.01 dd(3.0, 1.0)	
3'''	—	3.88~3.94 m	3.86	4.80 dd(9.0, 3.0)	
4'''	—	4.23~4.28 m	3.58	4.20 dd(9.0, 9.0)	

Table 3-5-46 (continued)

H	3-5-171	3-5-172	3-5-173	3-5-174	3-5-180
5'''	—	4.40~4.45 m 4.23~4.28 m	3.72	4.48 dq(9.0, 6.0)	
6'''	1.34		1.35 d(6.4)	1.76 d(6.0)	
1''''	5.37	5.65 br s	5.14 d(1.2)	5.17 d(7.5)	
2''''	—	3.88~3.94 m	4.18 (1.2, 3.5)	4.06 dd(8.0, 7.5)	
3''''	—	3.88~3.94 m	3.81	4.21 dd(8.0, 8.0)	
4''''	—	4.23~4.28 m	4.12	4.12 ddd(10.5, 8.0, 4.5)	
5''''	—	4.23~4.28 m	3.78, 3.68	3.52 dd(10.5, 10.5) 4.21 dd(10.5, 4.5)	
6''''		1.63 (ov)			
1'''''	5.20 br s	5.15 d(7.6)	4.53 d(7.7)	6.15 d(1.0)	
2'''''		4.03~4.06 m	3.42 (ca. 8.0)	4.76 dd(3.0, 1.0)	
3'''''		3.88~3.94 m	3.51 (8.7, 8.7)	4.59 dd(9.0, 3.0)	
4'''''		4.15~4.17 m	3.57	4.31 dd(9.0, 9.0)	
5'''''		3.52 t(9.6)	3.94, 3.28	4.93 dq(9.0, 6.0)	
6'''''	1.34			1.66 d(6.0)	
1''''''	4.72 d(7.7)	6.26 br s	4.90 d(1.6)		
2''''''	—	5.65 br s	3.96 (3.4, 1.7)		
3''''''	—	—	3.83 (9.5, 3.4)		
4''''''	—	4.15~4.17 m 4.88 d(7.8)	3.42 (9.5, 9.5)		
5''''''	—	4.23~4.28 m	3.85 (9.5, 6.3)		
6''''''			1.28 d(6.5)		
1'''''''	5.37				

Table 3-5-47: ¹H NMR spectroscopic data of oleanane-type saponins 3-5-175~3-5-179.

H	3-5-175	3-5-176	3-5-177	3-5-178	3-5-179
2	4.75 ddd (3.5, 3.5, 3.5)	4.75 ddd (3.5, 3.5, 3.0)	4.75 ddd (3.5, 3.5, 3.5)	4.83	4.31 ddd (4.0, 3.5, 3.5)
3	4.41 d(3.5)	4.41 d(3.5)	4.40 d(3.5)	4.35	3.61 d(3.0)
12	5.66 dd(3.0, 3.0)	5.68 dd(3.5, 3.5)	5.68 dd(3.0, 3.0)	5.64 br s	5.32 dd(3.0, 3.0)
16	5.20 br s	5.23 br s	5.22 br s	5.25	4.46 br s
18	3.42 dd(13.5, 4.0)	3.43 dd(13.0, 4.0)	3.43 dd(13.5, 3.5)	3.61 dd(14.0, 3.7)	2.95 dd(13.5, 3.5)
19	2.75 dd(13.5, 13.5)	2.76 dd(13.0, 13.0)	2.76 dd(13.5, 13.5)		ax 2.30 dd (13.5, 13.5)
23	3.72 s	3.72 br s	3.72 s	3.68 d(10.5) 4.34 d(10.5)	3.24 d(9.5) 3.59 d(9.5)
24	1.23 s	1.23 s	1.23 s	1.37 s	0.78 s ^①
25	1.58 s	1.58 s	1.58 s	1.61 s	0.88 s ^①

Table 3-5-47 (continued)

H	3-5-175	3-5-176	3-5-177	3-5-178	3-5-179
26	1.20 s	1.21 s	1.20 s	1.17 s	0.92 s ^①
27	1.76 s	1.77 s	1.76 s	1.77 s	0.96 s ^①
29	0.93 s	0.93 s	0.93 s	1.01 s	1.27 s ^①
30	1.02 s	1.04 s	1.04 s	1.18 s	1.39 s ^①
1'	5.78 d(1.0)	5.79 d(1.0)	5.78 d(1.0)	5.17 d(7.8)	4.43 d(7.8)
2'	4.72 dd(3.0, 1.0)	4.73 dd(3.5, 1.0)	4.72 dd(3.5, 1.0)	4.01	—
3'	4.60 dd(9.0, 3.0)	4.60 dd(9.0, 3.5)	4.60 dd(9.0, 3.5)	4.17	—
4'	4.30 dd(9.0, 9.0)	4.31 dd(9.0, 9.0)	4.30 dd(9.0, 9.0)	4.24	—
5'	4.94 dq(9.0, 6.0)	4.61 dq(9.0, 6.0)	4.61 dq(9.0, 6.0)	3.91 m	—
6'	1.62 d(6.0)	1.62 d(6.0)	1.62 d(6.0)	4.34, 4.47	—
1''	6.06 d(8.0)	6.06 d(8.0)	6.06 d(8.0)	6.60 br s	4.24 d(6.5)
2''	4.54 dd(9.0, 8.0)	4.53 dd(9.0, 8.0)	4.53 dd(9.0, 8.0)	4.50	3.55 dd(8.0, 6.5)
3''	4.32 dd(9.0, 3.5)	4.33 dd(9.0, 3.5)	4.33 dd(9.0, 3.5)	4.59	—
4''	5.57 d(3.5)	5.52 d(3.5)	5.51 d(3.5)	4.45	—
5''	4.05 q(6.0)	4.02 q(6.5)	4.03 q(6.5)	3.99, 4.61	—
6''	1.32 d(6.0)	1.25 d(6.5)	1.25 d(6.5)		
1'''		6.27 d(1.5)	6.26 d(1.5)	5.59 d(1.2)	5.43 d(8.0)
2'''	2.63 dd(14.0, 5.0)	4.79 dd(3.0, 1.5)	4.78 dd(3.0, 1.5)	4.75 br s	3.92 dd(9.0, 8.0)
	2.73 dd(14.0, 8.0)				
3'''	4.57 ddd (8.0, 6.0, 5.0)	4.66 dd(9.0, 3.0)	4.66 dd(9.0, 3.0)	4.45	4.06 dd(9.0, 3.5)
4'''	1.37 d(6.0)	4.36 dd(9.0, 9.0)	4.36 dd(9.0, 9.0)	4.48	5.39 d(3.5)
5'''		4.52 dq(9.0, 6.0)	4.53 dd(9.0, 6.0)	4.35	3.89 q(6.5)
6'''		1.77 d(6.0)	1.76 d(6.0)	1.71 d(6.2)	1.07 d(6.5)
1''''	6.23 d(1.0)	5.04 d(7.8)	5.04 d(7.8)	5.97 d(4.8)	5.41 d(1.5)
2''''	4.80 dd(3.0, 1.0)	4.09 dd(8.0, 8.0)	4.09 dd(8.0, 8.0)	4.83 d(4.8)	3.95 dd(3.5, 1.5)
3''''	4.66 dd(9.0, 3.0)	4.24 dd(9.0, 8.0)	4.23 dd(9.0, 8.0)		—
4''''	4.34 dd(9.0, 9.0)	4.09 ddd (10.0, 9.0, 5.0)	4.09 ddd (10.0, 9.0, 5.5)	4.16 4.55 d(9.1)	—
5''''	4.47 dq(9.0, 6.0)	3.46 dd(10.5, 10.0) 4.16 dd(10.5, 5.0)	3.46 dd(10.5, 10.0) 4.16 dd(10.5, 5.5)	4.08	—
6''''	1.73 d(6.0)				1.32 d(6.0)
1'''''	5.03 d(8.0)	6.24 d(1.0)	6.23 d(1.0)	5.29 d(7.8)	4.48 d(7.8)
2'''''	4.08 dd(8.0, 8.0)	4.81 dd(3.5, 1.0)	4.80 dd(3.5, 1.5)	3.90	—
3'''''	4.23 dd(8.0, 8.0)	4.61 dd(9.0, 3.0)	4.60 dd(9.0, 3.5)	4.18	—
4'''''	4.10 ddd (10.5, 8.0, 5.0)	4.34 dd(9.0, 9.0)	4.33 dd(9.0, 9.0)	4.00	—
5'''''	3.46 dd(10.5, 10.5) 4.16 dd(10.5, 5.0)	4.96 dq(9.0, 6.0)	4.95 dq(9.0, 6.0)	3.35 dd(11.0, 10.6) 4.08	—
6'''''		1.67 d(6.0)	1.67 d(6.0)		—

Table 3-5-47 (continued)

H	3-5-175	3-5-176	3-5-177	3-5-178	3-5-179
1''''''	6.23 d(1.0)			6.48 d(0.9)	4.48 d(7.8)
2''''''	4.80 dd(3.0, 1.0)	2.64 dd(15.5, 5.5) 2.73 dd(15.5, 7.5)		5.10 br s	—
3''''''	4.60 dd(9.0, 3.0)	5.49 ddd(7.5, 6.0, 5.5)			—
4''''''	4.32 dd(9.0, 9.0)	1.26 d(6.0)		4.14, 4.59 d(8.9)	—
5''''''	4.50 dq(9.0, 6.0)			4.24	—
6''''''	1.67 d(6.0)				
1''''''				5.27 d(8.0)	
2''''''		2.01 s		4.52	
3''''''				4.09	
4''''''				4.50	
5''''''				4.10	
6''''''				4.38	
2a			2.61~2.74 (ov) 2.75~2.84 (ov)		4.23 dd(7.5, 5.0)
3a			5.48~5.60 (ov)		
4a			1.30 d(6.0)		
8a					2.45 t(7.0) 2.46 t(7.0)
10a					2.45 t(7.0) 2.46 t(7.0)
2b			2.61~2.74 (ov) 2.75~2.84 (ov)		
3c			5.48~5.60 (ov)		
4c			1.34 d(6.0)		
2d			2.61~2.74 (ov) 2.75~2.84 (ov)		
3d			4.57 m		
4d			1.40 d(6.0)		

① The data of methyls in the literature were not assigned, and here, the deployments are only to display the data.

Table 3-5-48: ¹H NMR spectroscopic data of oleanane-type saponins 3-5-181~3-5-185.

H	3-5-181	3-5-182	3-5-183	3-5-184	3-5-185
1	2.12 dd(14.4, 2.5) 1.22 dd(<i>ca.</i> 15, <i>ca.</i> 4)	—	—	2.10 1.22	2.12 1.16
2	4.37 d (<i>ca.</i> 4)	4.36 ddd (3.0, 3.7, 4.0)	4.88 m	4.36 dd(4.5, 3.5)	4.32

Table 3-5-48 (continued)

H	3-5-181	3-5-182	3-5-183	3-5-184	3-5-185
3	3.60 d(3.8)	3.62 d(3.7)	4.26 m	3.66 d(3.5)	3.65
5	1.25	—	—	1.34	—
6	—	—	5.03 m	ca. 1.3 ca. 1.3	—
7	—	—	—	1.43, 1.43	—
9	1.58 dd(11.3)	—	—	1.61	1.62
11	2.02 dd(9.7)	—	—	2.05	2.01
	1.97 t(5.3)	—	—	1.95	1.97
12	5.33 t(3.6)	—	5.48 t-like	5.31 t(3.5)	5.31 t (ca. 3.5)
15	—	—	—	1.76, 1.18	—
16	—	—	—	2.10, 1.70	—
18	2.89 dd(13.7, 4.3)	2.88 dd (13.6, 4.4)	3.27 dd(12.5, 4.0)	2.88 dd(13.7, 4.1)	2.90 dd (ca. 13.5, ca. 3.5)
19	1.73 m, 1.18 m	—	—	1.76, 1.18	2.10, 1.14
21	1.94, 1.94	—	—	1.45, 1.27	—
22	1.42	—	—	1.87, 1.60	—
23	4.13 d(11.4)	3.23 d(12.5)	—	3.65 d(11.3)	3.63
	4.05 d(11.3)	3.78 d(12.5)	—	3.26 d(11.3)	3.26
24	1.09 s	0.96 s	1.85 s	0.98 s	0.86 s ^①
25	1.32 s	1.31 s	1.55 s	1.33 s	0.95 s ^①
26	0.85 s	0.84 s	2.07 s	0.86 s	0.98 s ^①
27	1.19 s	1.19 s	1.20 s	1.21 s	0.98 s ^①
29	0.95 s	0.94 s	1.01 s	0.95 s	1.21 s ^①
30	1.00 s	0.96 s	0.91 s	0.98 s	1.33 s ^①
1'	4.37 d(7.7)	4.48 d(8.0)	4.94 d(8.0)	5.46 d(7.8)	②
2'	3.29	3.45 dd(8.0, 9.0)	3.89	3.31	—
3'	3.37	3.59 dd(9.0, 9.0)	4.01	3.40	—
4'	3.39	3.50 dd(9.0, 9.0)	4.01	3.41	—
5'	3.30	3.66 d(9.0)	3.95 m	3.34	—
6'	3.84, 3.72	—	4.05, 4.70 dd(8.2, 1.0)	3.84, 3.75	—
1''	5.63 d(7.8)	5.22 d(1.5)	4.82 d(7.7)	5.47 d(7.9)	②
2''	3.86	3.97 dd(1.5, 2.5)	3.88	3.89	—
3''	3.83	3.75 dd(2.5, 8.9)	4.09	3.81	—

Table 3-5-48 (continued)

H	3-5-181	3-5-182	3-5-183	3-5-184	3-5-185
4''	3.65	3.41 dd(8.9, 9.0)	4.03	3.90	—
5''	3.64	4.16 m	3.81	3.78	—
6''	4.31 dd(1.5)	1.26 d(6.5)	4.38	1.26 d(6.1)	—
	4.25 dd(5.0, 11.7)		4.20		
1'''	5.27 d(1.8)	5.41 d(8.0)	6.34 d(2.8)	5.13 d(1.6)	②
2'''	4.02 dd(3.4)	3.36 dd(8.0, 9.0)	4.40	3.98 dd(1.6, 3.2)	—
3'''	3.69 dd(9.3)	3.44 d(9.0)	4.28	3.71	—
4'''	3.41 t(9.3)	3.45 dd(9.0, 9.0)	4.25	3.42	—
5'''	3.74 dd(6.2)	3.38 d(9.0)	3.85	3.76 dd	—
			4.38	(ca. 6, ca. 9)	
6'''	1.27 d(6.2)	3.71 dd(12.0, 5.0)		1.26 d(6.4)	—
		3.85 dd(12.0, 3.5)			
1''''	4.58 d(7.8)		5.59 s	5.16 bs	
2''''	3.31		4.62	4.16 dd(3.1, 1.2)	
3''''	3.41		4.41	3.89	
4''''	3.33		4.16	4.12 ddd	
				(3.5, 5.0, 9.0)	
5''''	3.38		4.74 m	3.78, 3.67	
6''''	3.94 dd(2.2)		1.59 d(6.1)		
	3.67 dd(6.4, 11.7)				
1'''''			4.97 d(7.9)		
2'''''			3.89		
3'''''			4.03		
4'''''			4.00		
5'''''			4.12		
			3.41 dd(11.0, 0.5)		
1''''''			5.98 s		
2''''''			4.40		
3''''''			4.40		
4''''''			4.18		
5''''''			4.27 m		
6''''''			1.64 d(5.8)		

① The data of methyls in the literature were not assigned, and here, the deployments are only to display the data.

② The data of anomeric protons at δ 4.37 d(7.7), 5.39 d(8.1), and 4.39 d(7.8) were not assigned in the literature.

Table 3-5-49: ^1H NMR spectroscopic data of oleanane-type saponins **3-5-187**~**3-5-189**, **3-5-194**, and **3-5-195**.

H	3-5-187	3-5-188	3-5-189	3-5-194	3-5-195
1	—	—	—	—	1.80 m, 1.65 m
2	4.73 m	—	—	—	5.43 bs
3	4.17 d(3)	—	—	—	3.80 bs
12	5.44 t-like	5.60 br s	5.61 br s	5.57 br s	5.49 bs
18	3.13 dd(14, 4)	—	—	—	2.15 bs
19	—	—	—	—	3.51 bs
23	3.63 d(11), 4.29 d(11)	1.18 s	1.28 s	1.00 s ^①	0.96 s ^①
24	1.35 s	0.99 s	1.00 s	1.05 s ^①	0.97 s ^①
25	1.48 s	0.94 s	0.95 s	1.09 s ^①	1.08 s ^①
26	1.08 s	1.18 s	1.14 s	1.28 s ^①	1.10 s ^①
27	1.18 s	1.89 s	1.86 s	1.30 s ^①	1.15 s ^①
29	0.86 s	1.03 s	1.04 s	1.39 s ^①	1.20 s ^①
30	0.86 s	1.05 s	1.08 s	1.80 s ^①	1.49 s ^①
OAc					1.94 s(2-OAc)
1'	5.10 d(8)	5.03 d(8.5)	4.91 d(7.8)	4.80 d(7.8)	6.30 d(8.1)
2'	4.11 t(8.5)	—	—	—	—
1''	5.36 d(8)	4.99 d(8.5)	5.15 br s	4.72 d(7.8)	5.02 d(7.7)
6''	—	1.48 d(5.5)	—	—	—
1'''	6.18 d(8)	5.08 d(6.0)	4.98 d(7.4)	6.32 d(4.4)	—
2'''	4.44 t(8.5)	—	—	—	—
1''''	5.69 d(8)	6.06 d(7.5)	6.03 d(7.2)	6.20 br s	—
6''''	—	—	—	1.73 d(6)	—
1'''''	—	5.91 br s	5.88 br s	5.16 d(7.3)	—
6'''''	—	1.78 d(5.5)	1.74 d(5.5)	—	—
1''''''	—	5.35 d(7.0)	5.31 d(7.5)	—	—
1'''''''	—	6.28 br s	6.24 br s	—	—
1''''''''	—	4.86 d(8.0)	4.83 d(9.5)	—	—
6''''''''	—	1.35 d(6.0)	1.32 d(6.1)	—	—
1'''''''''	—	4.83 d(8.0)	4.85 d(8.0)	—	—
6'''''''''	—	1.59 d(5.0)	1.57 d(5.0)	—	—
3a	—	6.88 t(7.5)	7.02 br s	—	—
7a	—	6.22 dd(11.0, 17.0)	6.19 dd(11.1, 17.6)	—	—
8a	—	5.25 d(11.0)	5.21 d(11.1)	—	—
	—	5.45 d(17.0)	5.39 d(17.6)	—	—
9a	—	1.83 s	4.70 s	—	—
10a	—	1.53 s	1.49 s	—	—
3b	—	7.10 t(7.5)	7.02 br s	—	—
5b	—	—	1.71 t(7.8)	—	—
7b	—	6.31 dd(11.0, 18.0)	6.19 dd(11.1, 17.6)	—	—
8b	—	5.18 d(11.0)	5.21 d(11.1)	—	—
	—	5.41 d(18.0)	5.41 d(17.6)	—	—
9b	—	1.93 s	1.86 s	—	—
10b	—	1.45 s	1.52 s	—	—

^① The data of methyls in the literature were not assigned, and here, the deployments are only to display the data.

Table 3-5-50: ^1H NMR spectroscopic data of oleanane-type saponins **3-5-186**, **3-5-190**, **3-5-191**, **3-5-196**, and **3-5-197**.

H	3-5-186	3-5-190	3-5-191	3-5-196	3-5-197
2	4.23 m	—	—	—	4.27 ddd(3.0, 3.7, 4.0)
3	4.20 m	4.15 (ov)	4.12 dd(4.0, 11.5)	3.98 s	—
12	5.43 brs	5.61 brs	5.56 brs	5.54 s	—
16	—	5.25 brs	5.05 brs	—	—
18	3.08 dd(13.5, 3.5)	3.52 dd(14, 4)	3.48 dd(4.0, 14.0)	3.36 dd(14.3, 3.8)	2.90 dd(13.6, 4.4)
19	1.73 m, 1.18 m	—	—	—	—
23	3.63 d(10.5)	3.64 d(11)	3.64 d(11.0)	3.72 d(11.4)	1.11 s
	4.18 d(10.5)	4.17 (ov)	4.26 d(11.0)	3.92 d(11.4)	
24	0.75 s ^①	1.00 s	1.03 s	0.85 s ^①	1.11 s
25	0.82 s ^①	0.94 s	0.89 s	1.06 s ^①	1.29 s
26	1.03 s ^①	1.03 s	1.11 s	1.14 s ^①	0.85 s
27	1.08 s ^①	1.79 s	1.74 s	1.24 s ^①	1.18 s
29	1.12 s ^①	1.02 s	0.94 s	3.56 s(2H)	0.94 s
30	1.14 s ^①	1.10 s	0.97 s	1.25 s ^①	0.96 s
1'	6.21 d(8.0)	4.90 d(7.3)	4.98 d(7.5)	6.32 d(8.1)	4.44 d(8.0)
2'	4.51 dd(8.0, 8.3)	4.38 t(8)	4.27	—	—
3'	4.38	4.11 (ov)	4.02	—	—
4'	4.36	4.31 brs	4.28	—	—
5'	4.00	3.73 d(11), 4.21 (ov)	3.63	—	—
6'	4.41		4.48 (ov)		
1''	6.65 brs	6.26 d(8.1)	5.64 d(8.0)	5.04 d(7.7)	5.22 d(1.5)
2''	4.83	4.05 t(9)	4.07	—	3.98 d(1.5)
3''	4.58	4.19 t(9)	4.14	—	—
4''	4.34	4.21 (ov)	4.13	—	—
5''	4.58	4.11 (ov)	4.22	—	4.14 d(8.0)
6''	1.77 d(6.1)	4.32 (ov), 4.69 d(12)	4.34 (ov)	—	1.26 d(6.5)
1'''		4.99 d(7.8)	5.29 d(8.0)	5.91 s	5.42 d(8.2)
2'''		3.92 t(8)	3.99	—	—
3'''		4.14 (ov)	4.22	—	—
4'''		4.36 (ov)	3.98	—	—
5'''		3.72 d(10)	3.95	—	—
6'''		4.11 (ov), 4.27 (ov)	4.40 (ov)	1.76 d(6.2)	—
1''''		5.87 bs	5.13 d(8.0)		
2''''		4.64 brs	4.01		
3''''		4.50 dd(9, 2)	3.90		
4''''		4.29 (ov)	4.02		
5''''		4.87 m	4.12		
6''''		1.72 d(6)	4.44 (ov)		
1'''''			6.32 d(8.0)		
2'''''			4.15		
3'''''			4.25		
4'''''			4.30		
5'''''			4.02		
6'''''			4.32 (ov)		

^① The data of methyls in the literature were not assigned, and here, the deployments are only to display the data.

Table 3-5-51: ^1H NMR spectroscopic data of oleanane-type saponins **3-5-199**, **3-5-200**, and **3-5-202~3-5-204**.

H	3-5-199	3-5-200	3-5-202	3-5-203	3-5-204
3	3.26 dd(12.0, 4.5)	3.25 dd(12.0, 4.5)	3.40 m	3.38 dd(4, 12)	3.34 dd(12.0, 3.0)
5	0.80 d(12.0)	0.80 d(11.5)	—	—	—
12	5.59 brt(3.0)	5.59 brt(3.0)	5.60 brt	5.57 br s	5.60 t(3.0)
16	5.27 br s	5.27 br s	5.22 brt	5.31 br s	5.28 br s
18	3.50 dd(14.0, 3.5)	3.50 dd(14.0, 3.5)	—	3.53 dd(13, 4)	3.51 dd(14.0, 3.0)
23	1.24 s	1.23 s	1.30 s	1.27 s	1.28 s
24	1.09 s	1.10 s	0.94 s	1.01 s	1.00 s
25	0.91 s	0.90 s	0.91 s	0.91 s	0.94 s
26	1.11 s	1.11 s	0.99 s	1.02 s	1.13 s
27	1.80 s	1.81 s	1.84 s	1.76 s	1.83 s
29	0.99 s	0.99 s	0.92 s	1.02 s	1.00 s
30	1.06 s	1.06 s	1.12 s	1.12 s	1.07 s
1'	4.78 d(6.7)	4.77 d(6.7)	4.90 d(7.9)	4.76 d(6.7)	4.68 d(7.4)
2'	4.72	4.68	4.05	4.48 t(9)	4.51 t(8.0)
3'	4.33	4.29	4.20	4.24 (ov)	4.18
4'	4.48	4.50	4.14	4.49 br s	4.37
5'	3.67, 4.18	3.68, 4.18	4.10	3.78 d(11), 4.20 (ov)	3.68, 4.19
6'			4.25, 4.66		
1''	5.49 d(8.0)	5.43 d(8.0)	5.16 d(4.9)	5.31 d(7.9)	5.36 d(8.0)
2''	4.03	4.02	4.52	4.00 (ov)	4.14
3''	4.18	4.12	4.38	4.19 (ov)	3.96
4''	4.13	4.09	4.40	4.30 (ov)	4.04
5''	3.70	3.69	3.75, 4.30	3.91 m	3.86
6''	4.27, 4.34	4.25, 4.36		4.47 (ov), 4.47 (ov)	4.20, 4.39
1'''	5.28 d(8.0)	5.28 d(8.0)	4.99 d(7.0)	5.12 d(7.8)	5.09 d(8.0)
2'''	3.99	4.10	4.03	4.59 t(9)	4.05
3'''	4.20	5.98	4.08	4.20 (ov)	4.28
4'''	4.18	4.39	4.15	4.69 br s	4.10
5'''	3.93 m	3.97 m	3.56, 4.40	4.17 m	3.96
6'''	4.31	4.35		4.29 (ov)	4.20
	4.47	4.45		4.42 (ov)	4.52
1''''	6.22 d(8.5)	6.22 d(8.5)	6.12 d(7.6)	5.24 d(7.7)	5.18 d(8.0)
2''''	4.05	4.05	4.39	4.02 (ov)	4.05
3''''	4.17	4.17	4.20	4.15 (ov)	4.16
4''''	4.22	4.23	4.25	4.18 (ov)	4.04
5''''	4.08	4.08	4.00	3.71 d(11), 4.33 (ov)	3.91
6''''	4.30, 4.64	4.30, 4.64	4.30, 4.39		4.20, 4.42
1'''''	4.96 d(8.0)	4.96 d(8.0)	6.54 br s	6.25 d(8.1)	6.22 d(8.0)
2'''''	3.91	3.91	4.85	4.09 t(9)	4.06
3'''''	4.15	4.13	4.76	4.21 t(9)	4.17
4'''''	4.37	4.37	4.38	4.23 (ov)	4.30
5'''''	3.66 m	3.66	4.48	4.10 m	4.08
6'''''	4.08, 4.20	4.08, 4.20	1.65 d(6.1)	4.34 dd(12, 5) 4.66 (ov)	4.30, 4.64

Table 3-5-51 (continued)

H	3-5-199	3-5-200	3-5-202	3-5-203	3-5-204
1''''''	5.82 br s	5.82 d(2.0)	5.17 d(7.3)	4.99 d(7.8)	4.96 d(8.0)
2''''''	4.65 dd(3.0, 1.5)	4.65 dd(3.0, 2.0)	4.47	3.92 t(9)	3.91 t(8.0)
3''''''	4.52 dd(9.0, 3.5)	4.52 dd(9.5, 3.5)	4.00	4.15 (ov)	4.13
4''''''	4.30	4.30	4.43	4.39 (ov)	4.37
5''''''	4.92 dq(9.0, 6.5)	4.92 dq(9.0, 6.5)	4.00	3.69 m	3.66
6''''''	1.69 d(6.5)	1.69 d(6.5)	4.31	4.10 (ov), 4.23 (ov)	4.08, 4.20
1''''''			5.10 d(7.6)	5.86 br s	5.81 br s
2''''''		7.48 d(8.8)	4.03	4.62 br s	4.65
3''''''		7.13 d(8.8)	4.01	4.49 dd(9, 3)	4.52
4''''''			4.08	4.25 (ov)	4.30
5''''''		7.13 d(8.8)	3.49, 4.25	4.84 m	4.91 dq(9.0, 6.2)
6''''''		7.48 d(8.8)		1.72 d(6)	1.69 d(6.2)
7''''''		7.88 d(16.0)			
8''''''		6.53 d(16.0)			
1''''''			5.13 d(7.3)		
2''''''			4.03		
3''''''			4.12		
4''''''			4.15		
5''''''			3.35, 4.29		

Table 3-5-52: ¹H NMR spectroscopic data of oleanane-type saponins 3-5-192, 3-5-193, 3-5-198, 3-5-201, and 3-5-207.

H	3-5-192	3-5-193	3-5-198	3-5-201	3-5-207
1	1.60, 1.11	1.60, 1.10	ax 1.00, eq 1.59	0.90, 1.46	1.59, 0.98
2	2.66, 2.04	2.22, 2.01	ax 1.90, eq 2.15	1.86, 2.25	2.16, 0.90
3	4.28	4.28	3.37 dd(4.5, 12.0)	3.42	3.38
5	1.69	1.73	0.86 br d(12.0)	0.85	0.85 br d(11.6)
6	1.64, 1.36	1.65, 1.35	ax 1.32	1.76	1.48, 1.35
7	1.39, 1.74	1.34, 1.73		1.64	1.61, 1.42
9	1.92	1.92	1.79	1.79	1.81
11	2.01	1.99	2.00	1.96	1.99
12	5.60 br s	5.58 br s	5.60 br t(3.5)	5.62	5.61 br s
15	2.52 br d(12.4), 1.69	2.50 br d(12.0), 1.73	ax 2.53 dd(14.5, 4.0)	2.00, 2.23	2.56 br d(12.0)
16	5.27 br s	5.25 br s	eq 1.77 dd(14.5, 3.5)		1.81
18	3.50 dd(14.0, 3.2)	3.48 dd(14.0, 3.2)	eq 5.28 br s	5.26	5.31 br s
19	2.75 t(13.4), 1.32	2.74 t(13.4), 1.32	3.51 dd(3.5, 14.0)	3.45	3.52 dd(13.6, 3.4)
			ax 2.78 t(13.7)	1.37, 2.78	2.80 t(13.4), 1.37
21	2.39, 1.24	2.36, 1.24	eq 1.33 dd(13.7, 4.0)		
			ax 2.40, eq 1.27	1.33, 2.45	2.43, 1.28

Table 3-5-52 (continued)

H	3-5-192	3-5-193	3-5-198	3-5-201	3-5-207
22	2.37, 2.15	2.36, 2.12	ax 2.13 dt(13.5, 3.5) eq 2.39	2.24, 2.41	2.42, 2.16
23	3.66 d(10.8) 4.28 d(10.8)	3.67 d(10.4) 4.31 d(10.4)	1.24 s	1.31 s	1.29 s
24	0.92 s	0.93 s	0.97 s	0.98 s	0.99 s
25	1.01 s	0.99 s	0.95 s	0.81 s	0.93 s
26	1.16 s	1.14 s	1.13 s	1.09 s	1.14 s
27	1.76 s	1.76 s	1.82 s	1.86 s	1.85 s
29	0.94 s	0.95 s	1.00 s	1.00 s	0.99 s
30	1.02 s	1.02 s	1.06 s	1.07 s	1.06 s
1'	4.97 d(4.6)	4.93 d(4.3)	4.77 d(6.7)	5.05 d(8.0)	4.76 d(4.8)
2'	4.39	4.58	4.41 t(7.0)	4.14 d(8.9)	4.60
3'	4.07	4.25	4.15	4.32 dd(9, 9)	4.28
4'	4.21	4.35	—	4.61 dd(9, 9)	4.46
5'	3.72 d(7.2), 4.27	3.60, 4.16	3.83 br d(10.5), 4.31	4.69 d(9)	3.76 d(7.6), 4.23
1''	6.25 d(8.4)	5.29 d(8.0)	6.22 d(8.0)	6.18 d(7.2)	5.40 d(7.8)
2''	4.09	4.03	4.06 t(8.0)	4.32	4.09
3''	4.17	4.24	4.17 t(8.0)	4.25	4.15
4''	4.29	4.21	—	4.18	4.26
5''	4.06	3.97	4.08 m	3.82 dd(10, 12) 4.34 dd(4, 12)	3.66 br d(9.6)
6''	4.34, 4.70	4.36, 4.52	4.30 dd(12.0, 3.0)		4.39, 4.56
1'''	5.0 d(7.6)	6.22 d(8.0)	4.96 d(8.0)	6.29 br s	6.25 d(8.1)
2'''	3.99	4.02	3.91 t(8.0)	4.77 br d(3)	4.13
3'''	4.17	4.15	4.14 t(8.9)	4.67 dd(3, 8)	4.21
4'''	4.19	4.29	4.37 t(9.0)	4.41 dd(8, 8)	4.31
5'''	3.87	4.13	3.66 m	4.45 dq(8, 6.0)	4.11
6'''	4.35, 4.45	4.29, 4.62	4.08, 4.22	1.76 d(6.0)	4.35, 4.68
1''''		4.96 d(8.0)	5.82 br s	5.20 d(8.0)	4.98 d(7.6)
2''''		3.93	4.66 br s	4.03	4.03
3''''		4.13	4.53 dd(9.0, 3.0)	4.04	4.17
4''''		4.38	4.30 t(9.0)	4.06	4.24
5''''		3.66	4.92 dq(9.0, 6.0)	3.47 dd(10, 12) 4.21 dd(4, 12)	3.94 t(8.0)
6''''		4.10, 4.20	1.69 d(6.0)		4.09, 4.22
1'''''		5.83 br s		5.18 d(8.0)	5.86 br s
2'''''		4.66		4.02	4.68
3'''''		4.58		4.12	4.56
4'''''		4.34		4.13	4.38
5'''''		4.93		3.66 dd(10, 12) 4.29 dd(4, 12)	4.97
6'''''		1.69 d(6.0)			1.71 d(6.1)

Table 3-5-53: ^1H NMR spectroscopic data of oleanane-type saponins **3-5-205**, **3-5-206**, **3-5-208**, **3-5-209**, and **3-5-214**.

H	3-5-205	3-5-206	3-5-208	3-5-209	3-5-214
3	3.26 dd(11.5, 4.0)	3.40 dd(4.0, 11.5)	α 3.29 dd(11.2, 4.5)	α 3.30 dd(11.3, 4.3)	4.11 dd(11.5, 4.0)
12	5.58 br s	5.31 br m	5.50 br s	5.50 br s	5.39 br s
16	5.26 br s	4.48 br m	—	—	—
18	3.49 dd(14.0, 4.0)	2.96 dd(4.5, 13.6)	α 3.50 br s	α 3.51 br s	3.14 dd(4.0, 12.0)
23	1.21 s	0.95 s	0.87 s ^①	0.87 s ^①	3.64 d(11.0), 4.24 d(11.0)
24	1.06 s	1.05 s	0.97 s ^①	0.97 s ^①	1.03 s
25	0.82 s	0.84 s	1.10 s ^①	1.10 s ^①	0.88 s
26	1.09 s	0.80 s	1.12 s ^①	1.12 s ^①	1.07 s
27	1.81 s	1.36 s	1.14 s ^①	1.14 s ^①	1.14 s
29	0.98 s	0.88 s	1.19 s ^①	1.19 s ^①	0.85 s
30	1.02 s	0.96 s	1.64 s ^①	1.64 s ^①	0.84 s
1'	4.81 d(7.5)	4.32 d(7.5)	4.86 d(5.5)	4.86 d(5.7)	4.99 d(7.5)
2'	4.35	3.45	—	—	4.67
3'	4.22	3.31	—	—	4.13
4'	3.98	3.57	—	—	3.39
5'	3.82	3.22	—	—	3.51 d(11.6), 4.08 d(11.6)
6'	4.43	3.52, 3.57	—	—	—
1''	5.70 d(7.5)	5.21 bs	6.11 br s	6.16 br s	5.49 d(8.0)
2''	4.06	3.89	—	—	4.03
3''	4.25	3.66	—	—	3.65
4''	4.12	3.36	—	—	4.11
5''	3.84	3.98	—	—	4.15
6''	4.44	1.28	1.61 d(6.2)	1.62 d(6.8)	4.38 (ov)
1'''	5.34 d(7.5)	5.47 d(3.7)	6.30 d(7.9)	5.09 d(8.1)	5.22 d(8.0)
2'''	4.00	3.57	—	—	3.95
3'''	4.18	3.92	—	—	4.18
4'''	4.13	3.33	—	—	4.15
5'''	4.18	3.30, 3.59	—	—	3.90
6'''	4.34	—	—	—	4.32
1''''	6.30 d(8.0)	4.91 bs	—	6.36 d(7.5)	6.29 d(8.0)
2''''	4.13	3.82	—	—	4.15
3''''	4.23	3.93	—	—	4.24
4''''	4.30	3.61	—	—	4.31
5''''	3.98	3.70	—	—	3.98
6''''	4.52	1.32	—	—	4.49
1'''''	—	4.50 d(7.4)	—	—	—
2'''''	—	3.28	—	—	—
3'''''	—	3.55	—	—	—
4'''''	—	3.61	—	—	—
5'''''	—	3.45, 3.92	—	—	—
6'''''	—	—	—	—	—

^① The data of methyls in the literature were not assigned, and here, the deployments are only to display the data.

Table 3-5-54: ^1H NMR spectroscopic data of oleanane-type saponins **3-5-210**, **3-5-212**, **3-5-213**, **3-5-216**, and **3-5-220**.

H	3-5-210	3-5-212	3-5-213	3-5-216	3-5-220
1	1.03, 1.56	ax 1.05, eq 1.54	ax 1.05 eq 1.56 dt(13.5, 3.7)	—	0.92, 1.47
2	1.97, 2.16	ax 1.98, eq 2.19	ax 2.0, eq 2.19	—	1.80, 2.01
3	4.14	4.27	4.25	3.60 m	3.07 dd(12.0, 4.0)
5	1.58	1.69	1.71	—	0.82
6	1.36, 1.70	—	—	—	1.33, 1.44
7	1.27	—	—	—	1.44, 1.83
9	1.75	1.77	1.75	—	2.15
11	1.93	1.92	1.90	1.90 m	1.95
12	5.43 t(3.3)	5.40 brt(3)	5.42 brt(3.5)	5.25 t(3.2)	5.79 t(3.3)
15	1.10 brd(13.3) 2.31 dt(13.3, 3.5)	—	—	—	1.44 2.30 dt(14.0, 3.3)
16	1.96 2.04 dt(13.3, 3.0)	—	—	—	1.96 2.10 dt(14.0, 3.3)
18	3.19 dd(14.7, 4.0)	3.16 dd(13.5, 3.7)	3.14	—	3.28 dd(14.7, 3.3)
19	1.23, 1.75	ax 1.73	ax 1.67	—	1.32, 1.72
21	1.08, 1.33	—	—	—	1.10, 1.28
22	1.73, 1.84	—	—	—	1.73, 1.94
23	3.73 d(10.0), 4.20	3.62, 4.08	3.67 d(10.0), 4.09	3.58 m	1.16 s
24	1.02 s	1.00 s	1.02 s	0.71 s	1.02 s
25	0.97 s	0.95 s	0.98 s	0.98 s	0.90 s
26	1.12 s	1.06 s	1.10 s	0.80 s	1.11 s
27	1.18 s	1.18 s	1.17 s	1.16 s	3.75 d(10.4), 4.01
29	0.90 s	0.88 s	0.85 s	0.88 s	0.83 s
30	0.89 s	0.91 s	0.89 s	0.90 s	0.91 s
1'	5.15 d(6.0)	5.10 d(6.2)	5.12 d(6.2)	4.32 d(6.6)	4.92 d(6.0)
2'	4.55 t(6.3)	4.56 t(6.5)	4.55 t(6.5)	3.54 m	4.55 t(6.0)
3'	4.24	4.11 dd(6.5, 3.7)	4.10 dd(6.5, 3.7)	3.40 m	4.35
4'	4.29	4.17	4.16	3.78 m	4.37
5'	3.70 d(11.3), 4.27	3.71 d(11.0)	3.71 dd(12.3, 1.3)	3.84 m	3.8 d(10.0), 4.28
6'		4.25 dd(11.0, 1.5)	4.26		5.16 d(8.0)
1''	5.17 d(8.0)	6.24 d(1.5)	6.21 d(1.5)	5.35 d(8.0)	4.07 t(8.7)
2''	4.05 t(8.8)	4.69 dd(2.5, 1.5)	4.71 dd(2.5, 1.5)	3.32 m	4.17 t(9.0)
3''	4.15 t(9.0)	4.61 dd(9.0, 3.0)	4.62 dd(9.0, 3.0)	3.42 m	4.31 t(9.5)
4''	4.20 t(8.0)	4.26 t(9.0)	4.27 t(9.0)	3.44 m	3.80 m
5''	3.8 m	4.65	4.65 dq(9.0, 6.0)	3.52 m	4.41 d(3.3)

Table 3-5-54 (continued)

H	3-5-210	3-5-212	3-5-213	3-5-216	3-5-220
6''	4.34 dd(10.7, 3.0) 4.44 br d(10.7)	1.64 d(6.0)	1.64 d(6.0)	4.10 m	6.26 d(8.0)
1'''	6.31 d(8.0)	6.10 d(8.0)	6.09 d(8.0)	4.34 d(7.8)	4.14 t(8.0)
2'''	4.17 t(8.0)	4.20	4.27 t(8.0)	3.21 m	4.21 t(8.5)
3'''	4.25 t(9.0)	4.20	4.22 t(8.0)	3.36 m	4.31 t(8.5)
4'''	4.33 t(8.0)	4.22	4.19	3.34 m	4.13 m
5'''	4.01 m	3.98 m	4.04 m	3.25 m	4.36 dd(11.0, 3.0) 4.70 dd(11.0, 1.5)
6'''	4.37 dd(10.7, 3.0) 4.45 dd(11.0, 2.0)	4.28, 4.59 dd(12.0, 2.5)	4.28, 4.61	3.84 m	5.03 d(8.0)
1''''		5.36 d(7.4)	6.36 d(2.5)	4.47 d(7.6)	3.99 t(8.0)
2''''		4.03 t(8.0)	4.97	3.28 m	4.17 t(8.5)
3''''		4.14 t(8.0)	4.90	3.42 m	4.19 t(9.0)
4''''		4.23	4.81	3.30 m	3.88 m
5''''		3.69 t(12.0) 4.37 dd(12.0, 4.0)	4.28 dd(11.7, 4.3) 4.40 dd(11.7, 3.7)	3.25 m	4.35 dd(11.0, 3.5) 4.47 dd(11.0, 2.0)
6''''				3.82 m	
1'''''		4.95 d(8.0)	4.96		
2'''''		3.93 t(8.0)	3.94 t(8.0)		
3'''''		4.12 t(8.0)	4.13 t(8.0)		
4'''''		4.37 t(8.0)	4.37 t(8.0)		
5'''''		3.67 m	3.66 m		
6'''''		4.08 dd(12.0, 2.0) 4.21 d(12.0)	4.09, 4.21		
1''''''		5.81 br s	5.82 d(1.5)		
2''''''		4.65 dd(2.5, 1.5)	4.65 dd(2.5, 1.5)		
3''''''		4.52 dd(9.0, 3.0)	4.52 dd(9.0, 3.0)		
4''''''		4.30 t(9.0)	4.30 t(9.0)		
5''''''		4.91 dq(9.0, 6.0)	4.90 dq(9.0, 6.0)		
6''''''		1.69 d(6.0)	1.69 d(6.0)		

Table 3-5-55: ¹H NMR spectroscopic data of oleanane-type saponins 3-5-211, 3-5-215, 3-5-217~3-5-219, and 3-5-221.

H	3-5-211	3-5-215	3-5-217	3-5-218	3-5-219	3-5-221
3	3.62 m	4.13 (ov)	4.18	3.64 dd(4.5, 11.1)	—	3.65 s
11	1.88					

Table 3-5-55 (continued)

H	3-5-211	3-5-215	3-5-217	3-5-218	3-5-219	3-5-221
12	5.24 t ^①	5.42 br s	5.38	5.35 t(3.4)	5.41 m	5.51 s
18	—	3.23 br d(13)	3.15 dd(13.5, 3.1)	2.90 dd(3.0, 11.0)	2.88 dd(13.0, 2.9)	3.34 dd(13.3, 4.0)
23	—	3.66 d(11) 4.19 (ov)	3.71 d(11.1) 4.34	—	3.30 d(11.8) 3.70 d(11.8)	0.93 s ^②
24	0.71 s	1.02 s	1.09 s	0.73 s	0.74 s	1.03 s ^②
25	0.97 s	0.93 s	0.94 s	1.02 s	1.00 s	1.12 s ^②
26	0.79 s	1.01 s	1.10 s	0.83 s	0.82 s	1.20 s ^②
27	1.16 s	1.25 s	1.18 s	1.21 s	1.20 s	1.21 s ^②
29	0.90 s	0.97 s	0.86 s	0.94 s	0.96 s	3.57 s(2H)
30	0.93 s	0.98 s	0.88 s	0.98 s	0.94 s	1.25 s ^②
1'	4.53 d ^③	4.94 d(6.7)	5.18 d(7.4)	4.53 d(3.0)	4.45 d(7.5)	6.31 d(7.7)
2'	3.86 m	4.64 t(9)	4.27 t(8.0)	3.67 dd(3.0, 8.5)	—	—
3'	3.24 m	4.32 (ov)	4.30	3.67 dd(3.0, 8.5)	—	—
4'	3.86 m	4.49 br s	4.53	3.79 m	—	—
5'	3.64 m	3.69 d(11) 4.17 (ov)	4.47	3.54 dd(12.0, 3.5) 3.87 dd(2.0, 12.0)	—	—
1''	4.64 d(7.7)	5.49 d(7.8)	5.40 d(8.0)	5.20 d(1.5)	4.59 d(8.1)	5.04 d(7.7)
2''	3.22 m	3.99 (ov)	4.12 t(8.0)	4.30 dd(1.5, 2.5)	—	—
3''	3.40 m	4.19 (ov)	4.22	3.91 dd(2.5, 9.0)	—	—
4''	3.98 m	4.15 (ov)	4.29	3.59 t(9.0)	—	—
5''	3.28 m	3.71 m	3.92	3.95 m	—	—
6''	3.84 m	4.27 (ov) 4.36 (ov)	4.42 4.49 d(12.0)	1.29 d(6.5)	—	—
1'''	4.49 d(7.7)	5.33 d(7.9)	6.21 d(8.0)	4.51 d(8.0)	4.78 d(8.1)	5.89 s
2'''	3.24 m	3.95 t(9)	4.10	3.65 dd(8.0, 9.3)	—	—
3'''	3.40 m	4.19 (ov)	4.18	3.53 dd(9.3, 3.5)	—	—
4'''	3.30 m	4.18 (ov)	4.27 t(8.0)	3.85 m	—	—
5'''	3.42 m	3.92 m	4.10	3.58 m	—	—
6'''	3.84 m	4.33 (ov) 4.47 d(12)	4.31 4.64	3.74 dd(4.5, 12.0) 3.80 dd(2.5, 12.0)	—	1.75 d(6.2)
1''''	5.33 d(8.1)	6.23 d(8.1)	4.97 d(8.0)	5.37 d(8.0)	5.41 d(8.4)	
2''''	3.34 m	4.11 t(9)	3.92	3.37 dd(8.0, 9.0)	—	

Table 3-5-55 (continued)

H	3-5-211	3-5-215	3-5-217	3-5-218	3-5-219	3-5-221
3 ^{''''}	3.40 m	4.19 (ov)	4.12	3.44 t(9.0)	—	
4 ^{''''}	3.42 m	4.20 (ov)	4.37	3.44 t(9.0)	—	
5 ^{''''}	3.30 m	4.08 (ov)	3.66 m	3.56 ddd(2.5, 4.5, 9.0)	—	
6 ^{''''}	3.78 m	4.31 (ov)	4.07	3.83 dd(4.5, 12.0)	—	
		4.66 d(12)	4.20	4.12 dd(2.5, 12.0)		
1 ^{'''''}	4.40 d(7.9)	4.99 d(7.9)	5.81 br s	4.45 d(8.0)		
2 ^{'''''}	3.24 m	3.93 t(9)	4.65 d(2.5)	3.27 dd(8.0, 9.0)		
3 ^{'''''}	3.46 m	4.14 (ov)	4.52 dd(9.0, 3.5)	3.50 t(9.0)		
4 ^{'''''}	3.54 m	4.38 (ov)	4.30	3.57 t(9.0)		
5 ^{'''''}	3.28 m	3.71 m	4.91 dq(9.0, 6.0)	3.33 ddd(2.0, 4.5, 9.0)		
6 ^{'''''}	3.64 m	4.10 (ov)	1.68 d(6.0)	3.69 dd(4.5, 9.0)		
		4.21 (ov)		3.87 dd(2.0, 9.0)		
1 ^{''''''}	4.84 d(1.0)	5.85 br s		4.88 d(1.5)		
2 ^{''''''}	3.84 m	4.61 br s		3.87 dd(1.5, 2.5)		
3 ^{''''''}	3.64 m	4.47 (ov)		3.66 dd(2.5, 9.0)		
4 ^{''''''}	3.42 m	4.26 (ov)		3.45 t(9.0)		
5 ^{''''''}	3.96 m	4.85 m		4.00 m		
6 ^{''''''}	1.27 d(6.2)	1.71 d(6)		1.31 d(6.5)		

① Twisted triplets.

② The data of methyls in the literature were not assigned, and here, the deployments are only to display the data.

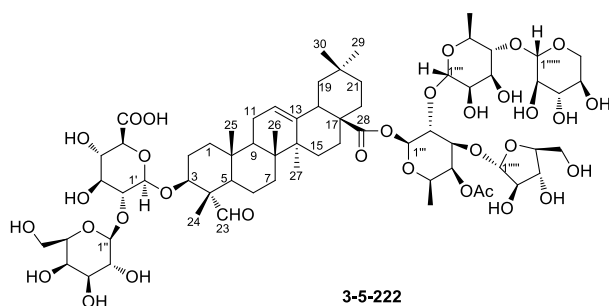
③ Unresolved doublet.

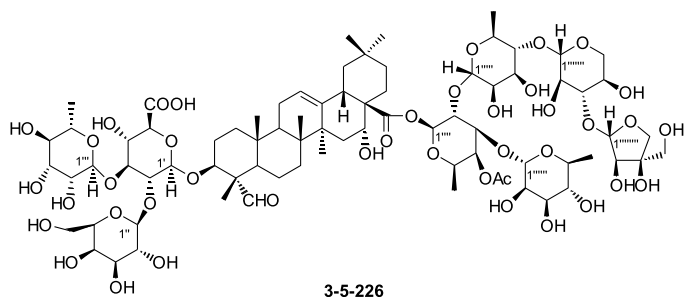
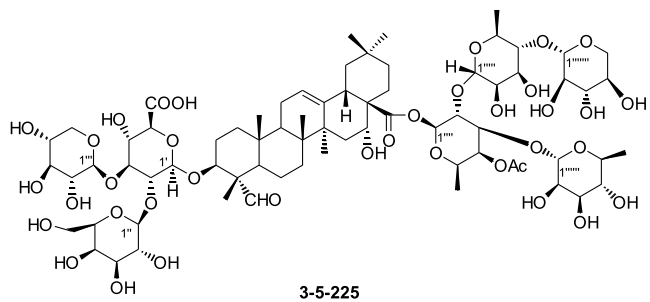
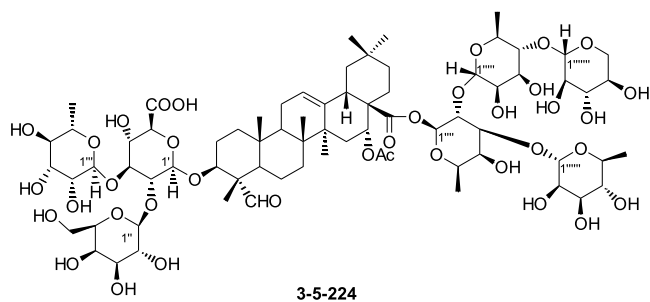
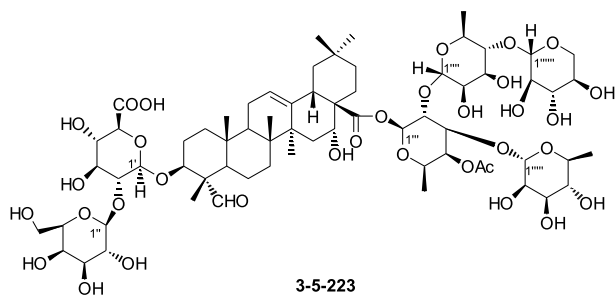
Table 3-5-56: Cos, MFs, and TSs of oleanane-type saponins 3-5-222~3-5-248.

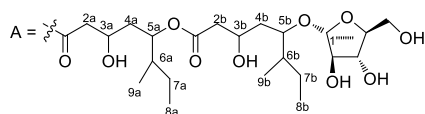
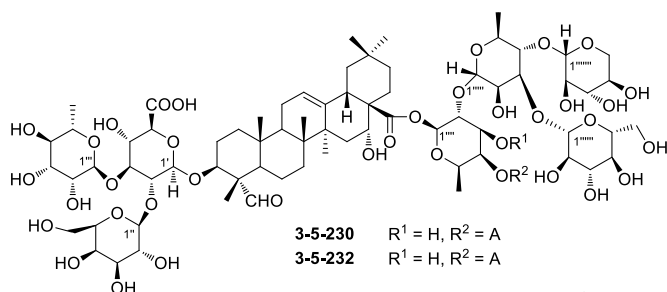
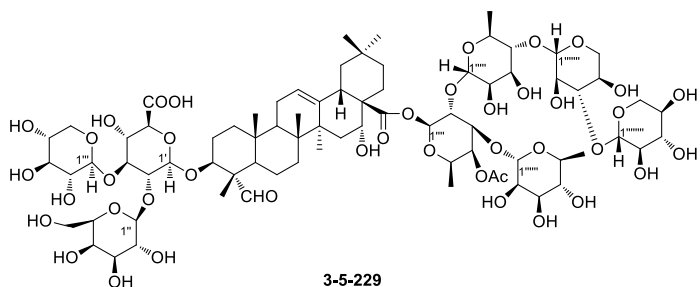
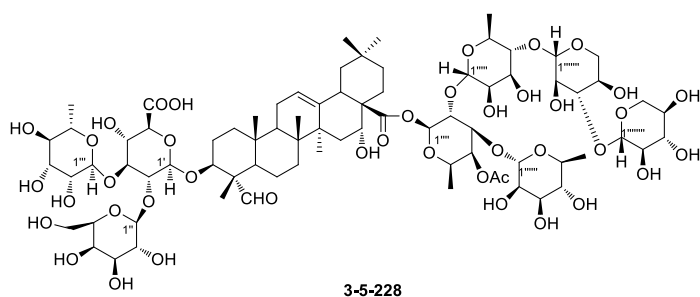
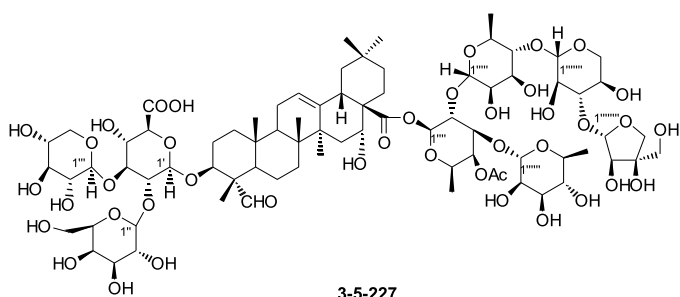
No.	Compounds	MFs	Test solvents	References
3-5-222	vaccaroside G	C ₆₆ H ₁₀₂ O ₃₂	C ₅ D ₅ N	[167]
3-5-223	—	C ₆₇ H ₁₀₄ O ₃₃	CD ₃ OD	[168]
3-5-224	—	C ₇₃ H ₁₁₄ O ₃₇	CD ₃ OD	[168]
3-5-225	—	C ₇₂ H ₁₁₂ O ₃₇	CD ₃ OD	[168]

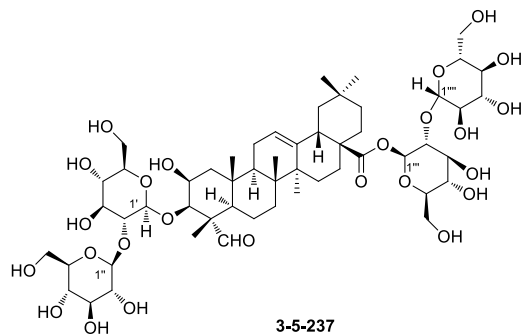
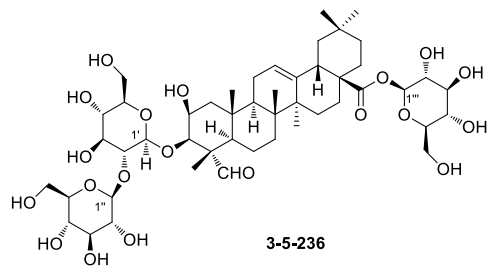
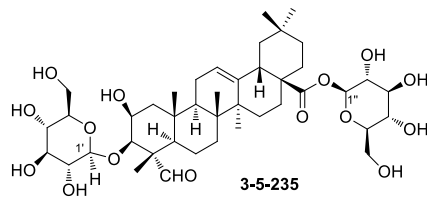
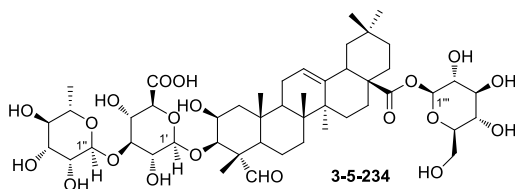
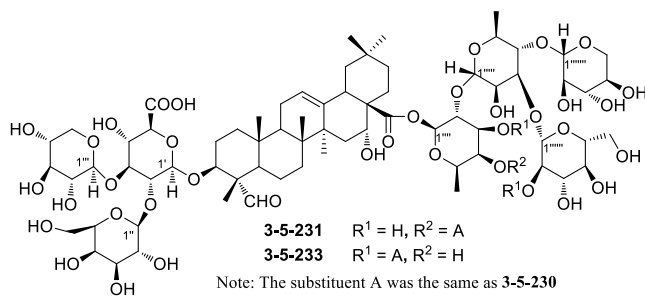
Table 3-5-56 (continued)

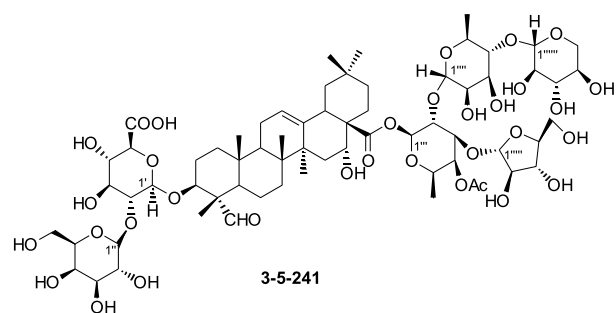
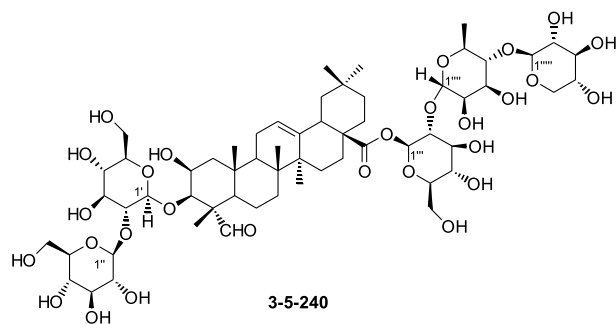
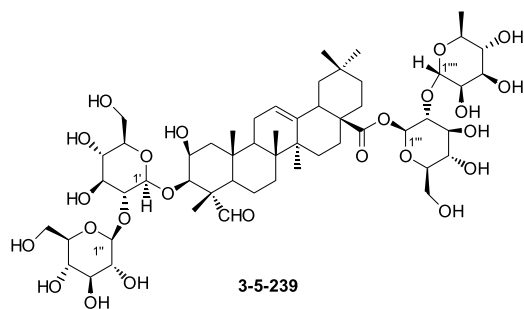
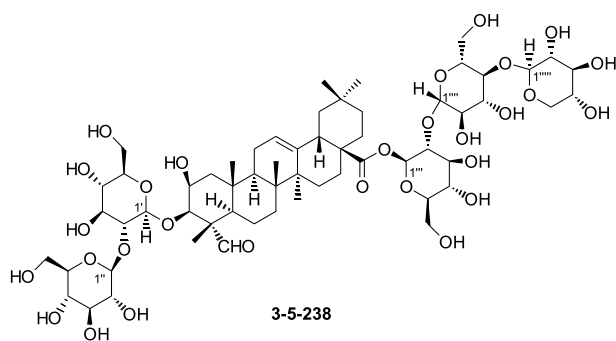
No.	Compounds	MFs	Test solvents	References
3-5-226	—	C ₇₈ H ₁₂₂ O ₄₁	CD ₃ OD	[168]
3-5-227	—	C ₇₇ H ₁₂₀ O ₄₁	CD ₃ OD	[168]
3-5-228	—	C ₇₈ H ₁₂₂ O ₄₁	CD ₃ OD	[168]
3-5-229	—	C ₇₇ H ₁₂₀ O ₄₁	CD ₃ OD	[168]
3-5-230	—	C ₉₈ H ₁₅₈ O ₄₇	CD ₃ OD	[169]
3-5-231	—	C ₉₈ H ₁₅₂ O ₄₇	CD ₃ OD	[169]
3-5-232	—	C ₉₈ H ₁₅₈ O ₅₁	CD ₃ OD	[169]
3-5-233	—	C ₉₈ H ₁₅₂ O ₅₁	CD ₃ OD	[169]
3-5-234	3-β-O-[α-L-rhamnopyranosyl-(1→3)-β-D-glucuronopyranosyl]-2β,3β-dihydroxy-23-oxo-olean-12-en-28-oic acid-28-O-β-D-glucopyranosyl ester	C ₄₈ H ₇₄ O ₂₀	CD ₃ OD	[148]
3-5-235	polygalasaponin XII	C ₄₂ H ₆₆ O ₁₅	C ₅ D ₅ N	[152]
3-5-236	polygalasaponin XIV	C ₄₈ H ₇₆ O ₂₀	C ₅ D ₅ N	[152]
3-5-237	polygalasaponin XV	C ₅₄ H ₈₆ O ₂₅	C ₅ D ₅ N	[152]
3-5-238	polygalasaponin XVI	C ₅₉ H ₉₄ O ₂₉	C ₅ D ₅ N	[152]
3-5-239	polygalasaponin XVII	C ₅₄ H ₈₆ O ₂₅	C ₅ D ₅ N	[152]
3-5-240	polygalasaponin XVIII	C ₅₉ H ₉₄ O ₂₈	C ₅ D ₅ N	[152]
3-5-241	vaccaroside E	C ₆₆ H ₁₀₂ O ₃₃	CD ₃ OD	[167]
3-5-242	3-O-[β-D-galactopyranosyl-(1→2)-β-D-glucuronopyranosyl]-28-O-[β-D-glucuronopyranosyl-(1→2)-α-L-rhamnopyranosyl-β-D-4-O-trans-p-methoxycinnamoyl-fucopyranosyl] quillaic acid	C ₇₀ H ₁₀₂ O ₃₁	DMSO-d ₆	[170]
3-5-243	—	C ₉₀ H ₁₄₄ O ₄₄	CD ₃ OD	[171]
3-5-244	—	C ₈₉ H ₁₄₂ O ₄₄	CD ₃ OD	[171]
3-5-245	—	C ₉₅ H ₁₅₂ O ₄₈	CD ₃ OD	[171]
3-5-246	—	C ₉₄ H ₁₅₀ O ₄₈	CD ₃ OD	[171]
3-5-247	ilexoside XXXIII	C ₃₆ H ₅₄ O ₁₁	C ₅ D ₅ N	[172]
3-5-248	spinoside C ₄	C ₄₈ H ₇₆ O ₁₉	C ₅ D ₅ N	[158]

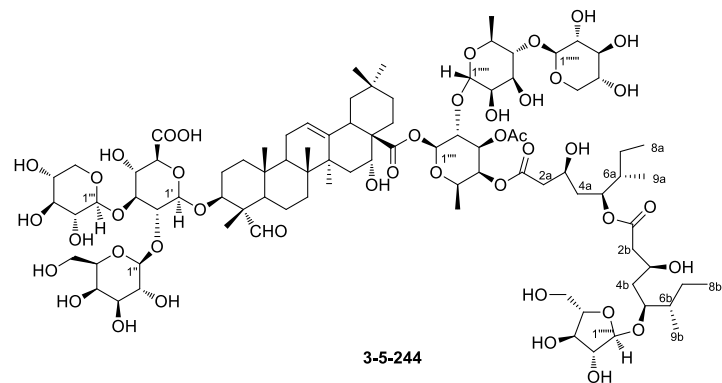
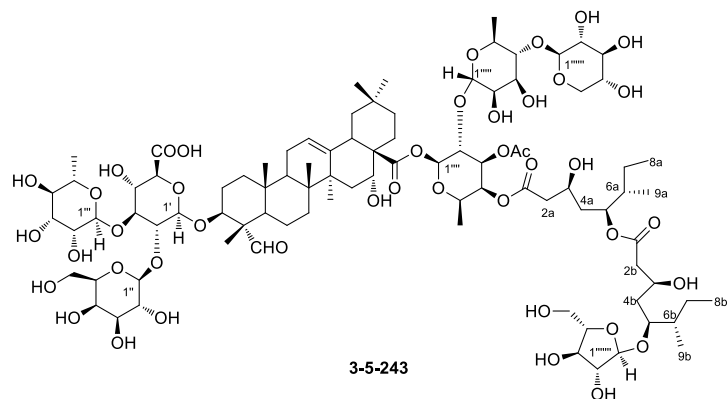
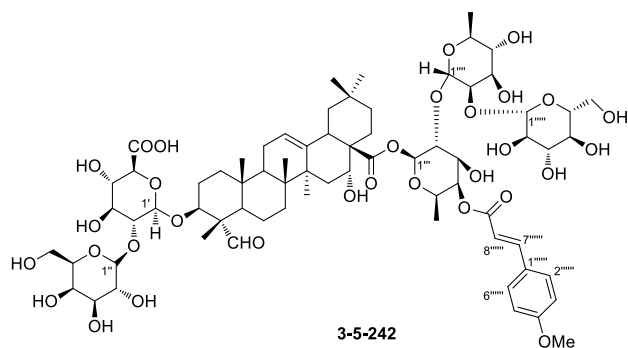












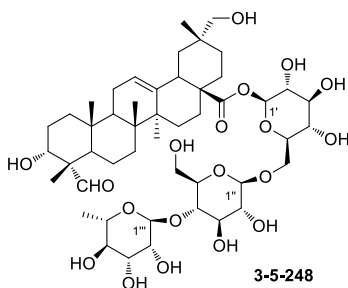
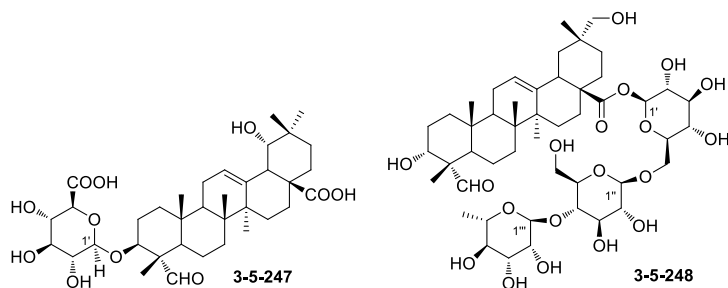
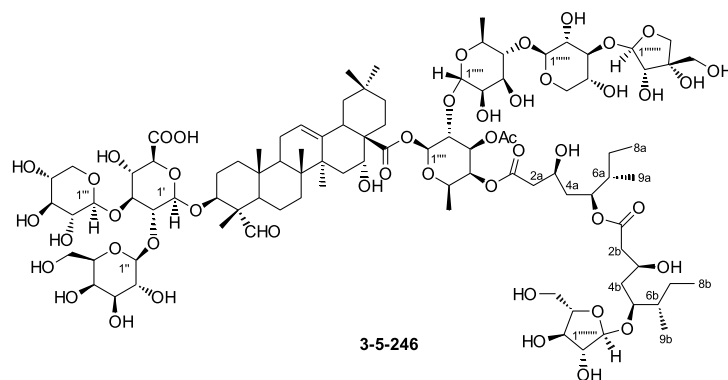
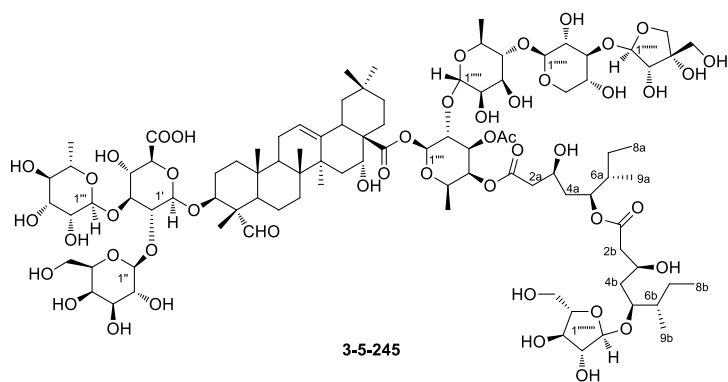


Table 3-5-57: ^1H NMR spectroscopic data of oleanane-type saponins 3-5-222~3-5-226.

H	3-5-222	3-5-223	3-5-224	3-5-225	3-5-226
1	—	1.11, 1.72	1.10, 1.71	1.11, 1.72	1.11, 1.72
2	—	2.00, 1.78	2.00, 1.77	1.97, 1.79	2.09, 1.78
3	4.05 m	3.89	3.86	3.87	3.87

Table 3-5-57 (continued)

H	3-5-222	3-5-223	3-5-224	3-5-225	3-5-226
5	—	1.33	1.32	1.32	1.35
6	—	0.94, 1.48	0.93, 1.51	0.96, 1.50	0.94, 1.48
7	—	1.53, 1.31	1.55, 1.31	1.50, 1.31	1.52, 1.37
9	—	1.74	1.75	1.75	1.75
11	—	1.93, 1.93	1.90, 1.93	1.93, 1.92	1.94, 1.93
12	5.39 br s	5.34	5.34	5.34	5.34
15	—	1.69, 1.42	1.68, 1.42	1.70, 1.43	1.62, 1.45
16	—	4.43	4.44	4.44	4.45
18	3.08 dd(14.1, 4.2)	2.94	2.99	2.94	2.95
19	—	2.30, 1.06	2.30, 1.06	2.30, 1.06	2.31, 1.07
21	—	1.92, 1.18	1.92, 1.17	1.93, 1.18	1.93, 1.17
22	—	1.91, 1.83	1.89, 1.82	1.91, 1.85	1.94, 1.77
23	9.96 s	9.46 s	9.45 s	9.45 s	9.47 s
24	1.42 s	1.16 s	1.17 s	1.17 s	1.16 s
25	0.82 s	1.01 s	1.00 s	1.00 s	1.01 s
26	1.04 s	0.80 s	0.79 s	0.80 s	0.79 s
27	1.25 s	1.40 s	1.40 s	1.40 s	1.40 s
29	0.87 s	0.88 s	0.88 s	0.88 s	0.88 s
30	0.89 s	0.96 s	0.96 s	0.96 s	0.95 s
1'	4.92 d(7.4)	4.40	4.45	4.45	4.39
2'	4.21	3.47	3.63	3.66	3.62
3'	4.28	3.54	3.64	3.69	3.63
4'	4.51	3.49	3.48	3.56	3.55
5'	4.52	3.72	3.77	3.79	3.67
1''	5.22 d(7.6)	4.50	4.46	4.80	4.47
2''	4.54	3.55	3.56	3.45	3.51
3''	4.14	3.46	3.48	3.43	3.49
4''	—	3.83	3.82	3.82	3.83
5''	—	3.52	3.47	3.49	3.47
6''	4.52(2H)	3.74, 3.80	3.73, 3.79	3.73, 3.78	3.73, 3.78
1'''	5.99 d(8.3)	5.43	5.04	4.58	5.06
2'''	4.52	3.85	4.02	3.24	4.01
3'''	4.24	3.95	3.65	3.30	3.67
4'''	5.78 d(3.3)	5.18	3.40	3.50	3.38
5'''	3.96	3.87	3.95	3.24, 3.91	4.03
6'''	1.18 d(6.5)	1.05	1.25		1.24
OAc	2.01 s(6'''-OAc)				
1''''	6.00 s	5.08	5.44	5.44	5.44
2''''	4.74 s	3.84	3.85	3.85	3.88
3''''	4.58 dd(9.1, 3.0)	3.78	3.95	3.96	3.97
4''''	4.30	3.55	5.18	5.18	5.19
5''''	4.38	3.77	3.87	3.87	3.86
6''''	1.78 d(6.1)	1.30	1.06	1.06	1.04

Table 3-5-57 (continued)

H	3-5-222	3-5-223	3-5-224	3-5-225	3-5-226
1 ^{''''}	5.72 s	4.89	5.08	5.08	5.12
2 ^{''''}	4.88 m	3.87	3.83	3.83	3.84
3 ^{''''}	4.82 m	3.55	3.78	3.79	3.76
4 ^{''''}	4.71 m	3.37	3.55	3.38	3.54
5 ^{''''}	4.18, 4.34	3.58	3.77	3.77	3.77
6 ^{''''}		1.22	1.30	1.31	1.33
1 ^{'''''}	5.01 d(7.6)	4.48	4.89	4.89	4.89
2 ^{'''''}	4.02	3.20	3.87	3.87	3.87
3 ^{'''''}	4.05	3.31	3.56	3.56	3.55
4 ^{'''''}	4.16	3.46	3.38	3.37	3.37
5 ^{'''''}	3.51 t(10.7), 4.22	3.18, 3.85	3.58	3.57	3.57
6 ^{'''''}			1.23	1.23	1.24
1 ^{''''''}			4.48	4.48	4.48
2 ^{''''''}			3.20	3.20	3.30
3 ^{''''''}			3.31	3.32	3.39
4 ^{''''''}			3.47	3.47	3.49
5 ^{''''''}			3.19, 3.85	3.19, 3.85	3.19, 3.85
1 ^{'''''''}					5.25
2 ^{'''''''}					4.07
4 ^{'''''''}					3.81, 4.16
5 ^{'''''''}					3.67

Table 3-5-58: ¹H NMR spectroscopic data of oleanane-type saponins 3-5-227~3-5-231.

H	3-5-227	3-5-228	3-5-229	3-5-230	3-5-231
1	1.11, 1.73	1.11, 1.72	1.10, 1.73	1.11, 1.72	1.12, 1.72
2	1.97, 1.77	2.05, 1.79	2.04, 1.79	1.98, 1.79	1.97, 1.79
3	3.87	3.86	3.86	3.86	3.87
5	1.34	1.34	1.34	1.33	1.33
6	0.93, 1.52	0.93, 1.50	0.94, 1.48	0.95, 1.47	0.94, 1.47
7	1.57, 1.36	1.53, 1.37	1.52, 1.36	1.54, 1.29	1.54, 1.29
9	1.75	1.75	1.75	1.75	1.76
11	1.94, 1.94	1.94, 1.94	1.93, 1.93	1.93, 1.93	1.94, 1.94
12	5.34	5.34	5.34	5.33	5.33
15	1.64, 1.45	1.63, 1.45	1.63, 1.45	1.74, 1.41	1.74, 1.42
16	4.45	4.44	4.44	4.45	4.46
18	2.93	2.95	2.95	2.93	2.95
19	2.31, 1.07	2.31, 1.07	2.30, 1.06	2.30, 1.05	2.31, 1.07
21	1.94, 1.18	1.94, 1.18	1.92, 1.17	1.96, 1.19	1.96, 1.17
22	1.93, 1.90	1.94, 1.78	1.93, 1.78	1.84, 1.83	1.82, 1.93

Table 3-5-58 (continued)

H	3-5-227	3-5-228	3-5-229	3-5-230	3-5-231
23	9.47 s	9.44 s	9.44 s	9.44 s	9.45 s
24	1.18 s	1.17 s	1.15 s	1.17 s	1.17 s
25	1.01 s	1.02 s	1.01 s	1.02 s	1.01 s
26	0.79 s	0.79 s	0.79 s	0.81 s	0.80 s
27	1.40 s	1.41 s	1.40 s	1.40 s	1.40 s
29	0.88 s	0.88 s	0.88 s	0.89 s	0.89 s
30	0.95 s	0.95 s	0.95 s	0.97 s	0.97 s
1'	4.45	4.41	4.40	4.46	4.46
2'	3.65	3.62	3.65	3.63	3.65
3'	3.68	3.63	3.68	3.64	3.68
4'	3.55	3.55	3.53	3.60	3.56
5'	3.72	3.69	3.60	3.80	3.80
1''	4.80	4.46	4.80	4.46	4.80
2''	3.47	3.51	3.48	3.48	3.45
3''	3.44	3.48	3.45	3.47	3.42
4''	3.83	3.83	3.84	3.82	3.81
5''	3.49	3.47	3.49	3.47	3.49
6''	3.74, 3.77	3.47, 3.78	3.74, 3.77	3.73, 3.79	3.72, 3.77
1'''	4.58	5.04	4.62	5.02	4.58
2'''	3.23	4.01	3.23	4.01	3.23
3'''	3.31	3.66	3.31	3.65	3.30
4'''	3.51	3.39	3.51	3.40	3.50
5'''	3.25, 3.92	3.98	3.24, 3.91	3.92	3.23, 3.90
6'''		1.23		1.22	
1''''	5.44	5.44	5.44	5.34	5.34
2''''	3.88	3.88	3.88	3.67	3.66
3''''	3.95	3.96	3.96	3.85	3.85
4''''	5.18	5.18	5.18	5.12	5.12
5''''	3.87	3.87	3.87	3.84	3.84
6''''	1.06	1.05	1.05	1.09	1.10
1'''''	5.11	5.12	5.12	5.17	5.17
2'''''	3.84	3.84	3.84	4.25	4.23
3'''''	3.76	3.76	3.76	3.93	3.93
4'''''	3.54	3.54	3.54	3.67	3.67
5'''''	3.77	3.76	3.76	3.82	3.81
6'''''	1.33	1.32	1.32	1.27	1.27
1''''''	4.88	4.89	4.89	4.53	4.53
2''''''	3.86	3.86	3.87	3.29	3.29
3''''''	3.56	3.56	3.55	3.26	3.26
4''''''	3.38	3.37	3.38	3.31	3.31
5''''''	3.57	3.57	3.57	3.31	3.31
6''''''	1.22	1.21	1.22	3.68, 3.84	3.68, 3.84
1'''''''	4.48	4.53	4.53	4.69	4.69
2'''''''	3.30	3.35	3.35	3.10	3.10

Table 3-5-58 (continued)

H	3-5-227	3-5-228	3-5-229	3-5-230	3-5-231
3''''''	3.39	3.48	3.49	3.26	3.26
4''''''	3.49	3.52	3.53	3.47	3.47
5''''''	3.21, 3.89	3.21, 3.89	3.22, 3.89	3.16, 3.82	3.15, 3.82
1''''''	5.25	4.52	4.52	4.98	4.98
2''''''	4.06	3.38	3.38	3.96	3.96
3''''''		3.39	3.39	3.85	3.85
4''''''	3.81, 4.15	3.56	3.50	4.03	4.02
5''''''	3.67	3.28, 3.94	3.29, 3.94	3.63, 3.76	3.63, 3.75
2a				2.62, 2.62	2.63, 2.63
3a				4.04	4.03
4a				1.67, 1.83	1.67, 1.84
5a				5.18	5.19
6a				1.61	1.62
7a				1.16, 1.50	1.16, 1.49
8a				0.93	0.93
9a				0.93	0.94
2b				2.52, 2.52	2.52, 2.52
3b				4.29	4.30
4b				1.51, 1.61	1.50, 1.62
5b				3.80	3.80
6b				1.62	1.62
7b				1.10, 1.62	1.11, 1.61
8b				0.93	0.93
9b				0.88	0.91

Table 3-5-59: ¹H NMR spectroscopic data of oleanane-type saponins 3-5-232~3-5-235 and 3-5-241.

H	3-5-232	3-5-233	3-5-234	3-5-235	3-5-241
1	1.11, 1.70	1.10, 1.70	—	—	—
2	1.98, 1.79	1.98, 1.78	4.38 ddd, (3.0, 3.7, 4.0)	4.73 m	—
3	3.86	3.86	5.31 t(3.4)	4.12 d(3.0)	4.10 m
5	1.33	1.31	—	—	—
6	0.95, 1.47	0.96, 1.48	—	—	—
7	1.54, 1.29	1.52, 1.30	—	—	—
9	1.74	1.74	—	—	—
11	1.93, 1.93	1.92, 1.92	—	—	—
12	5.33	5.32	—	5.43 t-like	5.76 brs
15	1.74, 1.41	1.74, 1.40	—	—	—
16	4.45	4.47	—	—	5.22 brt
18	2.93	2.95	2.90 dd(4.4, 13.6)	3.18 dd(14, 4)	3.38 dd(13.2, 4.4)
19	2.30, 1.05	2.31, 1.06	—	—	—

Table 3-5-59 (continued)

H	3-5-232	3-5-233	3-5-234	3-5-235	3-5-241
21	1.96, 1.19	1.95, 1.18	—	—	—
22	1.91, 1.83	1.83, 1.92	—	—	—
23	9.44 s	9.45 s	9.39 s	9.72 s	9.92 s
24	1.17 s	1.18 s	1.35 s	1.68 s	1.43 s
25	1.00 s	1.01 s	1.33 s	1.48 s	0.83 s
26	0.78 s	0.77 s	0.85 s	1.10 s	1.09 s
27	1.40 s	1.39 s	1.21 s	1.24 s	1.78 s
29	0.89 s	0.89 s	0.95 s	0.92 s	0.98 s
30	0.97 s	0.96 s	0.97 s	0.89 s	1.02 s
1'	4.46	4.43	4.30 d(8.0)	4.89 d(8)	4.96 d(7.3)
2'	3.63	3.66	—	3.87 t(8.5)	4.28
3'	3.64	3.69	—	—	4.32
4'	3.60	3.55	—	—	4.57
5'	3.80	3.75	—	—	4.55
1''	4.45	4.80	5.19 d(1.5)	6.29 d(8)	5.26 d(7.3)
2''	3.50	3.46	3.92 d(3.7)	—	4.58
3''	3.47	3.43	—	—	4.16
4''	3.82	3.81	—	—	4.60
5''	3.47	3.49	4.15 m	—	4.28
6''	3.73, 3.79	3.73, 3.66	1.26 d(6.5)	—	4.57(2H)
1'''	5.04	4.59	5.42 d(8.2)	—	6.01 d(8.4)
2'''	4.01	3.23	—	—	4.41
3'''	3.66	3.30	—	—	4.19
4'''	3.39	3.51	—	—	5.81 d(2.7)
5'''	3.92	3.24, 3.91	—	—	4.02
6'''	1.22	—	3.85 dd(3.0, 12.0)	—	1.20 d(6.2)
1''''	5.42	5.43	—	—	6.06 s
2''''	4.06	4.08	—	—	4.74
3''''	4.93	4.93	—	—	4.64 dd(8.8, 3.2)
4''''	3.80	3.82	—	—	4.44
5''''	3.76	3.77	—	—	4.47
6''''	1.21	1.22	—	—	1.75 d(5.9)
1'''''	5.04	5.05	—	—	5.76 s
2'''''	4.00	4.01	—	—	4.90
3'''''	3.79	3.79	—	—	4.87
4'''''	3.64	3.64	—	—	4.73
5'''''	3.77	3.78	—	—	4.16, 4.35
6'''''	1.28	1.29	—	—	—
1''''''	4.49	4.51	—	—	5.21 d(8.0)
2''''''	3.28	3.29	—	—	4.03
3''''''	3.24	3.25	—	—	4.10
4''''''	3.39	3.40	—	—	4.11
5''''''	3.30	3.32	—	—	3.47 t(9.8), 4.16
6''''''	3.72, 3.82	3.75, 3.82	—	—	—

Table 3-5-59 (continued)

H	3-5-232	3-5-233	3-5-234	3-5-235	3-5-241
1''''''	4.66	4.67			
2''''''	3.08	3.09			
3''''''	3.26	3.26			
4''''''	3.46	3.47			
5''''''	3.15, 3.81	3.16, 3.82			
1''''''	4.98	4.99	4.52		
2''''''	3.96	3.97	3.38		
3''''''	3.84	3.86	3.39		
4''''''	4.03	4.03	3.50		
5''''''	3.63, 3.77	3.64, 3.77	3.29, 3.94		
2a	2.51, 2.63	2.51, 2.64			
3a	4.07	4.08			
4a	1.62, 1.77	1.64, 1.77			
5a	5.16	5.18			
6a	1.60	1.60			
7a	1.17, 1.50	1.17, 1.50			
8a	0.93	0.93			
9a	0.94	0.94			
2b	2.51, 2.52	2.52, 2.52			
3b	4.30	4.31			
4b	1.50, 1.62	1.50, 1.62			
5b	3.79	3.81			
6b	1.62	1.62			
7b	1.12, 1.62	1.12, 1.62			
8b	0.93	0.93			
9b	0.91	0.91			

Table 3-5-60: ¹H NMR spectroscopic data of oleanane-type saponins 3-5-236~3-5-240.

H	3-5-236	3-5-237	3-5-238	3-5-239	3-5-240
2	4.64 m	4.63 m	4.63 m	4.63 m	4.65 m
3	4.00 d(3)	3.96 d(3)	3.97 d(3)	3.96 d(3)	4.01 d(3)
12	5.42 t-like	5.42 t-like	5.42 t-like	5.46 t-like	5.45 t-like
18	3.18 dd(14, 4)	3.14 dd(14, 4)	3.13 dd(14, 4)	3.14 dd(14, 4)	3.11 dd(14, 4)
23	9.78 s	9.76 s	9.74 s	9.71 s	9.75 s
24	1.71 s	1.65 s	1.67 s	1.67 s	1.70 s
25	1.44 s	1.37 s	1.38 s	1.44 s	1.43 s
26	1.09 s	1.01 s	1.01 s	1.08 s	1.09 s
27	1.24 s	1.23 s	1.24 s	1.25 s	1.27 s
29	0.92 s	0.90 s	0.91 s	0.90 s	0.88 s
30	0.89 s	0.88 s	0.89 s	0.82 s	0.85 s
1'	4.93 d(8)	4.92 d(8)	4.91 d(8)	4.92 d(8)	4.91 d(8)

Table 3-5-60 (continued)

H	3-5-236	3-5-237	3-5-238	3-5-239	3-5-240
2'	4.02 t(8.5)	4.03 t(8.5)	4.02 t(8.5)	4.02 t(8.5)	4.01 t(8.5)
1''	5.21 d(8)	5.22 d(8)	5.22 d(8)	5.21 d(8)	5.21 d(0)
1'''	6.29 d(8)	6.18 d(8)	6.17 d(8)	6.17 d(8)	6.18 d(8)
2'''	—	4.45 t(8.5)	4.39 t(8.5)	4.48 t(8.5)	4.39 t(8)
3'''	—	4.27 t(9)	4.31 t(9)	4.21 t(9)	4.28 t(9)
1''''		5.68 d(8)	5.63 d(8)	6.61 br s	6.45 br s
4''''		—	4.23 t(9)	—	4.34 t(9.5)
1'''''			5.06 d(7.5)		5.04 d(7.5)

Table 3-5-61: ¹H NMR spectroscopic data of oleanane-type saponins 3-5-243~3-5-246.

H	3-5-243	3-5-244	3-5-245	3-5-246
1	1.10, 1.72	1.11, 1.72	1.11, 1.72	1.11, 1.73
2	1.78, 2.01	1.77, 1.98	1.78, 2.01	1.79, 1.99
3	3.86	3.87	3.86	3.88
5	1.31	1.31	1.33	1.32
6	0.93, 1.47	0.93, 1.46	0.94, 1.47	0.94, 1.46
7	1.50, 1.31	1.52, 1.31	1.51, 1.34	1.49, 1.33
9	1.74	1.75	1.75	1.75
11	1.93, 1.93	1.94, 1.94	1.93, 1.93	1.94, 1.94
12	5.34	5.34	5.34	5.34
15	1.68, 1.41	1.68, 1.42	1.64, 1.44	1.65, 1.45
16	4.47	4.47	4.46	4.47
18	2.96	2.96	2.95	2.96
19	2.31, 1.06	2.31, 1.06	2.31, 1.06	2.31, 1.06
21	1.94, 1.18	1.95, 1.17	1.95, 1.16	1.95, 1.18
22	1.94, 1.79	1.95, 1.80	1.95, 1.75	1.95, 1.78
23	9.45 s	9.45 s	9.45 s	9.46 s
24	1.17 s	1.17 s	1.17 s	1.17 s
25	1.02 s	1.02 s	1.02 s	1.02 s
26	0.78 s	0.78 s	0.78 s	0.78 s
27	1.40 s	1.40 s	1.40 s	1.40 s
29	0.89 s	0.89 s	0.89 s	0.89 s
30	0.96 s	0.97 s	0.96 s	0.96 s
1'	4.46	4.44	4.46	4.44
2'	3.64	3.66	3.63	3.66
3'	3.64	3.68	3.64	3.69
4'	3.59	3.56	3.59	3.56
5'	3.76	3.76	3.76	3.76
1''	4.46	4.80	4.46	4.81
2''	3.49	3.45	3.50	3.47
3''	3.48	3.43	3.48	3.44

Table 3-5-61 (continued)

H	3-5-243	3-5-244	3-5-245	3-5-246
4''	3.82	3.82	3.82	3.83
5''	3.47	3.49	3.47	3.50
6''	3.72, 3.79	3.73, 3.77	3.73, 3.79	3.74, 3.78
1'''	5.03	4.59	5.04	4.60
2'''	4.02	3.23	4.01	3.24
3'''	3.66	3.30	3.65	3.31
4'''	3.40	3.49	3.40	3.51
5'''	3.95	3.24, 3.91	3.94	3.24, 3.91
6'''	1.24		1.24	
1''''	5.50	5.50	5.50	5.50
2''''	3.91	3.91	3.93	3.93
3''''	5.07	5.06	5.08	5.08
4''''	5.25	5.24	5.24	5.25
5''''	3.97	3.96	3.97	3.97
6''''	1.12	1.11	1.11	1.12
OAc	2.06 s(4''''''-OAc)	2.06(4''''''-OAc)	2.05(3''''''-OAc)	2.05(3''''''-OAc)
1''''''	4.97	4.97	4.99	4.99
2''''''	3.75	3.74	3.74	3.74
3''''''	3.73	3.72	3.71	3.72
4''''''	3.52	3.52	3.52	3.52
5''''''	3.72	3.72	3.72	3.73
6''''''	1.29	1.29	1.31	1.31
1'''''''	4.47	4.46	4.47	4.47
2'''''''	3.20	3.20	3.29	3.30
3'''''''	3.31	3.30	3.39	3.39
4'''''''	3.49	3.49	3.50	3.50
5'''''''	3.18, 3.84	3.18, 3.84	3.20, 3.88	3.21, 3.89
1''''''''	4.99	4.98	5.24	5.25
2''''''''	3.97	3.97	4.04	4.04
3''''''''	3.85	3.85		
4''''''''	4.03	4.03	3.80, 4.16	3.81, 4.16
5''''''''	3.63, 3.77	3.63, 3.77	3.65	3.66
1'''''''''			4.98	4.98
2'''''''''			3.97	3.97
3'''''''''			3.85	3.85
4'''''''''			4.02	4.03
5'''''''''			3.63, 3.76	3.63, 3.77
2a	2.61, 2.61	2.61, 2.61	2.61, 2.61	2.61, 2.61
3a	4.02	4.02	4.02	4.02
4a	1.67, 1.81	1.66, 1.81	1.67, 1.81	1.68, 1.82
5a	5.18	5.18	5.18	5.18
6a	1.62	1.62	1.61	1.61
7a	1.16, 1.50	1.16, 1.50	1.15, 1.49	1.16, 1.50

Table 3-5-61 (continued)

H	3-5-243	3-5-244	3-5-245	3-5-246
8a	0.93	0.94	0.93	0.93
9a	0.95	0.95	0.94	0.95
2b	2.53, 2.53	2.52, 2.52	2.53, 2.53	2.53, 2.53
3b	4.30	4.30	4.30	4.30
4b	1.50, 1.63	1.50, 1.65	1.49, 1.63	1.51, 1.64
5b	3.80	3.80	3.80	3.80
6b	1.62	1.62	1.61	1.61
7b	1.12, 1.60	1.11, 1.60	1.10, 1.60	1.11, 1.60
8b	0.93	0.94	0.93	0.93
9b	0.90	0.91	0.90	0.91

Table 3-5-62: ¹H NMR spectroscopic data of oleanane-type saponins 3-5-242, 3-5-247, and 3-5-248.

H	3-5-242	3-5-247	3-5-248	H	3-5-242	3-5-247	3-5-248
3	—	4.16 dd(12.0, 4.5)	4.07 s	5'	—	4.58 d(9.5)	—
12	5.24 m	5.55 br t	5.52 s	1''	4.26 d(8)	—	5.03 d(7.7)
18	—	3.62 br s	3.35 br d(12.8)	1'''	—	—	5.90 s
19	—	3.62 br s	—	6'''	—	—	1.75(ov)
23	9.90 s	9.79 s	10.0 s	1''''	5.38 d(7.8)	—	—
24	1.05 s	0.83 s ^①	1.00 s ^①	6''''	0.98 d(6.3)	—	—
25	0.89 s	0.99 s ^①	1.13 s ^①	1'''''	5.48 s	—	—
26	0.62 s	1.13 s ^①	1.15 s ^①	6'''''	1.15 d(6.1)	—	—
27	1.3 s	1.21 s ^①	1.20 s ^①	1''''''	4.25 d(8)	—	—
29	0.85 s	1.31 s ^①	3.57 s (2H)	2''''''	7.75 d(8)	—	—
30	0.9 s	1.66 s ^①	1.22 s ^①	3''''''	7.02 d(8)	—	—
1'	4.18 d(7.7)	4.92 d(7.7)	6.30 d(7.7)	5''''''	7.02 d(8)	—	—
2'	—	4.00 dd(8.8, 7.7)	—	6''''''	7.75 d(8)	—	—
3'	—	4.24 dd(9.2, 8.8)	—	7''''''	7.65 d(16)	—	—
4'	—	4.46 dd(9.5, 9.2)	—	8''''''	6.62 d(16)	—	—

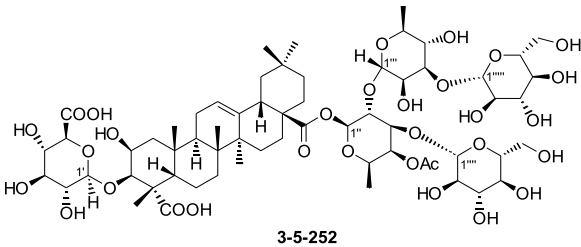
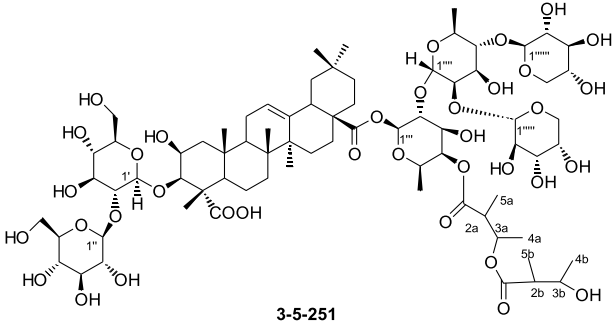
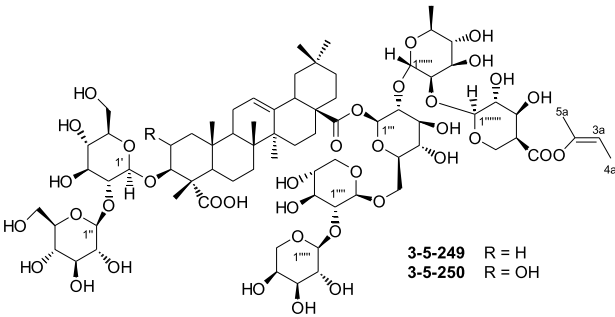
^①The data of methyls in the literature were not assigned, and here, the deployments are only to display the data.

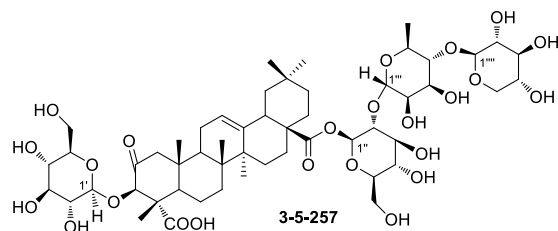
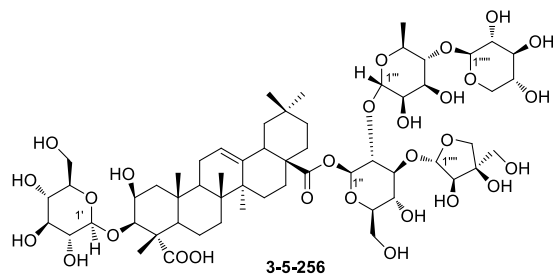
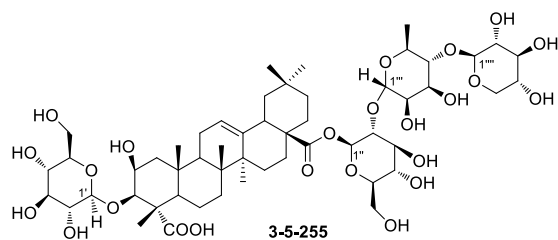
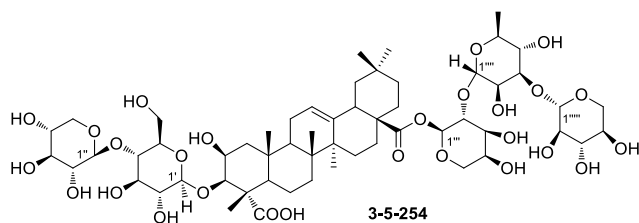
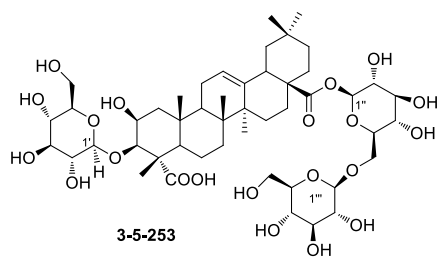
Table 3-5-63: Cos, MFs, and TSs of oleanane-type saponins **3-5-249~3-5-279**.

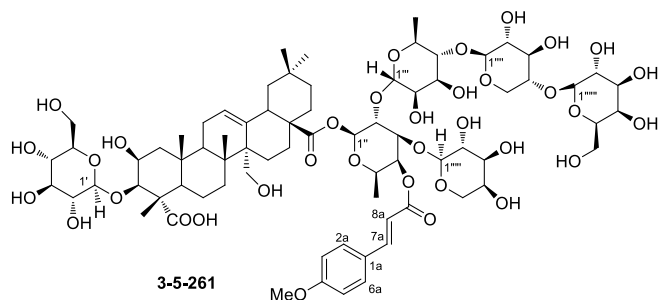
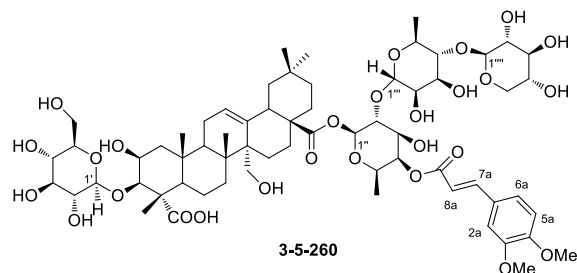
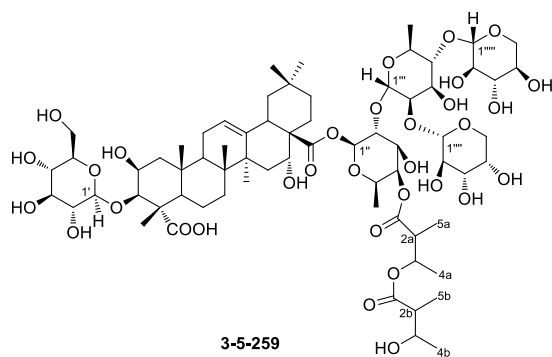
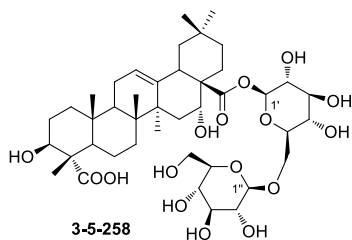
No.	Compounds	MFs	Test solvents	References
3-5-249	3- <i>O</i> -{ β -D-glucopyranosyl(1 $\rightarrow$ 2)- β -D-glucopyranosyl}-28- <i>O</i> -{[α -L-arabinopyranosyl(1 $\rightarrow$ 2)- β -D-xylopyranosyl(1 $\rightarrow$ 6)][4- <i>O</i> -angeloyloxy- α -L-arabinopyranosyl(1 $\rightarrow$ 2)- α -L-rhamnopyranosyl(1 $\rightarrow$ 2)]}- β -D-glucopyranosyl gypsogenic acid	C ₇₄ H ₁₁₆ O ₃₇	CD ₃ OD	[173]
3-5-250	3- <i>O</i> -{ β -D-glucopyranosyl(1 $\rightarrow$ 2)- β -D-glucopyranosyl}-28- <i>O</i> -{[α -L-arabinopyranosyl(1 $\rightarrow$ 2)- β -D-xylopyranosyl(1 $\rightarrow$ 6)][4- <i>O</i> -angeloyloxy- α -L-arabinopyranosyl(1 $\rightarrow$ 2)- α -L-rhamnopyranosyl(1 $\rightarrow$ 2)]}- β -D-glucopyranosyl medicagenic acid	C ₇₄ H ₁₁₆ O ₃₈	CD ₃ OD	[173]
3-5-251	3- <i>O</i> -{ β -D-glucopyranosyl(1 $\rightarrow$ 2)- β -D-glucopyranosyl}-28- <i>O</i> -{[α -L-arabinopyranosyl(1 $\rightarrow$ 2)]- β -D-xylopyranosyl(1 $\rightarrow$ 4)] α -L-rhamnopyranosyl(1 $\rightarrow$ 2)-4- <i>O</i> -[(3'-hydroxy-2'-methyl-butyroyloxy)-3-hydroxy-2-methyl-butyroyloxy]- β -D-fucopyransyl} medicagenic acid	C ₇₄ H ₁₁₈ O ₃₆	CD ₃ OD	[173]
3-5-252	herniaria saponin 3	C ₆₀ H ₉₆ O ₂₉	CD ₃ OD- C ₅ D ₅ N(3:2)	[174]
3-5-253	ageratoside B ₁	C ₄₈ H ₇₆ O ₂₁	C ₅ D ₅ N	[175]
3-5-254	ageratoside B ₂	C ₅₇ H ₉₀ O ₂₇	C ₅ D ₅ N	[175]
3-5-255	polygalasaponin XXI	C ₅₃ H ₈₄ O ₂₄	C ₅ D ₅ N	[87]
3-5-256	polygalasaponin XXII	C ₅₈ H ₉₂ O ₂₈	C ₅ D ₅ N	[87]
3-5-257	polygalasaponin XXIII	C ₅₃ H ₈₂ O ₂₄	C ₅ D ₅ N	[87]
3-5-258	dianchenoside D	C ₄₂ H ₆₆ O ₁₆	C ₅ D ₅ N	[176]
3-5-259	3- <i>O</i> -{ β -D-glucopyranosyl}-28- <i>O</i> -{[α -L-arabinopyranosyl(1 $\rightarrow$ 2)]- β -D-xylopyranosyl(1 $\rightarrow$ 4)] α -L-rhamnopyranosyl(1 $\rightarrow$ 2)-4- <i>O</i> -[(3'-hydroxy-2'-methyl-butyroyloxy)-3-hydroxy-2-methyl-butyroyloxy]- β -D-fucopyransyl}zanhic acid	C ₆₈ H ₁₀₈ O ₃₂	CD ₃ OD	[173]
3-5-260	polygalasaponin XLII	C ₆₄ H ₉₄ O ₂₇	C ₅ D ₅ N	[177]
3-5-261	polygalasaponin XLIII	C ₇₄ H ₁₁₀ O ₃₅	C ₅ D ₅ N	[177]
3-5-262	polygalasaponin XLIV	C ₇₆ H ₁₁₄ O ₃₇	C ₅ D ₅ N	[177]
3-5-263	polygalasaponin XLV	C ₇₈ H ₁₁₆ O ₃₈	C ₅ D ₅ N	[177]
3-5-264	polygalasaponin XLVI	C ₇₈ H ₁₁₆ O ₃₈	C ₅ D ₅ N	[177]
3-5-265	ageratoside A ₁	C ₅₉ H ₉₂ O ₂₉	C ₅ D ₅ N	[175]
3-5-266	polygalasaponin XXVIII	C ₅₃ H ₈₄ O ₂₄	C ₅ D ₅ N	[178]
3-5-267	polygalasaponin XXIX	C ₆₄ H ₁₀₂ O ₃₃	C ₅ D ₅ N	[178]
3-5-268	polygalasaponin XXX	C ₇₅ H ₁₁₂ O ₃₆	C ₅ D ₅ N	[178]
3-5-269	polygalasaponin XXXI	C ₇₅ H ₁₁₂ O ₃₆	C ₅ D ₅ N	[178]

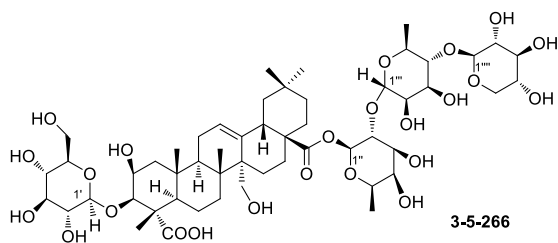
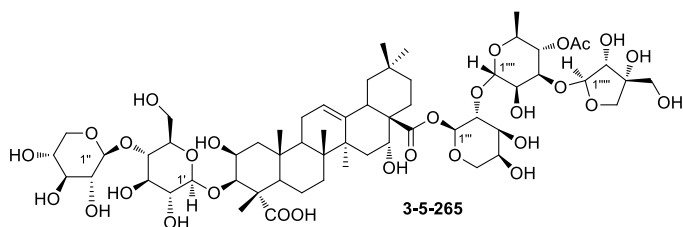
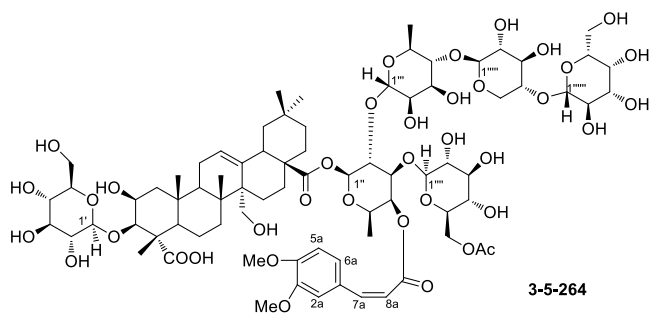
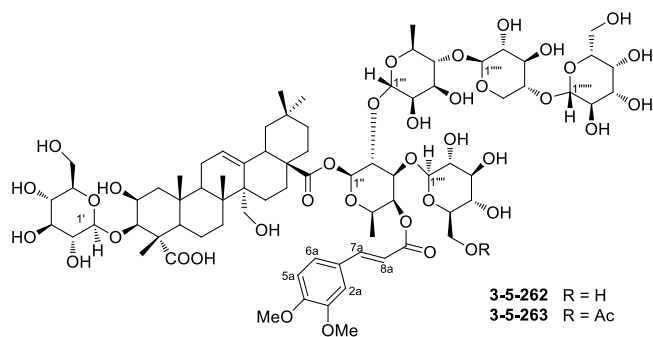
Table 3-5-63 (continued)

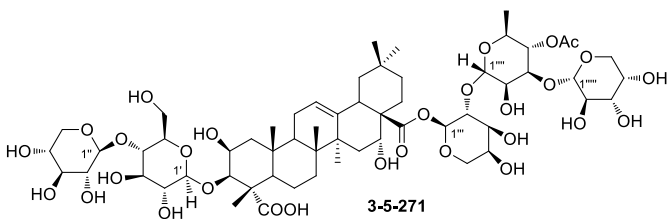
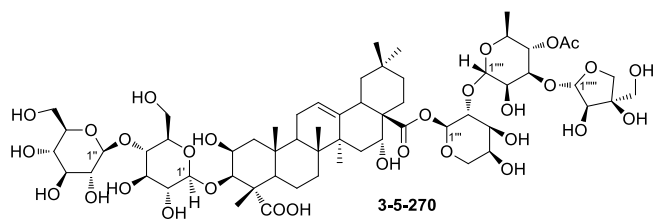
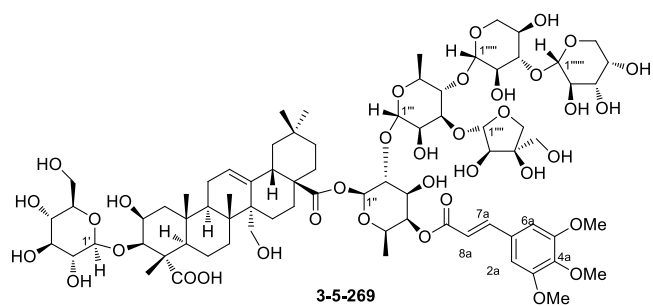
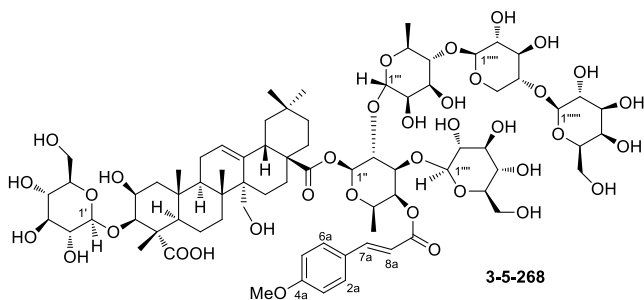
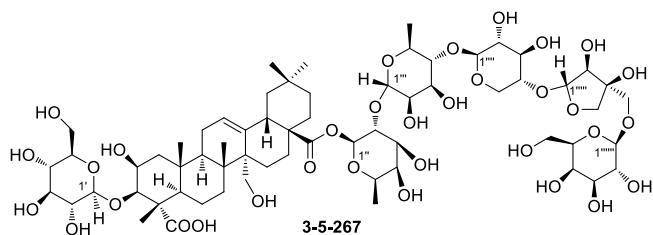
No.	Compounds	MFs	Test solvents	References
3-5-270	ageratoside A ₂	C ₆₀ H ₉₄ O ₃₀	C ₅ D ₅ N	[175]
3-5-271	ageratoside A ₃	C ₅₉ H ₉₂ O ₂₉	C ₅ D ₅ N	[175]
3-5-272	ageratoside A ₄	C ₅₄ H ₈₄ O ₂₅	C ₅ D ₅ N	[175]
3-5-273	ageratoside A ₅	C ₅₄ H ₈₄ O ₂₅	C ₅ D ₅ N	[175]
3-5-274	securioside A	C ₇₂ H ₁₀₆ O ₃₃	C ₅ D ₅ N	[179]
3-5-275	securioside B	C ₇₅ H ₁₁₂ O ₃₆	C ₅ D ₅ N	[179]
3-5-276	dianchinenoside C	C ₄₂ H ₆₆ O ₁₆	C ₅ D ₅ N	[176]
3-5-277	TR-saponin A methyl ester	C ₅₃ H ₈₀ O ₂₀	CD ₃ COCD ₃	[180]
3-5-278	TR-saponin B methyl ester	C ₅₃ H ₈₂ O ₂₀	CD ₃ OD	[180]
3-5-279	TR-saponin C methyl ester	C ₅₅ H ₈₄ O ₂₁	CD ₃ COCD ₃	[180]

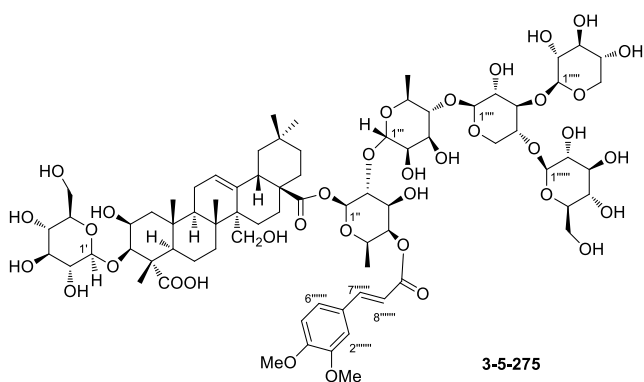
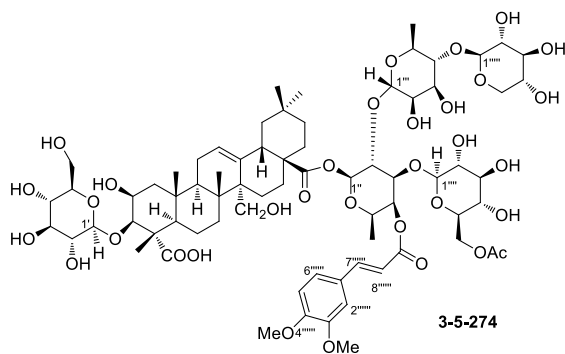
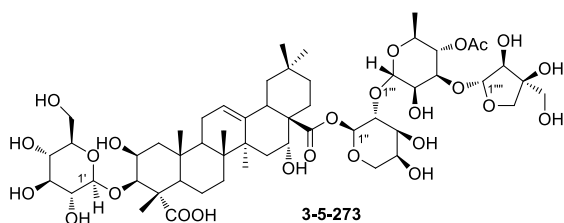
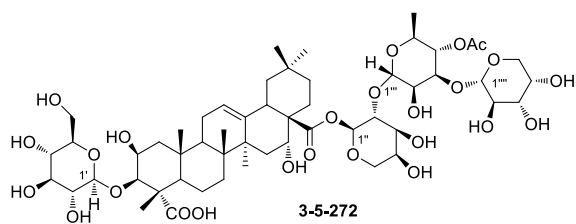


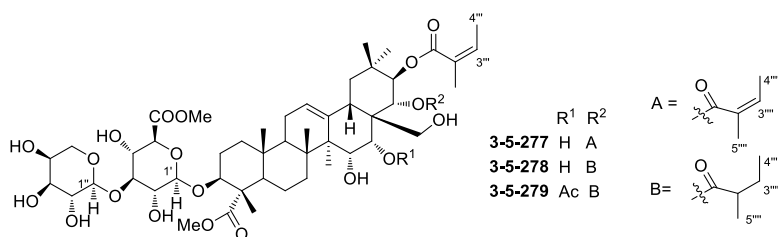
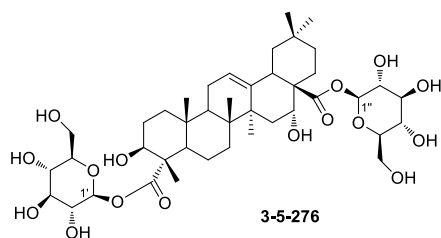










**Table 3-5-64:** ¹H NMR spectroscopic data of oleanane-type saponins **3-5-249**–**3-5-253**.

H	3-5-249	3-5-250	3-5-251	3-5-252	3-5-253
1	–	2.1	2.1 br d(14)	ax 1.19, eq 2.10	–
2	1.4	1.24 4.3 m(10)	1.25 4.32 m(12)	ax 4.45	ca. 4.79
3	4.14	4.2 m(11)	4.18 m(9)	ax 4.22	4.69 d(3)
5	1.37	–	–	ax 1.70	–
6	–	–	–	ax 1.69, eq 1.37	–
7	–	–	–	ax 1.53, eq 1.42	–
9	1.62	–	–	ax 1.56	–
11	1.9	1.96	1.93	ax 1.97, eq 1.87	–
12	5.29 m(9)	5.27 br t(2.5)	2 5.29 m(8)	ax 5.27	5.43 dd(3, 3)
15	–	–	–	ax 1.71, eq 1.15	–
16	–	–	–	ax 2.00, eq 1.67	ca. 1.90(2H)
18	2.81 br d(11)	2.81 ddd(7, 6, 4)	2.84 dd(10, 3)	ax 2.86	–
19	1.65	1.67 dd(9, 7)	1.7 t(13)	ax 1.65, eq 1.09	–
	1.1 d(10)	1.12 dd(9, 6)	1.15 d(10)		

Table 3-5-64 (continued)

H	3-5-249	3-5-250	3-5-251	3-5-252	3-5-253
21	—	—	—	ax 1.83, eq 1.52	—
24	1.15 s	1.36 s	1.36 s	1.56 s	1.98 s
25	1.01 s	1.28 s	1.26 s	1.32 s	1.57 s
26	0.83 s	0.82 s	0.79 s	0.89 s	1.14 s
27	1.15 s	1.12 s	1.14 s	1.09 s	1.23 s
29	0.91 s	0.88 s	0.9 s	0.81 s	0.87 s
30	0.96 s	0.93 s	0.94 s	0.84 s	0.88 s
1'	4.51 br d(7.5)	4.6 br d(6.0)	4.55 m	4.57 (7.7)	5.09 d(8)
2'	3.43 m	3.55 m	3.53 m	3.47 (8.7)	3.92 dd(8, 8)
3'	3.3	3.3	3.53 m	3.60 (8.5)	ca. 4.24
4'	to	to	3.36 t(8.0)	3.64 (8.5)	4.31 dd(8, 8)
5'	3.55	3.55	3.39 m	3.72	ca. 3.86
6'	3.66 br d(13.0)	3.65 br d(11.0)	3.72 dd(13.0, 5.0)		ca. 4.30
	3.83 br d(13.0)	3.82 dd(11.0, 5.0)	3.88 dd(13.0, 2.0)		ca. 4.45
1''	4.59 d(7.0)	4.57 d(7.0)	4.6 d(7.5)	5.62 d(7.7)	6.22 d(8)
2''	3.29 m	3.28 dd(9.0, 7.0)	3.27 dd(9.0, 8.0)	4.11 (9.6)	4.10 dd(8, 9)
3''	3.3	3.6 m	3.37 m	4.15 (3.3)	4.19 dd(9, 9)
4''	to	3.39 m	3.37 m	5.47 (0.3)	ca. 4.29
5''	3.4	3.22 m	3.29 m	3.86 (6.8)	ca. 4.10
6''	3.65 dd(12.0, 4.0)	3.7 dd(11.0, 4.0)	3.69 dd(13.0, 3.0)	1.03	ca. 4.35
	3.89 br d(12.0)	3.93 br d(11.0)	3.8 br d(13.0)		ca. 4.69
OAc				1.99 s(4''-OAc)	
1'''	5.41 d(7.0)	5.39 d(7.0)	5.35 d(8.0)	5.60 (1.9)	5.01 d(8)
2'''	3.42 t(9.0)	3.42 t(7.0)	3.67 dd(8.0, 7.0)	4.49 (3.1)	3.97 dd(8, 9)
3'''	3.5 m	3.53 t(7.0)	3.86 dd(7.0, 3.5)	3.93 (9.2)	ca. 4.20
4'''	3.62 t(9.0)	3.55 m	5.09 br d(3.5)	3.78 (9.2)	ca. 4.15
5'''	3.5 m	3.48 m	3.85 q(6.0)	3.99 (6.1)	ca. 3.86
6'''	3.74 dd(10.0, 4.0)	3.74 dd(12.0, 6.0)	1.08 d(6.0)	1.34	ca. 4.30, ca. 4.45
	3.97 br d(10.0)	4.02 dd(12.0, 3.0)			
1''''	5.42 d(2.0)	5.4 br s	5.52 d(1.0)	4.65 d(7.5)	
2''''	4.03 br s	4.02 dd(5.0, 1.5)	3.98 dd(3.0, 1.0)	3.37 (9.2)	
3''''	3.82 m	3.82 m	3.94 dd(9.0, 3.5)	3.59 (9.6)	
4''''	3.35 t(9.0)	3.35 m	3.54 dd(11.0, 9.0)	3.42 (9.6)	
5''''	3.7 m	3.69 m	3.77 dq(11.0, 6.5)	3.44 (6.0, 1.8)	
6''''	1.22 d(6.0)	1.2 d(6)	1.28 d(6.5)	4.00 (11.7), 3.74 (11.7)	
1'''''	4.48 d(7.0)	4.45 d(7.0)	4.52 d(7.5)	4.76 d(7.7)	
2'''''	3.42 t(8.0)	3.4 t(8.0)	3.21 dd(8.0, 7.5)	3.49 (9.2)	
3'''''	3.53 m	3.53 m	3.3 t(8.0)	3.66 (8.7)	
4'''''	3.53 m	3.54 td(7.0, 4.0)	3.48 m	3.53 (8.7)	

Table 3-5-64 (continued)

H	3-5-249	3-5-250	3-5-251	3-5-252	3-5-253
5''''''	3.19 t(10.0)	3.18 dd(11.0, 9.0)	3.18 t(11.5)	3.55 (5.3, 1.9)	
	3.84 dd(11.0, 5.0)	3.85 dd(11.0, 4.0)	3.85 dd(12.0, 5.5)		
1''''''	4.45 d(7.0)	4.42 d(7.5)	4.36 d(7.0)	4.01 (11.1), 3.81 (11.1)	
2''''''	3.65 dd(9.0, 7.0)	3.65 m	3.62 dd(9.0, 7.0)		
3''''''	3.75 dd(9.0, 4.0)	3.74 m	3.51 dd(9.0, 3.5)		
4''''''	5.08 m(7.0)	5.05 m(8.0)	3.78 br d(4.0)		
5''''''	3.58 dd(12.0, 3.0)	3.67 dd(11.0, 5.0)	3.56 br d(13.0)		
	3.99 br d(12.0)	3.99 br d(11.0)	3.87 dd(13.0, 3.0)		
1''''''	4.61 d(6.5)	4.6 d(7.0)			
2''''''	3.65 dd(8.0, 6.0)	3.66 dd(10.0, 7.0)			
3''''''	3.59 m	3.59 t(9.0)			
4''''''	3.83 br s	3.84 br s			
5''''''	3.58 dd(12.0, 4.0)	3.58 dd(10.0, 5.0)			
	4.01 dd(12.0, 2.0)	4.01 dd(10.0, 2.0)			
2a			2.78 q(7.0)		
3a	6.2 qd(7.0, 1.0)	6.16 qd(7.0, 1.5)	5.16 q(6.5)		
4a	2.05 br dd(7.0, 1.0)	2.02 dd(7.0, 1.4)	1.32 d(6.0)		
5a	1.96 m(5.0)	1.92 d(1.4)	1.19 d(7.0)		
2b			2.45 q(7.0)		
3b			3.92 q(6.5)		
4b			1.17 d(6.5)		
5b			1.1 d(7.0)		

Table 3-5-65: ¹H NMR spectroscopic data of oleanane-type saponins 3-5-254~3-5-258.

H	3-5-254	3-5-255	3-5-256	3-5-257	3-5-258
2	4.73 d-like	4.79 m	4.79 m		
3	4.65 d(3)	4.69 d(4.0)	4.69 d(4.0)	5.74 s	4.65 dd(4.0, 14.0)
12	5.44 dd(3, 3)	5.45 t-like	5.45 t-like	5.41 t-like	5.62 br s
15	—	—	—	—	ca. 1.66 (ov) 2.48 dd(4, 14)
16	ca. 1.90(2H)	—	—	—	5.22 br s
18	—	3.12 dd(14.0, 4.0)	3.10 dd(14.0, 4.0)	3.11 dd(14, 4)	3.52 dd(4, 14)
19	—	—	—	—	ca. 1.34 (ov) 2.75 dd(14, 14)
24	1.95 s	1.94 s	1.95 s	1.51 s	1.62 s
25	1.52 s	1.54 s	1.59 s	0.97 s	1.05 s

Table 3-5-65 (continued)

H	3-5-254	3-5-255	3-5-256	3-5-257	3-5-258
26	1.11 s	1.14 s	1.12 s	1.05 s	0.94 s
27	1.24 s	1.24 s	1.22 s	1.24 s	1.78 s
29	0.90 s	0.85 s	0.85 s	0.85 s	1.05 s
30	0.99 s	0.86 s	0.86 s	0.85 s	1.15 s
OH					6.26 d(5)(16-OH)
1'	5.04 d(9)	5.08 d(8.0)	5.08 d(8.0)	5.13 d(7.5)	6.22 d(8)
2'	3.95 dd(9, 9)	3.93 t(8.5)	3.93 t(8.0)	4.03 (ov)	4.05 dd(8, 9)
3'	4.15 dd(9, 9)	4.14 (ov)	4.14 (ov)	4.10 t(9)	4.07 (ov)
4'	ca. 4.23	4.15 (ov)	4.15 (ov)	4.14 t(9)	4.23 (ov)
5'	3.85 m	3.91 m	3.92 m	3.83 m	4.20 (ov)
6'	ca. 4.35	4.28 (ov)	4.28 (ov)	4.25 (ov)	4.33 dd(2, 12)
	ca. 4.50	4.46 dd(12, 2.5)	4.46 dd(12.0, 2.0)	4.39 (ov)	4.30 (ov)
1''	5.05 d(8)	6.19 d(8.0)	6.23 d(8.0)	6.19 d(6.5)	4.99 d(8)
2''	3.96 dd(8, 8)	4.36 (ov)	4.29 (ov)	4.35 (ov)	3.97 dd(8, 9)
3''	4.07 dd(8, 8)	4.27 (ov)	4.15 (ov)	4.27 (ov)	4.17
4''	ca. 4.15	4.28 (ov)	4.26 (ov)	4.28 (ov)	4.17
5''	ca. 3.62, ca. 4.21	3.96 m	3.94 m	3.95 m	3.97
6''		4.32 (ov)	4.29 (ov), 4.30 (ov)	4.26 (ov), 4.34 (ov)	4.45 dd(4, 12)
		4.38 dd(12, 2.5)			4.24 dd(2, 12)
1'''	6.48 d(3)	6.39 d(1.5)	5.92 br s	6.40 br s	
2'''	4.53 dd(3, 4)	4.81 dd(3.0, 1.5)	4.67 (ov)	4.81 br s	
3'''	ca. 4.50	4.69 dd(9.0, 3.0)	4.59 dd(9.0, 3.0)	4.67 dd(9, 3)	
4'''	ca. 4.40	4.34 (ov)	4.31 (ov)	4.33 (ov)	
5'''	ca. 3.93, ca. 4.47	4.51 m	4.36 m	4.49 m	
6'''		1.79 d(6.0)	1.76 d(6.0)	1.78 d(6)	
1''''	5.71 br s	5.04 d(8.0)	5.79 d(2.5)	5.04 d(7)	
2''''	ca. 4.55	4.05 (ov)	4.74 d(2.5)	4.05 (ov)	
3''''	ca. 4.35	4.05 (ov)		4.06 (ov)	
4''''	ca. 4.55	4.18 (ov)	4.28 (ov) 4.66 d(9.5)	4.19 (ov)	
5''''	ca. 4.37	3.53 t(11.0) 4.24 (ov)	4.09 d(11) 4.12 d(11)	3.53 t(11) 4.25 (ov)	
6''''	1.77 d(6)				
1'''''	5.10 d(7)		5.06 d(8.0)		
2'''''	ca. 4.00		4.03 (ov)		
3'''''	ca. 4.05		4.03 (ov)		
4'''''	ca. 3.65		4.17 (ov)		
5'''''	3.50 dd(10, 11) ca. 4.23		3.50 t(11.0) 4.24 (ov)		

Table 3-5-66: ^1H NMR spectroscopic data of oleanane-type saponins **3-5-259~3-5-263**.

H	3-5-259	3-5-260	3-5-261	3-5-262	3-5-263
1	2.14 dd(14, 2) 1.27 br d(14)	—	—		
2	4.31	4.71 m	4.70 m	4.70 m	4.71 m
3	4.1 br d(4)	4.61 d(3)	4.59 d(3)	4.59 d(3)	4.59 d(3)
11	1.65, 1.97	—	—	—	—
12	5.36	5.83 t-like	5.85 t-like	5.82 t-like	5.83 t-like
15	1.42 dd(11, 2) 1.69 dd(11, 4)	—	—		
16	4.49 m(6.5)	—	—		
18	2.95 dd(14, 3.5)	3.25 dd(14, 4)	3.24 dd(14, 4)	3.22 dd(14, 4)	3.22 dd(14, 4)
19	1.07, 2.29 t(14)	—	—		
24	1.38 s	1.95 s	1.95 s	1.97 s	1.95 s
25	1.38 s	1.56 s	1.52 s	1.52 s	1.52 s
26	0.8 s	1.14 s	1.15 s	1.13 s	1.14 s
27	1.29 s	3.81 d(12) 4.06 d(12)	3.82 d(12) 4.06 d(12)	3.82 d(12) 4.06 d(12)	3.82 d(12) 4.06 (ov)
29	0.87 s	0.79 s	0.79 s	0.78 s	0.78 s
30	0.96 s	0.96 s	0.94 s	0.92 s	0.92 s
1'	4.36 d(7)	5.05 d(8)	5.03 d(8)	5.04 d(8)	5.04 d(8)
2'	3.21 t(8)	3.92 (ov)	3.90 (ov)	3.91 (ov)	3.91 (ov)
3'	3.3 m	4.16 (ov)	4.14 (ov)	4.13 t(9)	4.15 t(9)
4'	3.3 m	4.14 (ov)	4.13 (ov)	4.14 (ov)	4.14 (ov)
5'	3.25 m	3.92 m	3.91 m	3.91 m	3.92 m
6'	3.68 dd(12, 5) 3.8 dd(12, 5)	4.29 dd(12, 5) 4.46 dd(12, 2)	4.28 dd(12, 5) 4.45 (ov)	4.29 dd(12, 5) 4.45 dd(12, 2)	4.28 (ov) 4.45 (ov)
1''	5.35 d(8)	6.17 d(8)	6.15 d(8)	6.16 d(8)	6.18 d(8)
2''	3.67 dd(8, 7)	4.73 t(8.5)	4.74 t(8.5)	4.78 t(8.5)	4.78 t(8.5)
3''	3.86 dd(7, 3.5)	4.49 dd(9, 3.5)	4.49 dd(9, 3.5)	4.51 dd(9, 3.5)	4.48 (ov)
4''	5.09 brd(3.5)	5.76 d(3.5)	5.96 d(3.5)	6.10 d(3.5)	6.03 d(3.5)
5''	3.85 q(6)	4.15 (ov)	4.11 (ov)	4.12 (ov)	4.21 m
6''	1.08 d(6)	1.37 d(6)	1.31 d(6)	1.30 d(6)	1.39 d(6)
1'''	5.52 d(1)	6.38 br s	6.27 br s	6.45 br s	6.38 br s
2'''	3.98 dd(3, 1)	4.82 br s	4.82 br s	4.82 br s	4.81 br s
3'''	3.94 dd(9, 3.5)	4.70 (ov)	4.64 dd(9, 3)	4.65 dd(9, 3)	4.64 dd(9, 3.5)
4'''	3.54 dd(11, 9)	4.35 t(9.5)	4.25 t(9)	4.26 t(9)	4.25 t(9)
5'''	3.77 dq(11, 6.5)	4.55 m	4.45 (ov)	4.48 (ov)	4.46 (ov)
6'''	1.28 d(6.5)	1.82 d(6)	1.73 d(6)	1.74 d(6)	1.73 d(6)
1''''	4.36 d(7)	5.07 d(7)	4.99 d(6.5)	5.11 d(8)	5.05 d(8)
2''''	3.62 dd(9, 7)	4.04 (ov)	4.41 (ov)	3.95 t(8.5)	3.96 t(8.5)
3''''	3.51 dd(9, 3.5)	4.04 (ov)	4.03 (ov)	4.11 t(9)	4.08 (ov)
4''''	3.78 br d(4)	4.16 (ov)	4.26 (ov)	4.02 t(9)	4.13 (ov)
5''''	3.56 br d(13) 3.87 dd(13, 3)	3.52 t(11) 4.24 dd(11, 5)	3.76 br d(12) 4.34 dd(12, 3)	3.92 m	3.94 (ov)

Table 3-5-66 (continued)

H	3-5-259	3-5-260	3-5-261	3-5-262	3-5-263
6 ^{'''}				4.29 dd(12, 5) 4.50 dd(12, 2)	4.73 dd(12, 5) 5.04 (ov) 2.08 s(6 ^{'''} -OAc)
OAc					
1 ^{'''}	4.52 d(7.5)		4.98 d(7.5)	4.97 d(7.5)	4.97 d(7.5)
2 ^{'''}	3.21 dd(8, 7.5)		4.02 t(8)	4.02 t(8)	4.02 t(8)
3 ^{'''}	3.3 t(8)		4.04 t(8.5)	4.04 t(8.5)	4.05 (ov)
4 ^{'''}	3.48 m		4.27 (ov)	4.28 (ov)	4.27 (ov)
5 ^{'''}	3.18 t(11.5) 3.85 dd(12, 5.5)		3.44 t(11) 4.28 (ov)	3.45 t(11) 4.29 (ov)	3.44 t(11) 4.28 (ov)
1 ^{'''}			4.95 d(8)	4.95 d(8)	4.95 d(8)
2 ^{'''}			4.45 (ov)	4.46 (ov)	4.46 (ov)
3 ^{'''}			4.08 (ov)	4.08 (ov)	4.10 (ov)
4 ^{'''}			4.47 d(3)	4.47 (ov)	4.47 (ov)
5 ^{'''}			4.13 (ov)	4.13 (ov)	4.12 (ov)
6 ^{'''}			4.34 dd(12, 5) 4.42 (ov)	4.35 dd(12, 5) 4.43 (ov)	4.36 dd(12, 5) 4.43 (ov)
2a	2.78 q(7)	7.10 ^①	7.40 d(8.5)	7.08 d(2)	7.08 d(2)
3a	5.16 q(6.5)		7.00 d(8.5)		
4a	1.32 d(6)				
5a	1.19 d(7)	6.92 d(8)	7.00 d(8.5)	6.91 d(8)	6.92 d(8)
6a		7.08 dd(8, 2)	7.40 d(8.5)	7.05 dd(8, 2)	7.06 dd(8, 2)
7a		7.94 d(16)	7.84 d(16)	7.93 d(16)	7.88 d(16)
8a		6.54 d(16)	6.48 d(16)	6.58 d(16)	6.54 d(16)
2b	2.45 q(7)				
3b	3.92 q(6.5)				
4b	1.17 d(6.5)				
5b	1.1 d(7)				
OMe		3.80 s, 3.74 s	3.69 s	3.80 s, 3.74 s	3.80 s, 3.74 s

^① The peaktype was not given in the original literature.

Table 3-5-67: ¹H NMR spectroscopic data of oleanane-type saponins 3-5-264~3-5-268.

H	3-5-264	3-5-265	3-5-266	3-5-267	3-5-268
2	4.71 m	ca. 4.76	4.71 m	4.71 m	4.70 m
3	4.61 d(3)	4.68 d(4)	4.60 d(3)	4.58 d(3)	4.59 d(3)
12	5.83 t-like	5.64 dd(3, 3)	5.79 t-like	5.80 t-like	5.84 t-like
16	—	5.18 br s	—	—	—
18	3.22 dd(14, 4)		3.22 dd(14, 4)	3.22 dd(14, 4)	3.23 dd(14, 4)
24	1.95 s	2.00 s	1.95 s	1.94 s	1.95 s
25	1.53 s	1.60 s	1.57 s	1.53 s	1.52 s
26	1.15 s	1.18 s	1.13 s	1.12 s	1.14 s

Table 3-5-67 (continued)

H	3-5-264	3-5-265	3-5-266	3-5-267	3-5-268
27	3.82 d(12) 4.06 (ov)	1.80 s	3.79 d(12) 4.05 d(12)	3.78 d(12) 4.06 d(12)	3.82 d(12) 4.06 d(12)
29	0.79 s	1.00 s	0.79 s	0.79 s	0.80 s
30	0.93 s	1.14 s	0.94 s	0.92 s	0.93 s
1'	5.06 d(8)	5.04 d(8)	5.06 d(8)	5.03 d(8)	5.03 d(8)
2'	3.92 (ov)	3.93 dd(8, 9)	3.92 (ov)	3.90 (ov)	3.91 (ov)
3'	4.14 (ov)	4.14 dd(9, 9)	4.15 (ov)	4.14 (ov)	4.14 (ov)
4'	4.13 (ov)	4.23 dd(9, 9)	4.16 (ov)	4.14 (ov)	4.15 (ov)
5'	3.91 m	3.85 m	3.91 (ov)	3.91 (ov)	3.92 (ov)
6'	4.28 (ov) 4.45 (ov)	ca. 4.39 ca. 4.48	4.26 dd(12, 5) 4.45 dd(12, 2)	4.27 (ov) 4.47 dd(12, 2)	4.29 (ov) 4.45 (ov)
1''	6.13 d(8)	5.05 d(8)	6.06 d(8)	6.05 d(8)	6.16 d(8)
2''	4.66 t(8.5)	3.93 dd(8, 9)	4.64 t(8.5)	4.62 t(8.5)	4.77 t(8.5)
3''	4.46 (ov)	4.06 dd(9, 9)	4.18 (ov)	4.14 (ov)	4.50 (ov)
4''	5.95 d(3.5)	4.11 m	3.95 (ov)	3.94 (ov)	6.07 d(3)
5''	4.18 (ov)	3.63 d-like ca. 4.21	3.90 (ov)	3.89 (ov)	4.10 (ov)
6''	1.34 d(6)		1.50 d(6)	1.48 d(6)	1.28 d(6)
1'''	6.30 br s	6.43 d(3)	6.40 br s	6.34 br s	6.44 br s
2'''	4.80 br s	4.52 dd(3, 4)	4.79 br s	4.78 br s	4.83 br s
3'''	4.63 (ov)	ca. 4.48	4.69 (ov)	4.64 dd(9.5, 3)	4.65 dd(9.5, 3)
4'''	4.24 t(9)	ca. 4.41	4.31 t(9.5)	4.21 t(9.5)	4.26 t(9.5)
5'''	4.42 (ov)	ca. 3.92 ca. 4.48	4.46 (ov)	4.42 (ov)	4.49 (ov)
6'''	1.74 d(6)		1.67 d(6)	1.62 d(6)	1.75 d(6)
1''''	5.03 d(8)	5.78 br s	5.40 d(7)	4.85 d(7.5)	5.10 d(8)
2''''	3.95 t(8.5)	4.76 br s	4.02 (ov)	4.03 (ov)	3.94 t(8.5)
3''''	4.06 (ov)	ca. 4.48	4.02 (ov)	4.03 (ov)	4.11 (ov)
4''''	4.12 (ov)	5.84 dd(10, 10)	4.14 (ov)	4.26 t(8.5)	4.12 (ov)
5''''	3.94 (ov)	ca. 4.43	3.50 t(11) 4.23 (ov)	3.33 t(11) 4.34 (ov)	3.90 (ov)
6''''	4.67 dd(12, 5) 5.01 (ov)	1.38 d(6)			4.28 (ov) 4.45 (ov)
OAc	2.06 s(6''''-OAc)	2.14 s(6''''-OAc)			
1'''''	4.97 d(7)	5.71 d(4)		6.34 br s	4.97 d(7.5)
2'''''	4.03 t(8)	4.53 d(4)		4.39 br s	4.02 (ov)
3'''''	4.06 t(8.5)				4.03 (ov)
4'''''	4.29 (ov)	4.21 d(9) 4.47 d(9)		4.17 (ov) 5.03 d(9.5)	4.28 (ov)
5'''''	3.44 t(11) 4.28 (ov)	ca. 3.95(2H)		4.18 d(12) 4.63 d(12)	3.45 t(11) 4.28 (ov)
1''''''	4.95 d(8)			4.82 d(8)	4.95 d(8)
2''''''	4.44 (ov)			4.38 (ov)	4.45 (ov)
3''''''	4.09 (ov)			4.36 (ov)	4.10 (ov)

Table 3-5-67 (continued)

H	3-5-264	3-5-265	3-5-266	3-5-267	3-5-268
4 ^{''''}	4.46 (ov)			4.48 d(3)	4.47 d(3)
5 ^{''''}	4.11 (ov)			4.00 (ov)	4.08 (ov)
6 ^{''''}	4.35 (ov)			4.36 dd(12, 5)	4.35 dd(12, 5)
	4.43 (ov)			4.42 dd(12, 2)	4.42 (ov)
2a	7.89 d(2)				7.38 d(8.5)
3a					6.96 d(8.5)
5a	6.93 d(8)				6.96 d(8.5)
6a	7.50 dd(8, 2)				7.38 d(16)
7a	6.82 d(13)				7.89 d(16)
8a	5.93 d(13)				6.52 d(16)
OMe	3.85 s, 3.71 s				3.67 s(4a-OMe)

Table 3-5-68: ¹H NMR spectroscopic data of oleanane-type saponins 3-5-269~3-5-273.

H	3-5-269	3-5-270	3-5-271	3-5-272	3-5-273
2	4.68 m	ca. 4.76	ca. 4.76	ca. 4.82	ca. 4.81
3	4.61 d(3)	4.68 d(4)	4.69 d(4)	4.73 d(3)	4.73 d(3)
12	5.78 t-like	5.64 dd(3, 3)	5.64 dd(3, 3)	5.64 dd(3, 3)	5.64 dd(3, 3)
16	—	5.18 br s	5.18 br s	5.18 br s	5.18 br s
18	3.23 dd(14, 4)	—	—		
24	1.97 s	1.98 s	1.98 s	1.98 s	2.00 s
25	1.55 s	1.59 s	1.61 s	1.61 s	1.61 s
26	1.10 s	1.17 s	1.19 s	1.19 s	1.18 s
27	3.80 (ov)	1.80 s	1.80 s	1.80 s	1.81 s
	4.06 d(12)				
29	0.80 s	1.00 s	1.00 s	1.00 s	1.00 s
30	0.93 s	1.13 s	1.14 s	1.14 s	1.14 s
1'	5.05 d(8)	5.04 d(8)	5.05 d(8)	5.10 d(8)	5.10 d(8)
2'	3.92 (ov)	3.92 dd(8, 9)	3.94 dd(8, 9)	3.93 dd(8, 9)	3.93 dd(8, 9)
3'	4.15 (ov)	ca. 4.15	4.15 dd(9, 9)	ca. 4.14	ca. 4.14
4'	4.16 (ov)	4.25 dd(9, 9)	4.24 dd(9, 9)	ca. 4.14	ca. 4.15
5'	3.89 (ov)	3.86 m	3.86 m	3.91 m	3.92 m
6'	4.29 dd(12, 5)	ca. 4.40	ca. 4.42	ca. 4.29	ca. 4.28
	4.45 (ov)	ca. 4.47	ca. 4.49	ca. 4.46	ca. 4.46
1''	6.14 d(8)	5.13 d(8)	5.06 d(8)	6.42 d(3)	6.43 d(3)
2''	4.69 t(8.5)	4.03 dd(8, 9)	3.96 dd(8, 9)	4.54 dd(3, 4)	4.43 dd(3, 4)
3''	4.49 (ov)	ca. 4.17	4.06 dd(9, 9)	ca. 4.42	ca. 4.48
4''	5.76 d(3)	ca. 4.13	ca. 4.12	4.38 m	ca. 4.40

Table 3-5-68 (continued)

H	3-5-269	3-5-270	3-5-271	3-5-272	3-5-273
5''	4.18 (ov)	ca. 3.94	3.62 dd(10, 11) ca. 4.21	ca. 3.88 ca. 4.47	ca. 3.94 ca. 4.48
6''	1.39 d(6)	ca. 4.23, ca. 4.45			
1'''	6.29 br s	6.42 d(3)	6.44 d(3)	5.80 br s	5.80 br s
2'''	5.01 br s	4.52 dd(3, 4)	4.54 dd(3, 4)	4.82 br s	4.76 br s
3'''	4.59 dd(9.5, 3)	ca. 4.45	ca. 4.47	4.56 dd(3, 10)	ca. 4.48
4'''	4.50 (ov)	ca. 4.40	ca. 4.38	5.86 dd(10, 10)	5.85 dd(10, 10)
5'''	4.50 (ov)	ca. 3.94, ca. 4.50	ca. 3.90, ca. 4.49	ca. 4.41	ca. 4.43
6'''	1.75 d(6)			1.42 d(6)	1.38 d(6)
1''''	6.01 d(4)	5.78 br s	5.78 br s	4.87 d(8)	5.71 d(3)
2''''	4.80 d(4)	4.76 br s	4.82 br s	ca. 4.27	4.54 d(3)
3''''	4.18 (ov)	ca. 4.46	4.53 dd(3, 10)	4.10 dd(3, 9)	
4''''	4.52 (ov)	5.83 dd(10, 10)	5.86 dd(10, 10)	ca. 4.24	4.21 d(9), 4.47 d(9)
5''''	4.05 (ov), 4.05 (ov)	ca. 4.40	ca. 4.45	3.68 d-like, ca. 4.12	ca. 3.95(2H)
6''''		1.38 d(6)	1.42 d(6)		
OAc		2.15 s(4''''- OAc)	2.24 s(4''''- OAc)	2.24 s(4''''- OAc)	2.14 s(4''''- OAc)
1'''''	5.30 d(7.5)	5.70 d(4)	4.86 d(7)		
2'''''	3.98 t(8.5)	4.54 d(4)	ca. 4.26		
3'''''	4.13 t(9.5)		ca. 4.07		
4'''''	4.04 (ov)	4.26 d(9), 4.48 d(9)	ca. 4.21		
5'''''	3.42 t(11), 4.19 (ov)	ca. 3.97(2H)	3.67 d-like, ca. 4.13		
1''''''	5.15 d(7)				
2''''''	4.47 (ov)				
3''''''	4.06 (ov)				
4''''''	4.20 (ov)				
5''''''	3.61 br d(12) 4.22 (ov)				
6''''''					
2a, 6a	6.85 s				
7a	7.95 d(16)				
8a	6.62 d(16)				
OMe	3.81 s(3a, 5a-OMe) 3.90 s(4a-OMe)				

Table 3-5-69: ^1H NMR spectroscopic data of oleanane-type saponins 3-5-274~3-5-276.

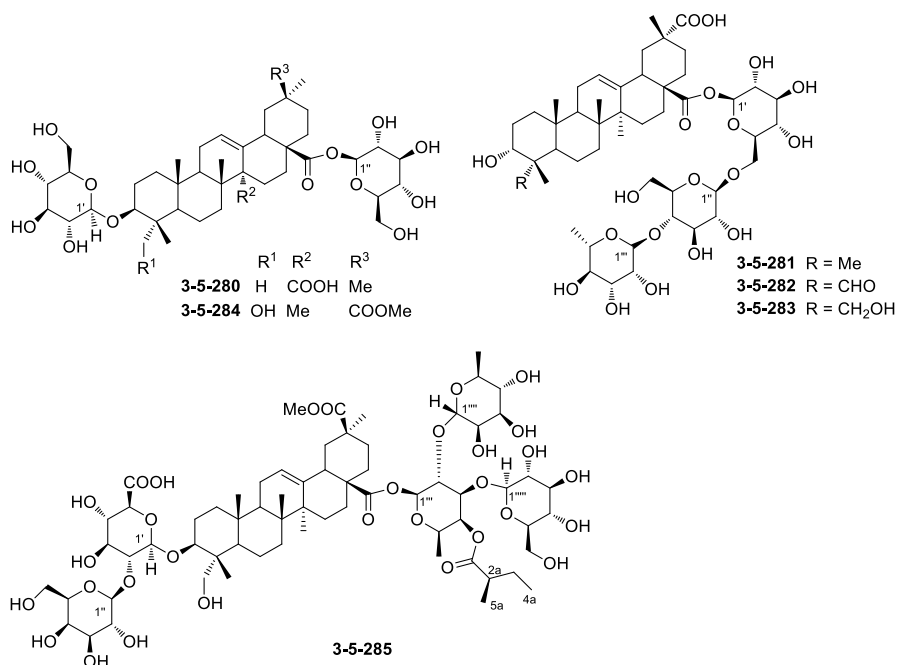
H	3-5-274	3-5-275	3-5-276
3	—	—	4.66 dd(4, 14)
12	5.84 br s	5.84 br s	5.43 br s
15	—	—	ca. 1.66 (ov), 2.47 dd(4, 14)
16	—	—	5.22 d(4)
18	—	—	3.50 dd(4, 14)
19	—	—	ca. 1.35 (ov), 2.74 dd(14, 14)
24	1.96 s	1.97 s	1.59 s
25	1.56 s	1.54 s	0.99 s
26	1.14 s	1.14 s	0.97 s
27	—	—	1.69 s
29	0.77 s	0.79 s	1.03 s
30	0.90 s	0.92 s	1.16 s
OH	—	—	6.27 d(5) (16-OH)
1'	5.07 d(7.7)	5.06 d(7.6)	6.29 d(8)
2'	—	—	4.13 t(8, 8)
3'	—	—	4.27 (ov)
4'	—	—	4.37 (ov)
5'	—	—	3.99 (ov)
6'	—	—	4.43 dd(2, 11), 4.37 (ov)
1''	6.19 d(8.2)	6.18 d(8.1)	6.39 d(8)
2''	—	—	4.22 t(8, 8)
3''	—	—	4.27 (ov)
4''	6.03 br d(3.2)	5.76 br d(3.7)	4.31 (ov)
5''	—	—	3.99 (ov)
6''	1.40 d(6.3)	1.36 d(6.3)	4.43 dd(2, 11), 4.07 (ov)
1'''	6.47 br s	6.35 br s	—
6'''	1.79 d(6.1)	1.75 d(6.3)	—
OAc	2.07 s(4''''-OAc)	—	—
1''''	5.06 d(7.8)	4.95 d(7.8)	—
6''''	5.04 m, 4.75 dd(11.5, 4.4)	—	—
1'''''	5.05 d(6.9)	5.74 d(5.7)	—
1''''''	—	4.91 d(7.7)	—
2''''''	7.06 br s	—	—
5''''''	6.91 d(8.1)	—	—
6''''''	7.05 br d(8.1)	—	—
7''''''	7.87 d(15.8)	—	—
8''''''	6.50 d(15.8)	—	—
2'''''''	—	7.11 br s	—
5'''''''	—	6.93 d(8.2)	—
6'''''''	—	7.09 br d(8.2)	—
7'''''''	—	7.96 d(15.9)	—
8'''''''	—	6.56 d(15.9)	—
OMe	3.80 s(3''''''-OMe)	3.81 s(3''''''-OMe)	—
	3.75 s(4''''''-OMe)	3.74 s(4''''''-OMe)	—

Table 3-5-70: ^1H NMR spectroscopic data of oleanane-type saponins 3-5-277~3-5-279.

H	3-5-277	3-5-278	3-5-279
1	<i>ca.</i> 1.68 m	<i>ca.</i> 1.68 m	1.78 m, <i>ca.</i> 1.69 m
2	<i>ca.</i> 1.85 m, <i>ca.</i> 1.67 m	<i>ca.</i> 1.85 m, <i>ca.</i> 1.70 m	1.84 m, <i>ca.</i> 1.68 m
3	4.02 m	4.02 dd(4.5, 11.9)	4.03 m
5	1.50 br d(13.2)	1.47 d(12.0)	1.50 m
6	1.53 m, <i>ca.</i> 0.95 m	1.58 m, 0.95 m	1.53 m, <i>ca.</i> 0.95 m
7	1.72 m, <i>ca.</i> 1.11 m	1.69 m	<i>ca.</i> 1.69 m, 1.11 m
9	<i>ca.</i> 1.68 m	<i>ca.</i> 1.66 m	<i>ca.</i> 1.67 m
11	1.95 m	1.95 m	1.97 m
12	5.48 br s	5.46 t(3.3)	5.54 m
15	3.71 m	3.71 d(4.3)	4.04 m
16	3.75 m	<i>ca.</i> 3.80 m	5.28 d(4.0)
18	2.70 m	2.62 m	2.73 dd(4.6, 14.3)
19	2.66 t(14.2), 1.37 m	2.63 m, 1.19 m	2.53 t(14.0), 1.38 m
21	5.97 d(10.1)	5.86 d(10.1)	5.47 d(10.4)
22	5.59 d(10.4)	5.55 d(10.1)	5.53 d(10.4)
24	1.15 s	1.17 s	1.29 s
25	0.99 s	0.99 s	1.00 s
26	1.00 s	1.00 s	1.00 s
27	1.45 s	1.41 s	1.40 s
28	3.18 m	3.26 d(10.3)	3.39 m
	3.05 m	3.00 d(10.3)	3.17 m
29	0.89 s	0.85 s	0.91 s
30	1.10 s	1.07 s	1.09 s
OAc			2.29 s
OMe	3.67 s (23-OMe)	3.69 s(23-OMe)	3.66 s (23-OMe)
	3.73 s (6'-OMe)	3.77 s (6'-OMe)	3.73 s (6'-OMe)
1'	4.39 d(8.0)	4.31 d(7.9)	4.39 d(7.6)
2'	3.29 m	3.30 m	3.28 m
3'	3.48 t(9.2)	3.50 t(9.0)	3.48 t(9.0)
4'	<i>ca.</i> 3.63 m	3.56 m	<i>ca.</i> 3.60 m
5'	3.87 d(9.7)	3.84 d(9.8)	3.88 d(9.0)
1''	4.44 d(7.1)	4.50 d(7.0)	4.44 m
2''	<i>ca.</i> 3.63 m	3.61 dd(7.0, 9.1)	<i>ca.</i> 3.62 m
3''	<i>ca.</i> 3.62 m	3.56 q(4.0, 9.1)	<i>ca.</i> 3.65 m
4''	3.82 m	3.79 m	3.83 m
5''	3.94 dd(2.4,10.1)	3.90 dd(3.0,12.5)	3.94 br d(12.8)
	<i>ca.</i> 3.60 m	3.58 dd(3.0, 12.5)	3.67 m
3'''	6.04 br q(6.0)	6.16 qd(1.7, 7.3)	6.15 br q(5.8)
4'''	1.90 dd(1.5, 4.6)	1.99 dd(1.7, 7.3)	1.97 m
5'''	1.81 m	1.85 m	1.83 m
2''''		2.33 q(7.0)	2.23 q(7.0)
3''''	6.04 br q(6.0)	1.63 m, 1.42 m	1.58 q(7.4), <i>ca.</i> 1.36 m
4''''	1.91 dd(1.5, 4.8)	0.87 t(7.3)	0.84 t(7.4)
5''''	1.81 m	1.03 d(7.0)	0.98 d(7.0)

Table 3-5-71: Compounds, MFs, and test solvents of oleanane-type saponins 3-5-280~3-5-285.

No.	Compounds	MFs	Test solvents	References
3-5-280	mussaendoside S	C ₄₂ H ₆₆ O ₁₅	C ₅ D ₅ N	[181]
3-5-281	spinoside D1	C ₄₈ H ₇₆ O ₁₉	C ₅ D ₅ N	[182]
3-5-282	spinoside D2	C ₄₈ H ₇₄ O ₂₀	C ₅ D ₅ N	[182]
3-5-283	spinoside D3	C ₄₈ H ₇₆ O ₂₀	C ₅ D ₅ N	[182]
3-5-284	diploclisin	C ₄₃ H ₆₈ O ₁₆	C ₅ D ₅ N	[183]
3-5-285	—	C ₆₆ H ₁₀₄ O ₃₁	CD ₃ OD	[184]

**Table 3-5-72:** ¹H NMR spectroscopic data of oleanane-type saponins 3-5-280~3-5-282.

H	3-5-280	3-5-281	3-5-282
3	3.34 dd(12.5, 4.3)	3.66 s	4.06 s
12	5.99 brs	5.53 s	5.54 s
18	—	3.36 dd(14.0, 4.0)	3.36 br d(13.8)
23	—	—	10.0 s
24	1.20 s ^①	0.95 s ^①	1.00 s ^①
25	1.11 s ^①	1.02 s ^①	1.15 s ^①
26	0.93 s ^①	1.18 s ^①	1.19 s ^①

Table 3-5-72 (continued)

H	3-5-280	3-5-281	3-5-282
27		1.19 s ^①	1.20 s ^①
28	0.85 s ^①	1.25 s ^①	
29	0.83 s ^①		
30	0.71 s ^①	1.49 s ^①	1.48 s ^①
1'	4.75 d(6.3)	6.31 d(7.7)	6.31 d(7.7)
1''	6.38 d(7.8)	—	5.02 d(7.7)
1'''		5.89 s	5.91 s

^①The data of methyls in the literature were not assigned, and here, the deployments are only to display the data.

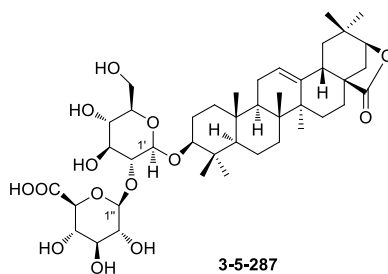
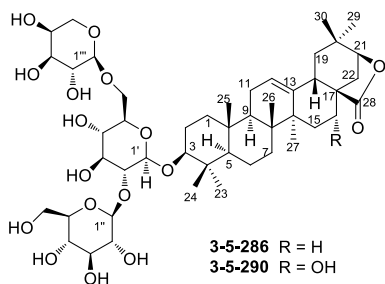
Table 3-5-73: ¹H NMR spectroscopic data of oleanane-type saponins 3-5-283~3-5-285.

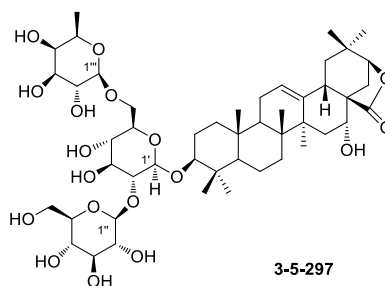
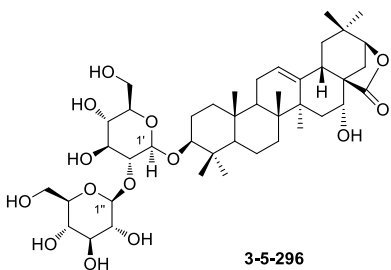
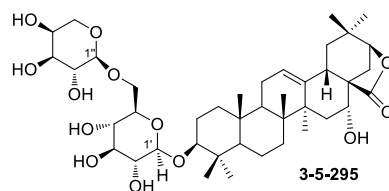
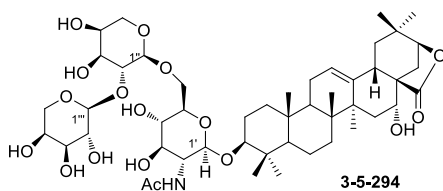
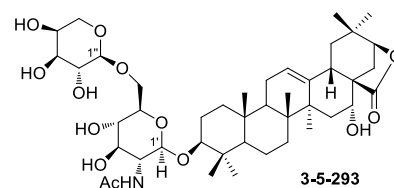
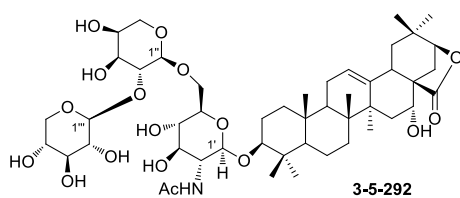
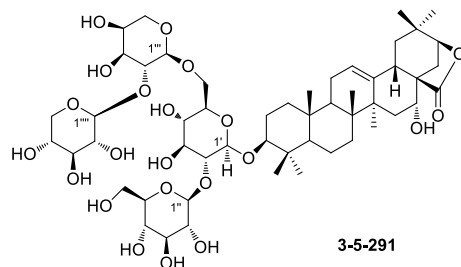
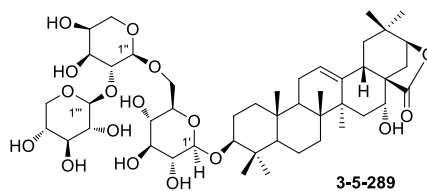
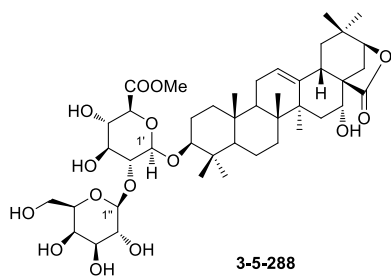
H	3-5-283	3-5-284	3-5-285	H	3-5-283	3-5-284	3-5-285
1	—	—	0.99, 1.64	1''	—	6.29 d(7.8)	4.60
2	—	—	1.93, 1.77	2''	—	—	3.59
3	3.72 s	3.3 m	3.64	3''	—	—	3.49
5	—	—	1.23	4''	—	—	3.85
6	—	—	1.36, 1.51	5''	—	—	3.48
7	—	—	1.61, 1.36	6''	—	—	3.71, 3.73
9	—	—	1.64	1'''	5.90 s	—	5.43
11	—	—	1.93, 1.92	2'''	—	—	3.88
12	5.54 s	5.60 m	5.34	3'''	—	—	4.01
15	—	—	1.65, 1.21	4'''	—	—	5.41
16	—	—	2.08, 1.71	5'''	—	—	3.87
18	3.36 dd(14.3, 4.3)	—	2.74	6'''	—	—	1.05
19	—	—	1.95, 1.72	1''''	—	—	5.28
21	—	—	2.03, 1.40	2''''	—	—	3.96
22	—	—	1.67, 1.67	3''''	—	—	3.65
23	—	3.65 d(11.5) 4.02 d(11.5)	3.27, 3.75	4''''	—	—	3.38
24	0.84 s ^①	0.90 s	0.73 s	5''''	—	—	3.72
25	1.04 s ^①	0.96 s	0.98 s	6''''	—	—	1.24
26	1.21 s ^①	1.10 s	0.81 s	1'''''	—	—	4.50
27	1.21 s ^①	1.15 s	1.19 s	2'''''	—	—	3.14
29	—	1.18 s	1.14 s	3'''''	—	—	3.33
30	1.48 s ^①	—	—	4'''''	—	—	3.19
OMe	—	3.56 s	3.73 s	5'''''	—	—	3.28
1'	6.31 d(8.1)	5.12 d(7.8)	4.57	6'''''	—	—	3.61, 3.86
2'	—	—	3.55	2a	—	—	2.53
3'	—	—	3.64	3a	—	—	1.75, 1.56
4'	—	—	3.57	4a	—	—	1.01
5'	—	—	3.72	5a	—	—	1.20

^①The data of methyls in the literature were not assigned, and here, the deployments are only to display the data.

Table 3-5-74: Cos, MFs, and TSs of oleanane-type saponins **3-5-286~3-5-303**.

No.	Compounds	MFs	Test solvents	Refer-ences
3-5-286	3 β -[O- β -D-glucopyranosyl-(1 $\rightarrow$ 2)-[O- α -L-arabinopyranosyl(1 $\rightarrow$ 6)] β -D-glucopyranosyloxy]-machaerinic acid γ -lactone	C ₄₇ H ₇₄ O ₁₇	C ₅ D ₅ N	[108]
3-5-287	3 β -[O- β -D-glucopyranosiduronic acid (1 $\rightarrow$ 2)- β -D-glucopyranosyloxy]-machaerinic acid γ -lactone	C ₄₂ H ₆₄ O ₁₄	C ₆ D ₆	[108]
3-5-288	tragopogonoside I methyl ester	C ₄₃ H ₆₆ O ₁₅	C ₅ D ₅ N	[185]
3-5-289	albiziasaponin A	C ₄₆ H ₇₂ O ₁₇	C ₅ D ₅ N	[186]
3-5-290	albiziasaponin B	C ₄₇ H ₇₄ O ₁₈	C ₅ D ₅ N	[186]
3-5-291	albiziasaponin C	C ₅₂ H ₈₂ O ₂₂	C ₅ D ₅ N	[186]
3-5-292	3-O-[β -D-xylopyranosyl-(1 $\rightarrow$ 2)- α -L-arabinopyranosyl-(1 $\rightarrow$ 6)-2-acetamido-2-deoxy- β -D-glucopyranosyl] acacic acid lactone	C ₄₈ H ₇₅ NO ₁₇	C ₅ D ₅ N	[187]
3-5-293	concinnoside B	C ₄₃ H ₆₇ NO ₁₃	C ₅ D ₅ N	[188]
3-5-294	concinnoside D	C ₄₈ H ₇₅ NO ₁₇	C ₅ D ₅ N	[188]
3-5-295	concinnoside A	C ₄₁ H ₆₄ O ₁₃	C ₅ D ₅ N	[188]
3-5-296	concinnoside C	C ₄₂ H ₆₆ O ₁₄	CD ₃ OD	[188]
3-5-297	concinnoside E	C ₄₈ H ₇₆ O ₁₈	C ₅ D ₅ N	[188]
3-5-298	ageratoside C ₁	C ₄₁ H ₆₂ O ₁₆	C ₅ D ₅ N	[175]
3-5-299	coumoside A	C ₅₈ H ₉₂ O ₂₇	DMSO- <i>d</i> ₆	[189]
3-5-300	soyasaponin Bh	C ₄₈ H ₇₈ O ₁₉	DMSO- <i>d</i> ₆	[190]
3-5-301	albiziasaponin A	C ₄₈ H ₇₂ O ₂₀	C ₅ D ₅ N	[191]
3-5-302	albiziasaponin C	C ₅₄ H ₈₄ O ₂₄	C ₅ D ₅ N	[191]
3-5-303	albiziasaponin D	C ₅₃ H ₈₂ O ₂₃	C ₅ D ₅ N	[191]





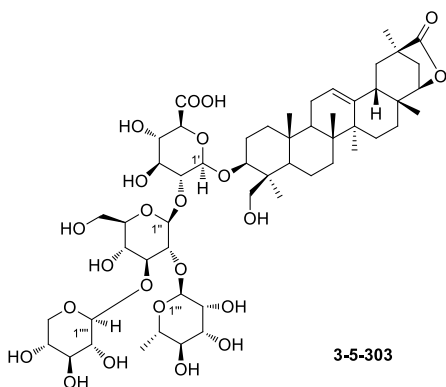
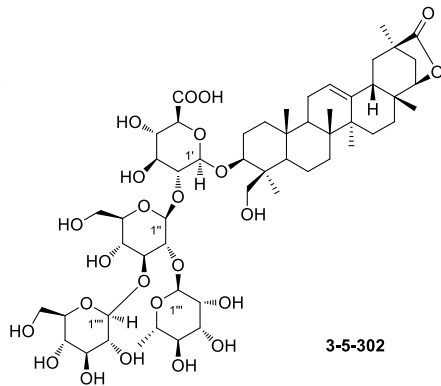
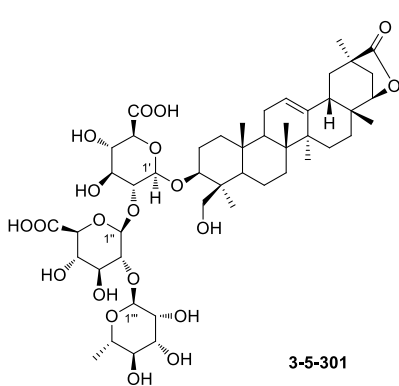
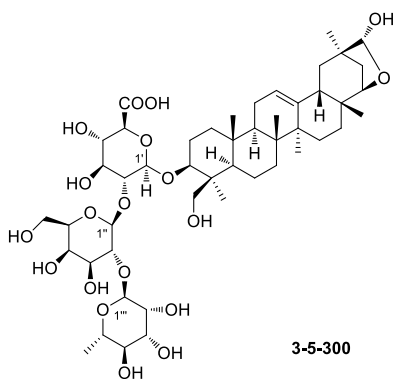
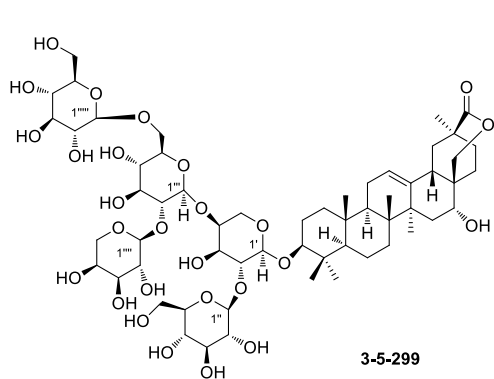
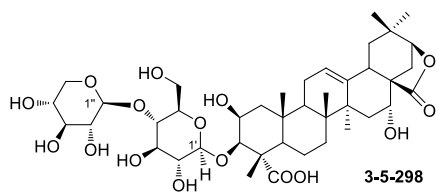


Table 3-5-75: ^1H NMR spectroscopic data of oleanane-type saponins **3-5-286**, **3-5-287**, **3-5-299**, and **3-5-300**.

H	3-5-286	3-5-287	3-5-299	3-5-300
1	1.03, 1.56	1.50, 0.87	0.90, 1.32	0.88, 1.45
2	2.35, 1.92	1.91, 1.84	1.84, 1.90	1.69, 1.95
3	3.27	3.03	3.00	3.23 br d(8.4)
5	0.74	0.71	0.80	0.99
6	1.54, 1.34	1.54, 1.34	1.40	1.50, 1.52
7	1.28, 1.28	1.27, 1.27	1.34	1.23, 1.42
9	1.64	1.60	1.52	1.55
11	2.00, 1.80	1.93, 1.74	1.82, 1.32	1.78, 1.80
12	5.48	5.33	5.25	5.22 br s
15	1.76, 1.05	1.71, 0.98	1.16, 1.80	0.98, 1.21
16	2.44, 1.48	2.56, 1.33	3.38	0.93, 1.67
18	2.49	2.41	3.45	1.87
19	1.95, 1.46	1.73, 1.42	1.10, 1.76	1.60
21	4.11	3.72	1.82, 2.45	1.61, 1.71
22	2.39, 1.79	2.13, 1.41	1.88, 1.94	3.61 d(4.8)
23	1.27 s	1.12 s	0.99 s	3.10, 3.92
24	1.13 s	1.02 s	0.87 s	1.14 s
25	0.87 s	0.84 s	0.79 s	0.79 s
26	0.70 s	0.68 s	0.78 s	0.84 s
27	1.09 s	0.99 s	1.07 s	1.10 s
28			3.48, 3.24	0.75 s
29	0.95 s	0.74 s	1.20 s	0.86 s
30	1.01 s	0.94 s		4.72 s
1'	4.84 d(9.0)	4.25 d(9.7)	4.29 d(5.3)	4.20 d(6.4)
2'	4.10	3.67	3.62	3.52
3'	4.21	5.34	3.44	3.44
4'	4.03	5.16	3.80	3.15
5'	3.99	3.31	3.78, 3.14	3.24
6'	4.74, 4.22	4.43, 4.10		
1''	5.29 d(7.0)	4.67 d(9.0)	4.49 d(8.0)	4.76 d(6.0)
2''	4.06	5.28	3.48	3.40
3''	4.20	5.43	3.36	3.34
4''	4.26	5.55	3.22	3.56
5''	3.89	3.89	3.18	3.37
6''	4.42, 4.42		3.52, 3.40	3.45, 3.52
1'''	4.92 d(7.0)		4.40 d(7.9)	4.95 s
2'''	4.42		3.39	3.67 br s
3'''	4.16		3.47	3.52
4'''	4.33		3.53	3.15
5'''	4.29, 3.77		3.71	3.91
6'''			4.18, 3.87	1.10 d(6.0)
1''''			4.43 d(5.2)	

Table 3-5-75 (continued)

H	3-5-286	3-5-287	3-5-299	3-5-300
2 ^{'''}			3.23	
3 ^{'''}			3.38	
4 ^{'''}			3.52	
5 ^{'''}			3.74, 3.40	
1 ^{''''}			4.41 d(7.9)	
2 ^{''''}			3.71	
3 ^{''''}			3.55	
4 ^{''''}			3.49	
5 ^{''''}			3.73	
6 ^{''''}			3.62, 3.25	

Note: The data of methyls in the literature were not assigned, and here, the deployments are only to display the data.

Table 3-5-76: ¹H NMR spectroscopic data of oleanane-type saponins 3-5-291~3-5-295.

H	3-5-291	3-5-292	3-5-293	3-5-294	3-5-295
3	3.44 dd(12.0, 5.5)	3.43 dd(11.5, 4.0)	3.11 dd(12.0, 4.6)	3.42 dd(11.7, 4.4)	3.16 dd(11.2, 4.6)
5	—	0.98	—	—	—
12	5.33 m	5.30 brt(3.0)	5.41 br s	—	5.42 br s
15	α 1.43 dd(13.5, 12.5) β 2.29 dd(13.5, 4.5)	—	—	—	—
16	4.52 dd(12.5, 4.5)	4.52 br s	3.90 dd(12.2, 4.9)	4.49 ~ 4.53	3.90 dd(11.7, 4.6)
18	—	2.77 dd(17.0, 5.5)	—	—	—
19	α 1.80 dd(13.5, 13.0) β 1.36 dd(13.3, 4.5)	1.37	—	—	—
21	4.25 d(5.3)	4.23 d(5.0)	4.25 d(5.4)	4.23 d(5.4)	4.26 d(5.4)
22	α 2.25 d(12.0) β 2.75 dd(12.0, 5.5)	—	—	—	—
23	1.29 s	1.21 s	0.77 s ^①	0.79 s ^①	0.87 s ^①
24	1.11 s	0.99 s	0.92 s ^①	0.80 s ^①	0.93 s ^①
25	0.83 s	0.82 s	0.94 s ^①	0.92 s ^①	0.96 s ^①

Table 3-5-76 (continued)

H	3-5-291	3-5-292	3-5-293	3-5-294	3-5-295
26	0.79 s	0.80 s	0.97 s ^①	1.00 s ^①	1.00 s ^①
27	1.37 s	1.38 s	0.99 s ^①	1.07 s ^①	1.01 s ^①
29	0.91 s	0.92 s	1.00 s ^①	1.21 s ^①	1.10 s ^①
30	1.05 s	1.07 s	1.24 s ^①	1.39 s ^①	1.24 s ^①
1'	4.88 d(7.3)	5.05 d(8.0)	4.44 d(8.4)	5.05 d(8.3)	4.32 d(7.8)
2'	4.17 dd(8.0, 7.3)	4.51 t(9.0)	3.65 dd(10.3, 8.3)	4.49~4.53	3.19 t(8.6)
3'	—	4.34 t(9.0)	3.44 dd(10.3, 8.8)	4.35~4.40	3.29~3.31
4'	—	4.11	3.32 t(8.8)	3.59 t(10.7)	
5'	—	4.02 m	3.42 m	4.12 m	3.41 m
6'	—	4.19 dd(10.0, 4.0)	3.71 dd(11.5, 5.7)	4.19 dd(11.2, 5.4)	4.06 dd(11.3, 2.2)
		4.64 d(10.0)	4.06 dd(11.5, 2.3)	4.61 d(9.3)	3.71 dd(11.3, 5.4)
Me (CONH)		2.15 s(C-2')	1.94 s(C-2')	2.16 s(C-2')	
NH		8.80 d(9.0) (C-2')	8.91 d(8.8) (C-2')	8.91 d(8.8) (C-2')	
1''	5.39 d(7.6)	5.14 d(5.0)	4.33 d(6.4)	5.16 d(4.9)	4.33 d(6.3)
2''	—	4.50 t(6.5)	3.58 dd(8.8, 6.4)	4.49~4.53	3.58 dd(8.8, 6.3)
3''	—	4.36 dd(6.5, 4.0)	3.51 dd(8.8, 3.4)	4.35~4.40	3.53 dd(8.3, 2.7)
4''	—	4.36 br s	3.79 m	4.12 m	3.80 m
5''	—	3.75 dd(11.5, 2.0)	3.52 dd(12.5, 1.4)	4.35~4.40	3.51 dd(12.7, 2.7)
		4.28 dd(11.5, 5.0)	3.85 dd(12.5, 3.7)	3.99~4.07	3.86 dd(12.7, 3.9)
1'''	5.14 d(5.1)	4.98 d(7.0)		4.98 d(6.6)	
2'''	4.52 dd(6.0, 5.1)	4.00 t(7.5)		3.99~4.07	
3'''	—	4.05 t(8.0)		3.99~4.07	
4'''	—	4.11		4.35~4.40	
5'''	—	3.59 dd(12.0, 10.0)		3.75 dd(11.2, 2.4)	
		4.38 dd(12.0, 6.0)		4.29 dd(11.7, 5.4)	
1''''	4.98 d(7.1)				

^①The data of methyls in the literature were not assigned, and here, the deployments are only to display the data.

Table 3-5-77: ^1H NMR spectroscopic data of oleanane-type saponins **3-5-288**, **3-5-289**, and **3-5-296~3-5-298**.

H	3-5-288	3-5-289	3-5-296	3-5-297	3-5-298
2	—	—	—	—	ca. 4.75
3	3.28 dd(12, 4)	3.52 dd(11.7, 4.4)	3.28 dd(11.7, 4.4)	3.23 dd(11.2, 4.1)	4.65 d(4)
12	5.35 t-like	5.30 m	5.36 br s	—	5.37 dd(3, 3)
15	—	α 1.44 dd(14.6, 12.4) β 2.30 dd(14.6, 5.0)	—	—	—
16	4.53 dd(11, 4.5)	4.52 dd(12.4, 5.0)	4.50~4.52	4.54 dd(11.2, 4.9)	4.50 dd(11, 5)
18	2.79 m	—	—	—	—
19	—	α 1.82 dd(13.3, 13.0) β 1.36 dd(13.3, 5.0)	—	—	—
21	4.25 d(5.5)	4.23 d(5.4)	4.25 d(5.4)	4.27 d(4.9)	—
22	—	α 2.25 d(12.0) β 2.76 dd(12.0, 5.4)	—	—	—
23	0.81 s ^①	1.32 s	0.79 s ^①	0.80 s ^①	—
24	0.81 s ^①	1.05 s	0.80 s ^①	0.83 s ^①	1.97 s
25	0.95 s ^①	0.82 s	0.95 s ^①	0.97 s ^①	1.50 s
26	1.07 s ^①	0.78 s	1.07 s ^①	1.09 s ^①	0.85 s
27	1.10 s ^①	1.38 s	1.10 s ^①	1.13 s ^①	1.33 s
29	1.30 s ^①	0.91 s	1.28 s ^①	1.24 s ^①	0.93 s
30	1.36 s ^①	0.99 s	1.36 s ^①	1.33 s ^①	1.06 s
1'	4.97 d(8)	4.91 d(7.8)	4.88 d(8.3)	4.81 d(7.8)	5.04 d(8)
2'	4.24 t(8.5)	—	4.24 t(9.2)	4.17 t(7.8)	3.93 dd(8, 9)
3'	4.30 t(8.5)	—	4.29 t(8.7)	4.23~4.39	4.14 dd(9, 9)
4'	4.42 t(8.5)	—	4.13 t(9.2)	4.10 t(9.5)	4.22 dd(9, 9)
5'	4.49 d(9.5)	—	3.91 m	4.01~4.10	3.85 m
6'	—	—	4.47 dd(11.0, 2.7)	4.23~4.39, 4.81~4.83	4.40 dd(3, 12)
			4.43 dd(11.0, 4.1)		4.46 dd(4, 12)
1''	3.73 s(C-6')	—	5.35 d(7.3)	5.34 d(7.8)	5.05 d(8)
2''	5.52 d(8)	5.18 d(5.1)	4.11 t(8.3)	4.12 t(7.8)	3.95 dd(9, 8)
3''	4.57 dd(9, 8)	4.55 dd(6.0, 5.1)	4.23 t(9.2)	4.23~4.29	4.05 dd(9, 9)
4''	4.17 dd(9.5, 3)	—	4.30 t(9.6)	3.93 m	ca. 4.10
5''	4.68 dd(3, 1)	—	3.91 m	3.93 m	3.62 dd(10, 11) 4.20 dd(5, 11)
6''	4.05 m	—	4.47 dd(11.0, 2.7)	4.52 dd-like(12.2, 4.9)	
			4.43 dd(11.0, 4.1)	4.48 dd-like(12.2, 2.2)	

Table 3-5-77 (continued)

H	3-5-288	3-5-289	3-5-296	3-5-297	3-5-298
1'''	4.40 dd(11, 5) 4.59 dd(11, 8)			4.90 d(7.3)	
2'''		5.00 d(6.8)		4.40 t(8.5)	
3'''		—		4.01~4.10	
4'''		—		3.81 t-like(6.4)	
5'''		—		3.81 t-like(6.4)	
6'''		—		1.53 d(6.4)	

① The data of methyls in the literature were not assigned, and here, the deployments are only to display the data.

Table 3-5-78: ¹H NMR spectroscopic data of oleanane-type saponins 3-5-290 and 3-5-301~3-5-303.

H	3-5-290	3-5-301	3-5-302	3-5-303
3	3.20 dd(12.0, 5.5)	3.45 dd(4.3, 11.6)	3.42 dd(4.6, 11.9)	3.42 dd(4.3, 11.6)
12	5.32 m	5.13 br s	5.12 br s	5.12 br s
16	ca. 4.53 m			
18	—	2.13 dd(6.4, 13.3)	2.13 dd(6.7, 12.8)	2.13 dd(6.4, 13.1)
21	4.25 d(4.0)			
22	—	4.20 br d(ca. 6)	4.15 br d(ca. 6)	4.16 br d(ca. 6)
23	1.22 s	1.51 s	1.46 s	1.49 s
24	1.10 s	3.48 d(11.6), 4.40 d(11.6)	3.33 d-like, 4.28 d-like	3.33 d-like, 4.28 d-like
25	0.79 s	0.71 s	0.68 s	0.68 s
26	0.77 s	0.82 s	0.82 s	0.82 s
27	1.31 s	1.22 s	1.19 s	1.24 s
28	0.96 s	0.98 s	0.98 s	0.98 s
29	1.07 s	1.20 s	1.18 s	1.19 s
1'	4.83 d(8.0)	5.06 d(7.6)	4.97 d(7.6)	4.97 d(8.0)
1''	5.33 d(7.3)	5.87 d(7.6)	5.75 d(7.6)	5.74 d(7.6)
1'''	4.92 d(6.5)	6.27 br s	6.33 br s	6.24 br s
6'''		1.81 d(6.4)	1.75 d(6.4)	1.74 d(6.1)
1''''			5.01 d(7.6)	4.86 d(7.3)

Table 3-5-79: Cos, MFs, and TSs of oleanane-type saponins 3-5-304~3-5-306.

No.	Compounds	MFs	Test solvents	References
3-5-304	—	C ₄₂ H ₆₆ O ₁₅ ①	C ₅ D ₅ N	[192]
3-5-305	scorzoneroside B	C ₄₇ H ₇₆ O ₁₉	C ₅ D ₅ N	[192]
3-5-306	scorzoneroside C	C ₄₁ H ₆₆ O ₁₄	C ₅ D ₅ N	[192]

① The molecular formula in the literature is not consistent with the structure.

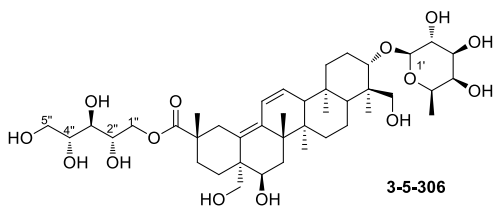
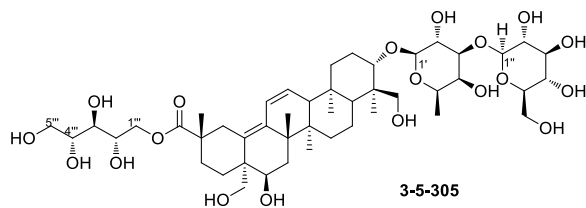
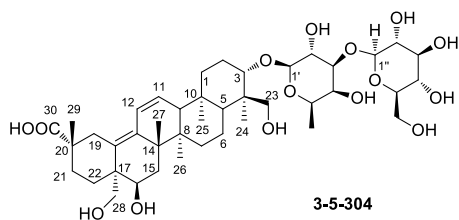
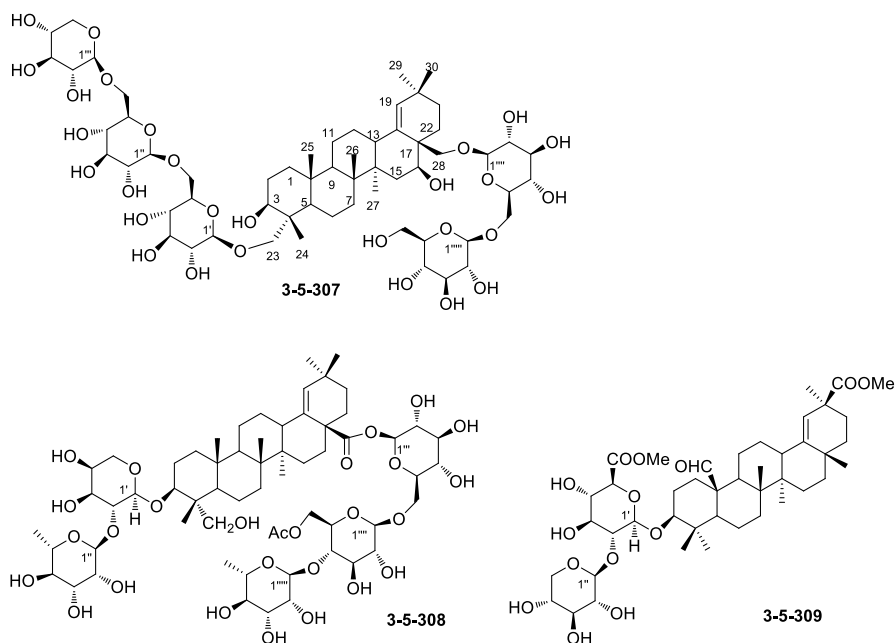


Table 3-5-80: ^1H NMR spectroscopic data of oleanane-type saponins **3-5-304**~**3-5-306**.

H	3-5-304	3-5-305	3-5-306
3	4.31 dd(4.9, 12.6)	4.32 m	4.30 m
11	6.76 d-like	6.61 dd-like	6.62 dd(2.8, 10.4)
12	5.74 d(10.7)	5.68 d(10.3)	5.69 d(10.4)
16	4.85 br s	4.80 br s	4.81 br s
23	3.72 m, 4.40 m	—	—
28	3.84 m, 4.40 m	—	—
1'	5.34 d(7.6)	5.01 d(7.9)	5.01 d(7.9)
6'	1.47 d(6.4)	—	—
1''	5.00 d(7.9)	5.36 d(7.9)	4.96 dd-like, 4.98 dd-like
5''	—	—	4.40 m, 4.57 m
1'''	—	4.96 dd-like, 5.10 dd-like	—
5'''	—	4.41 m, 4.58 m	—

Table 3-5-81: Cos, MFs, and TSs of oleanane-type saponins **3-5-307~3-5-309**.

No.	Compounds	MFs	Test solvents	References
3-5-307	gymnemoside-f	C ₅₉ H ₉₈ O ₂₈	C ₅ D ₅ N	[193]
3-5-308	3-O-[α -L-rhamnopyranosyl-(1 $\rightarrow$ 2)- α -L-arabinopyranosyl]-3 β ,23-dihydroxy-olean-18-en-28-oic acid 28-O-[α -L-rhamnopyranosyl-(1 $\rightarrow$ 4)- β -D-6-O-acetylglucopyranosyl-(1 $\rightarrow$ 6)- β -D-glucopyranosyl] ester	C ₆₁ H ₉₈ O ₂₇	C ₅ D ₅ N	[85]
3-5-309	periandrin V dimethyl ester	C ₄₃ H ₆₆ O ₁₄	CD ₃ OD	[194]

**Table 3-5-82:** ¹H NMR spectroscopic data of oleanane-type saponins **3-5-307~3-5-309**.

H	3-5-307	3-5-308	3-5-309
1	—	ax 1.00, eq 1.65	—
2	—	ax 2.02, eq 2.22 br d(12.5)	—
3	4.19 m	4.24	—
5	—	1.62	—
7	—	1.39 t(12.3)	—
12	—	ax 1.15, eq 1.59 br d(12.9)	—
13	2.55 dd-like	2.62 br d(11.1)	—

Table 3-5-82 (continued)

H	3-5-307	3-5-308	3-5-309
15	1.72 m, 2.34 dd-like	ax 2.11 dt(13.3, 3.0), eq 1.16	—
16	3.82 m	ax 1.45 t(12.9), eq 2.49 br d(12.3)	—
19	5.25 br s	ax 5.23 br s	5.15 s
22	1.92 m, 2.45 m	—	—
23	4.15 m	3.73 d(11.1), 4.10	0.79 s ^①
24	0.96 s	1.03 s	0.81 s ^①
25	0.87 s	0.93 s	1.24 s
26	1.08 s	1.16 s	1.00 s ^①
27	0.76 s	0.83 s	1.03 s ^①
28	3.90 m	—	—
29	0.99 s	1.06 s	1.10 s ^①
30	1.06 s	0.98 s	1.24 s ^①
OMe			3.64 d(OMe-30), 3.77 s(OMe)
1'	4.86 d(7.9)	5.11 d(5.5)	4.49 d(7.3)
2'	—	4.54 t(6.0)	—
3'	—	4.11	—
4'	—	4.17	—
5'	—	3.69 br d(11.7), 4.25	—
1''	4.99 d(7.6)	6.19 br s	4.51 d(7.8)
2''	—	4.70 dd(2.5, 1.5)	—
3''	—	4.62	—
4''	—	4.26 t(9.0)	—
5''	—	4.65	—
6''	—	1.63 d(6.0)	—
1'''	4.92 d(7.3)	6.32 d(8.0)	—
2'''	—	4.07 t(8.0)	—
3'''	—	4.17 t(8.0)	—
4'''	—	4.22 t(8.5)	—
5'''	—	4.08	—
6'''	—	4.30 dd(12.0, 2.0)	—
1''''	4.82 d(7.6)	4.92 d(8.0)	—
2''''	—	3.93 t(8.0)	—
3''''	—	4.11 t(8.0)	—
4''''	—	4.08 t(8.0)	—
5''''	—	3.83 m	—
6''''	—	4.54 dd(12.0, 3.0)	—
OAc		4.65 d(12.0)	—
1'''''	5.00 d(7.9)	1.95 s(6'''''-OAc)	—
2'''''	—	5.52 br s	—
3'''''	—	4.61	—
4'''''	—	4.48 dd(9.0, 3.0)	—
5'''''	—	4.30 t(9.0)	—
6'''''	—	4.82 dq(9.0, 6.0)	—
		1.70(6.0)	—

^① The data of methyls in the literature were not assigned, and here, the deployments are only to display the data.

Table 3-5-83: Co, MF, and TS of oleanane-type saponin **3-5-310**.

No.	Compound	MF	Test solvent	Reference
3-5-310	3-O-[β -D-glucopyranosyl-(1 $\rightarrow$ 2)-(β -D-glucopyranosyl-(1 $\rightarrow$ 3))- α -L-rhamnopyranosyl(1 $\rightarrow$ 4)- β -D-glucopyranosyl]steganogenin(peracetate)	C ₅₄ H ₈₈ O ₂₃	CDCl ₃	[195]

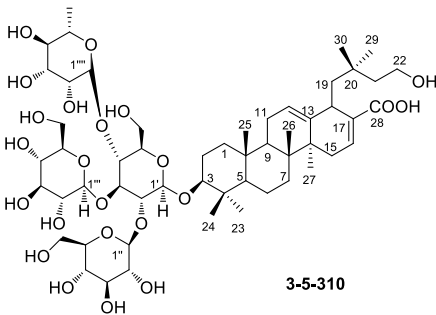
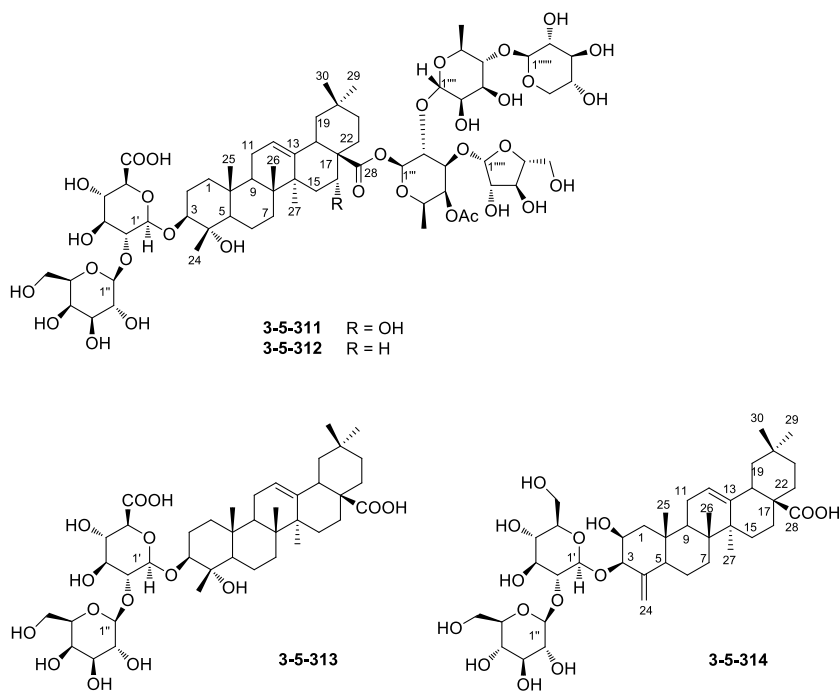


Table 3-5-84: ¹H NMR spectroscopic data of oleanane-type saponin **3-5-310**.

H	3-5-310	H	3-5-310	H	3-5-310
3	3.1 dd(5, 11)	29	0.9 s	1'''	4.52 d(8)
12	5.48 t(4)	30	0.95 s	3'''	5.21 t(9.5)
15	2.5 dd(8, 18)	OMe	3.75 s(28-OMe)	4'''	5.09 t(9.5)
16	6.96 dd(3, 7.5)	1'	4.39 br d(7.2)	5'''	3.7 m
18	3.5 m	2'	3.63 m	6'''	4.14 dd(2.3, 12.5)
22	3.5 m, 3.98 m	4'	3.49 m	1''''	4.87 d(1.5)
23	1.05 s	6'	4.32 m(2H)	2''''	5.13 dd(2.2, 3.5)
24	0.8 s	1''	5.06 d(8)	3''''	5.28 dd(3.3, 9.8)
25	0.85 s	3''	5.21 t(9.5)	4''''	5.1 t(10)
26	0.54 s	4''	5.12 t(9.5)	5''''	4.1 m
27	1.27 s	5''	3.7 m	6''''	1.24 d(7)
		6''	4.28 m	Oac	2.14~2 s
			4.08 dd(2.1, 12.1)		

Table 3-5-85: Cos, MFs, and TSs of oleanane-type saponins **3-5-311~3-5-314**.

No.	Compounds	MFs	Test solvents	References
3-5-311	vaccaroside F	C ₆₅ H ₁₀₂ O ₃₃	C ₅ D ₅ N	[167]
3-5-312	vaccaroside H	C ₆₅ H ₁₀₂ O ₃₂	C ₅ D ₅ N	[167]
3-5-313	—	C ₄₁ H ₆₄ O ₁₅	C ₅ D ₅ N	[167]
3-5-314	polygalasaponin XXVII	C ₄₁ H ₄₆ O ₁₃	C ₅ D ₅ N	[87]

**Table 3-5-86:** ^1H NMR spectroscopic data of oleanane-type saponins **3-5-311~3-5-314**.

H	3-5-311	3-5-312	3-5-313	3-5-314
2	—	—	—	4.52 m
3	3.60 m	3.68 m	3.70 dd(12.0, 4.1)	4.57 d(3)
12	5.56 br t	5.43 br s	5.62 br t	5.46 t-like
16	5.06 br s	—	5.23 br s	—
18	—	3.10 dd(14.4, 3.5)	3.60 dd(14.0, 3.5)	3.29 dd(14, 4)
19	—	—	2.83 t(13.6)	—
24	1.36 s	1.42 s	1.43 s	5.01 br s, 6.09 br s
25	0.78 s	0.79 s	0.82 s	1.21 s
26	1.06 s	1.09 s	1.18 s	1.04 s
27	1.69 s	1.23 s	1.82 s	1.29 s
29	0.91 s	0.87 s	1.03 s	0.97 s
30	0.98 s	0.88 s	1.06 s	1.01 s
1'	5.05 d(8.0)	5.13 d(7.7)	5.15 d(7.6)	5.17 d(8)
2'	4.08	4.16	4.19 dd(7.6, 8.5)	4.11 dd(8, 8.5)
3'	4.25	4.35	4.36 dd(8.5, 8.8)	4.32 t(8.5)
4'	4.49	4.56	4.57	4.20 t(9)
5'	4.50	4.60	4.60	3.92 m
6'	—	—	—	4.50 (ov), 4.54 dd(12, 2)

Table 3-5-86 (continued)

H	3-5-311	3-5-312	3-5-313	3-5-314
1''	5.09 d(8.1)	5.19 d(7.6)	5.20 d(7.6)	5.27 d(7.5)
2''	4.45	4.55	4.59	4.11 dd(7.5, 8.5)
3''	4.08	4.15	4.17 dd(9.5, 3.1)	4.16 t(8.5)
4''	4.45	N.A.	4.58	4.16 t(9)
5''	4.03 m	4.09	4.11 t(6.0)	3.90 m
6''	4.38, 4.50	4.51, 4.54	4.48 dd(12.0, 6.1) 4.56 dd(12.0, 6.5)	4.33 dd(12, 5) 4.46 dd(12, 2)
1'''	5.92 d(8.1)	6.00 d(8.0)		
2'''	4.40	4.54		
3'''	4.20	4.24		
4'''	5.71 d(3.0)	5.78 d(3.3)		
5'''	3.92	3.95		
6'''	1.14 d(6.2)	1.18		
OAc	1.99 s(4'''-OAc)	2.02 s(4'''-OAc)		
1''''	5.88 s	6.02 s		
2''''	4.61	4.75 s		
3''''	4.49	4.60		
4''''	4.23	4.30		
5''''	4.31 m	4.40		
6''''	1.66 d(6.2)	1.78 d(6.1)		
1'''''	5.62 s	5.72 s		
2'''''	4.75	4.89 m		
3'''''	4.69	4.83 m		
4'''''	4.58 m	4.71 m		
5'''''	4.07, 4.21	4.18, 4.33		
1''''''	5.01 d(7.0)	5.02 d(7.3)		
2''''''	3.92	4.05		
3''''''	3.92	4.04		
4''''''	4.07	4.04		
5''''''	3.40 t(9.8) 4.07	3.50 t(12.2) 4.21		

Table 3-5-87: Cos, MFs, and TSs of oleanane-type saponins 3-5-315~3-5-320.

No.	Compounds	MFs	Test solvents	References
3-5-315	3- <i>O</i> - β -D-glucopyranosylpyrocincholate	C ₃₅ H ₅₆ O ₈	C ₅ D ₅ N	[196]
3-5-316	inermiside II	C ₃₅ H ₅₆ O ₇	C ₅ D ₅ N	[197]
3-5-317	rubelloside C	C ₄₁ H ₆₆ O ₁₂	C ₅ D ₅ N	[198]
3-5-318	pyrocincholic acid 3 β - <i>O</i> - β -6-deoxy-D-glucopyranoside- 28- <i>O</i> - β -D-glucopyranoside	C ₄₁ H ₆₆ O ₁₂	CD ₃ OD	[199]

Table 3-5-87 (continued)

No.	Compounds	MFs	Test solvents	References
3-5-319	Inermiside I	C ₄₇ H ₇₆ O ₁₇	C ₅ D ₅ N	[197]
3-5-320	rubelloside D	C ₄₇ H ₇₆ O ₁₇	C ₅ D ₅ N	[198]

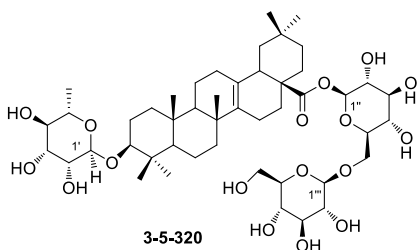
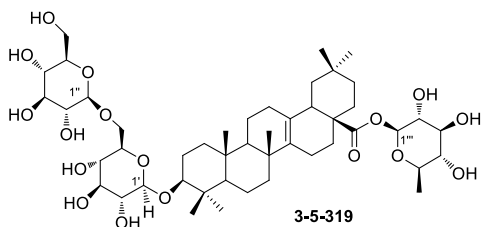
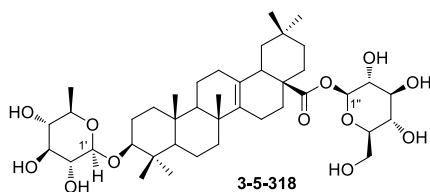
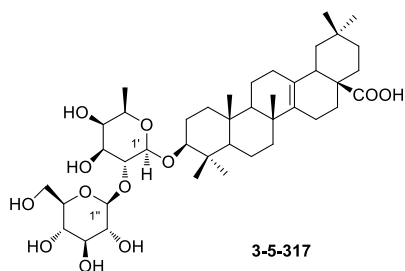
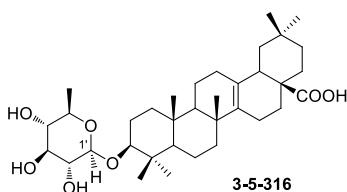
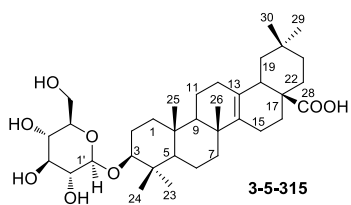


Table 3-5-88: ^1H NMR spectroscopic data of oleanane-type saponin **3-5-315**.

H	3-5-315	H	3-5-315	H	3-5-315
1	0.82 m, 1.55 t-like	15	2.19 (ov), 2.47 m	26	0.97 s
2	1.86 (ov), 2.28 (ov)	16	2.04 m	29	0.94 s
3	3.42 dd(4.4, 11.6)	18	2.84 dd(4.0, 12.0)	30	1.00 s
5	0.76 br d(11.6)	19	1.23 (ov), 1.68 dd-like	1'	4.95 d(8.0)
6	1.28 (ov), 1.52 (ov)	21	1.43 m	2'	4.04 t(8.4)
7	1.15 (ov), 1.80 (ov)	22	1.77 m, 2.14 (ov)	3'	3.98 m
9	1.01 t-like	23	1.33 s	4'	4.22 (ov)
11	1.44 (ov), 1.55 (ov)	24	0.97 s	5'	4.23 (ov)
12	2.04 (ov), 2.35 (ov)	25	0.73 s	6'	4.57 dd(2.4, 12)
					4.40 dd(5.2, 11.6)

Table 3-5-89: ^1H NMR spectroscopic data of oleanane-type saponins **3-5-316~3-5-320**.

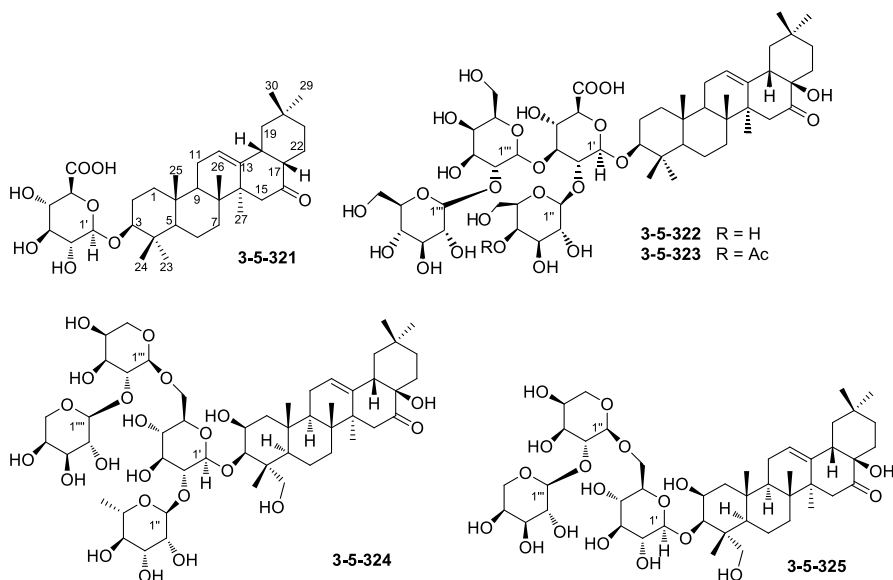
H	3-5-316	3-5-317	3-5-318	3-5-319	3-5-320
3	3.42 dd(4.0, 11.5)	3.31 dd(11.6, 4.2)	3.04 m	3.50 dd(11.7, 4.3)	3.28 dd(11.5, 4.2)
18	2.87 dd(4.0, 12.0)	2.85 dd(11.7, 3.9)	—	2.86 dd(3.7, 11.8)	2.71 dd(11.6, 3.3)
23	1.33 s	1.30 s	—	1.40 s	1.25 s
24	0.95 s	1.10 s	—	1.05 s	0.98 s
25	0.77 s	0.77 s	—	0.92 s	0.94 s
26	0.98 s	0.95 s	—	1.22 s	0.91 s
29	0.98 s	0.99 s	—	0.99 s	0.82 s
30	1.00 s	1.00 s	—	0.99 s	0.78 s
1'	4.88 d(8.0)	4.78 d(7.5)	4.22 d(7.8)	4.94 d(7.7)	5.33 br s
2'	4.05 t(8.5)	4.54 dd(9.3, 7.5)	—	4.20 (ov)	4.54 br s
3'	4.16 t(8.5)	4.15 dd(9.3, 3.3)	—	4.27 t(4.6)	4.48 (ov)
4'	3.75 t(9.0)	4.00 br d(3.3)	—	4.40 (ov)	4.30 (ov)
5'	3.83 m	3.75 (ov)	—	4.18 (ov)	4.30 (ov)
6'	1.67 d(6.0)	1.53 d(6.3)	1.22 d(6.5)	4.79 d(10.0), 4.43 (ov)	1.69 d(5.5)
1''		5.21 d(7.6)	5.34 d(7.8)	5.10 d(7.7)	6.24 d(8.0)
2''		4.10 dd(9.1, 7.6)	—	4.11 t(8.2)	4.11 t(8.0)
3''		4.15 t(9.1)	—	3.96 t(4.0)	4.30 (ov)
4''		4.30 t(9.1)	—	4.27 (ov)	4.15 (ov)
5''		3.75 (ov)	—	4.25 (ov)	3.90 (ov)
6''		4.40 d(3.4), 4.40 d(3.4)	—	4.56 dd(2.4, 11.8)	4.48 (ov), 4.30 m
1'''				4.43 (ov)	
2'''				6.32 d(8.0)	5.00 d(7.7)
3'''				4.11 t(8.2)	4.00 t(7.7)
				4.27 t(4.6)	4.15 (ov)

Table 3-5-89 (continued)

H	3-5-316	3-5-317	3-5-318	3-5-319	3-5-320
4'''				3.81 t(8.8)	4.30 (ov)
5'''				3.89 m	4.08 (ov)
6'''				1.74 d(6.0)	4.30 (ov), 4.72 d(10.2)

Table 3-5-90: Cos, MFs, and TSs of oleanane-type saponins 3-5-321~3-5-326.

No.	Compounds	MFs	Test solvents	References
3-5-321	auriculatusaponin A	C ₃₄ H ₅₄ O ₈	C ₅ D ₅ N	[200]
3-5-322	camellioside A	C ₅₃ H ₈₄ O ₂₄	C ₅ D ₅ N	[201]
3-5-323	camellioside B	C ₅₄ H ₈₄ O ₂₅	C ₅ D ₅ N	[201]
3-5-324	2β,3β,17,23-tetrahydroxy-28-norolean-12-en-16-one-3-O-α-L-arabinopyranosyl(1→2)-α-L-arabinopyranosyl(1→6)-[α-L-rhamnopyranosyl(1→2)]-β-D-glucopyranoside	C ₅₀ H ₈₀ O ₂₂	CD ₃ OD	[202]
3-5-325	2β,3β,17,23-tetrahydroxy-28-norolean-12-en-16-one-3-O-α-L-arabinopyranosyl(1→2)-α-L-arabinopyranosyl(1→6)-β-D-glucopyranoside	C ₄₄ H ₇₀ O ₁₈	CD ₃ OD	[202]
3-5-326	camellioside C	C ₅₃ H ₈₂ O ₂₃	C ₅ D ₅ N	[201]



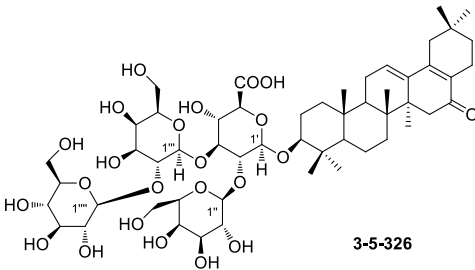


Table 3-5-91: ¹H NMR spectroscopic data of oleanane-type saponins **3-5-321~3-5-325**.

H	3-5-321	3-5-322	3-5-323	3-5-324	3-5-325
1	—	—	—	2.11 d(16.0) 1.26 d(16.0)	2.11 dd(3.6, 14.9) 1.25 dd(4.8, 14.9)
2	—	—	—	4.41 m	4.39 m
3	3.38 dd(4.6, 11.6)	3.27 dd(4.5, 11.8)	3.30 dd(3.5, 11.0)	3.74 d(3.6)	3.70 d(3.5)
5	0.76	—	—	1.39 d(11.3)	—
6	—	—	—	1.59 m	1.58 m
7	—	—	—	1.67 td(14.3, 4.0) 1.29 d(14.3)	1.67 1.30
9	2.51 t	—	—	1.59 dd(11.8, 7.1)	1.59 m
11	—	—	—	2.81 m, 2.05 m	2.18 m, 2.04 m
12	5.36 dd(2.5, 3.5)	5.49 br s	5.45 br s	5.46 t(3.6)	5.45 t(4.1)
15	2.02 d(14.5) 2.60 d(14.5)	—	—	3.35 d(14.9) 1.68 d(14.9)	3.34 d(13.3) 1.68 d(13.3)
17	2.82 m(3.9, 6.0, 6.0)	—	—	—	—
18	2.25 brd(11.5)	3.10 dd(3.5, 14.5)	3.08 dd-like	2.83 dd(4.2, 15.0)	2.83 dd(14.2, 3.9)
19	—	—	—	1.48 t(15.0) 1.27 dd(15.0, 4.2)	1.48 t(14.2) 1.27 dd(3.9, 14.2)
21	—	—	—	2.05 d(14.9) 1.46 m	2.06 d(13.0) 1.46 dt(4.8, 13.0)
22	—	—	—	1.60 t(15.5) 1.30 dd(15.5, 3.2)	1.58 (ov) 1.31 (ov)
23	1.311 s	1.34 s	1.37 s	3.65 d(12.2) 3.33 d(12.2)	3.67 d(11.5) 3.27 d(11.5)
24	1.005 s	1.10 s	1.10 s	1.00 s	0.99 s
25	0.846 s	0.87 s	0.87 s	1.35 s	1.36 s
26	0.910 s	1.27 s	1.27 s	1.16 s	1.16 s
27	1.249 s	1.37 s	1.34 s	1.20 s	1.20 s

Table 3-5-91 (continued)

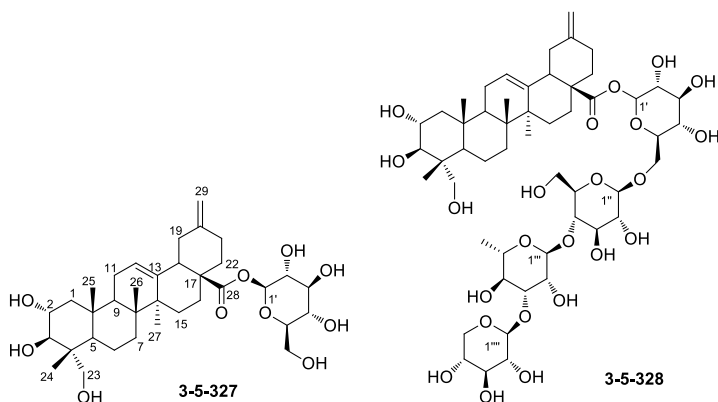
H	3-5-321	3-5-322	3-5-323	3-5-324	3-5-325
29	0.854 s	0.90 s	0.90 s	0.90 s	0.90 s
30	0.876 s	0.98 s	0.98 s	1.01 s	1.01 s
1'	5.03 d(7.8)	4.90 d(7.4)	4.89 d(7.6)	4.62 d(7.2)	4.49 d(7.8)
2'	4.14 dd(7.8, 9.1)	—	—	3.53 (ov)	3.31 (ov)
3'	4.34 dd(9.1, 9.2)	—	—	3.52 (ov)	3.39 (ov)
4'	4.60 dd(9.2, 9.7)	—	—	3.53 (ov)	3.40 (ov)
5'	4.69 d(9.7)	—	—	3.48 (ov)	3.50 (ov)
6'				4.04 dd(12.1, 2.3)	4.05 bd(11.2)
				3.80 dd(12.1, 4.8)	3.80 dd(11.2, 4.0)
1''		5.76 d(7.6)	5.87 d-like	5.41 d(1.8)	4.56 d(6.1)
2''		—	—	4.05 dd(1.8, 4.0)	3.81 (ov)
3''		—	—	3.83 dd(4.0, 9.6)	3.79 (ov)
4''		—	5.93br s	3.44 t(9.6)	3.87 (ov)
5''		—	—	3.99 dd(6.2, 9.6)	3.89 (ov)
					3.57 d(10.0)
6''		—	—	1.28 d(6.2)	
OAc			2.13 s(4''-OAc)		
1'''		5.70 d(7.6)	5.70 d(7.6)	4.53 d(6.8)	4.53 d(7.1)
2'''		—	—	3.82 (ov)	3.68 t(7.1)
3'''		—	—	3.79 (ov)	3.60 (ov)
4'''		—	—	3.91 d(4.5)	3.84 d(4.0)
5'''		—	—	3.88 dd(4.5, 13.3)	4.00 dd(4.0, 12.3)
				3.58 dd(2.3, 13.3)	3.62 bd(12.3)
1''''		5.18 d(7.7)	5.16 d(7.6)	4.54 d(7.0)	
2''''		—	—	3.69 dd(7.1, 8.9)	
3''''		—	—	3.60 dd(8.9, 4.7)	
4''''		—	—	3.86 d(4.7)	
5''''		—	—	4.01 bd(14.0)	
				3.63 bd(14.0)	

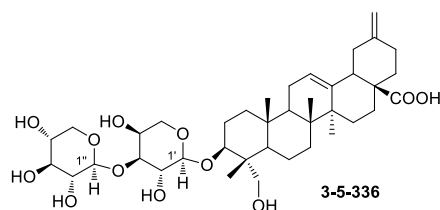
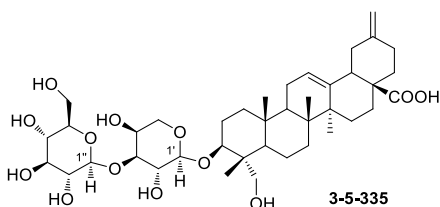
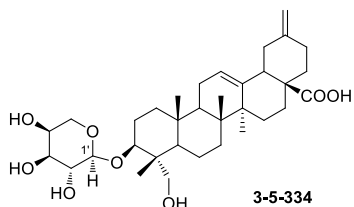
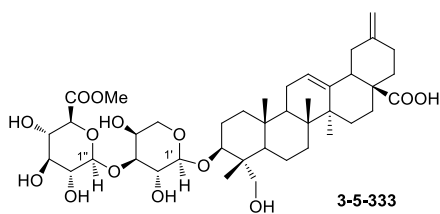
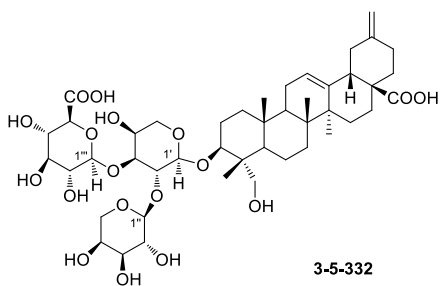
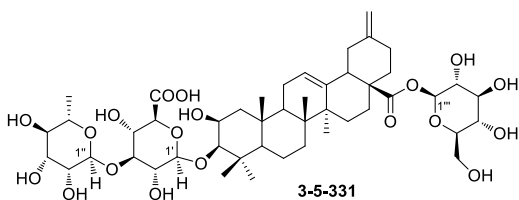
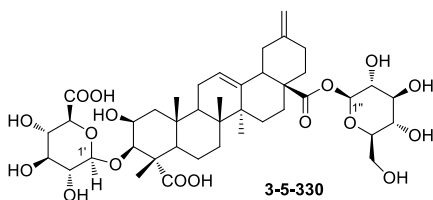
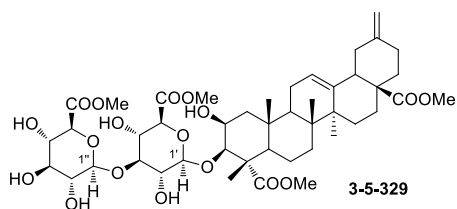
Table 3-5-92: ¹H NMR spectroscopic data of oleanane-type saponin **3-5-326**.

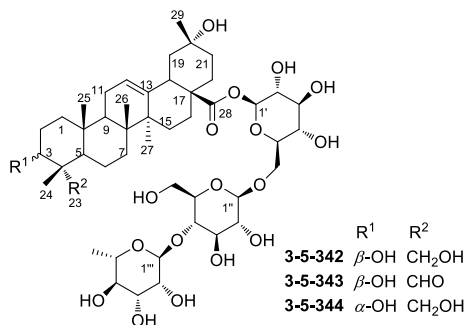
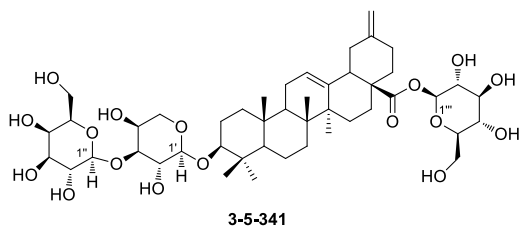
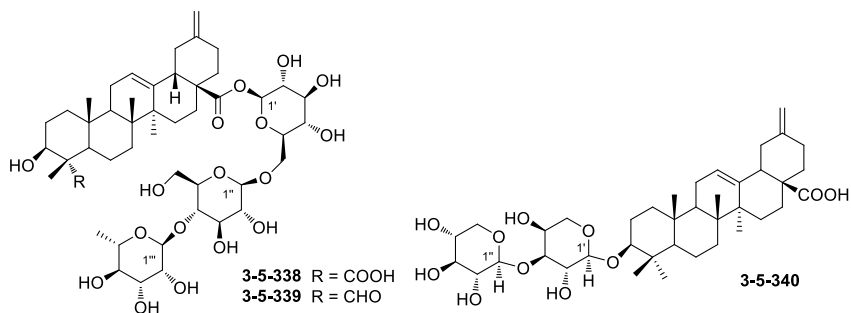
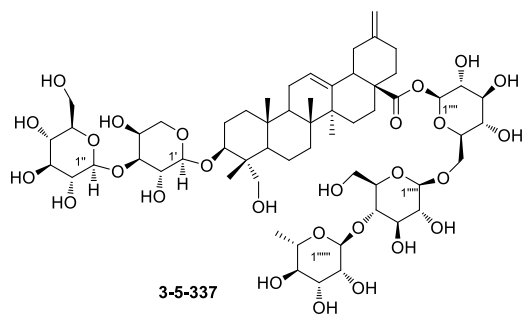
H	3-5-326	H	3-5-326	H	3-5-326
3	3.30 dd(4.5, 11.7)	26	0.87 s	1'	4.90 d(7.4)
12	6.07 br s	27	1.20 s	1''	5.76 d(7.7)
23	1.30 s	29	0.90 s	1'''	5.69 d(7.6)
24	1.10 s	30	0.88 s	1''''	5.17 d(8.1)
25	0.84 s				

Table 3-5-93: Cos, MFs, and TSs of oleanane-type saponins **3-5-327~3-5-351**.

No.	Compounds	MFs	Test solvents	References
3-5-327	mutongsaponin A	C ₃₅ H ₅₄ O ₁₀	C ₅ D ₅ N	[203]
3-5-328	mutongsaponin B	C ₅₂ H ₈₂ O ₂₃	C ₅ D ₅ N	[203]
3-5-329	lindernioside B methyl ester	C ₄₅ H ₆₆ O ₁₈	C ₅ D ₅ N	[204]
3-5-330	3-β- <i>O</i> -[β-glucuronopyranosyl]-2β,3β-dihydroxy-30-norolean-12,20(29)-diene-23,28-dioic acid 28- <i>O</i> -[glucopyranosyl] ester	C ₄₂ H ₆₄ O ₁₇	CD ₃ OD	[148]
3-5-331	amaranthus-saponin III	C ₄₈ H ₇₄ O ₁₉	C ₅ D ₅ N	[205]
3-5-332	fargoside C	C ₄₅ H ₆₈ O ₁₈	C ₅ D ₅ N	[206]
3-5-333	fargoside D	C ₄₁ H ₆₂ O ₁₄	C ₅ D ₅ N	[206]
3-5-334	quinatoside A	C ₃₄ H ₅₂ O ₈	C ₅ D ₅ N	[207]
3-5-335	quinatoside B	C ₄₀ H ₆₂ O ₁₃	C ₅ D ₅ N	[207]
3-5-336	quinatoside C	C ₃₉ H ₆₀ O ₁₂	C ₅ D ₅ N	[207]
3-5-337	mutongsaponin D	C ₅₈ H ₉₂ O ₂₇	C ₅ D ₅ N	[203]
3-5-338	acanjaposide A	C ₄₇ H ₇₂ O ₁₉	C ₅ D ₅ N	[208]
3-5-339	acanjaposide B	C ₄₇ H ₇₂ O ₁₈	C ₅ D ₅ N	[208]
3-5-340	quinatoside D	C ₃₉ H ₆₀ O ₁₁	C ₅ D ₅ N	[207]
3-5-341	nudicaucin A	C ₄₆ H ₇₂ O ₁₇	CD ₃ OD	[209]
3-5-342	nipponoside E	C ₄₇ H ₇₆ O ₁₉	C ₅ D ₅ N	[210]
3-5-343	acanjaposide C	C ₄₇ H ₇₄ O ₁₉	C ₅ D ₅ N	[208]
3-5-344	spinoside C6	C ₄₇ H ₇₆ O ₁₉	C ₅ D ₅ N	[211]
3-5-345	fargoside B	C ₄₆ H ₇₆ O ₁₈	C ₅ D ₅ N	[206]
3-5-346	spinoside C7	C ₄₇ H ₇₄ O ₁₉	C ₅ D ₅ N	[211]
3-5-347	spinoside C3	C ₄₇ H ₇₆ O ₁₈	C ₅ D ₅ N	[211]
3-5-348	yemuoside YM ₁₇	C ₄₇ H ₇₆ O ₁₉	C ₅ D ₅ N	[212]
3-5-349	fargoside A	C ₄₀ H ₆₄ O ₁₃	C ₅ D ₅ N	[206]
3-5-350	yemuoside YM ₁₉	C ₄₇ H ₇₄ O ₁₈	C ₅ D ₅ N	[212]
3-5-351	yemuoside YM ₁₈	C ₄₇ H ₇₆ O ₁₉	C ₅ D ₅ N	[212]







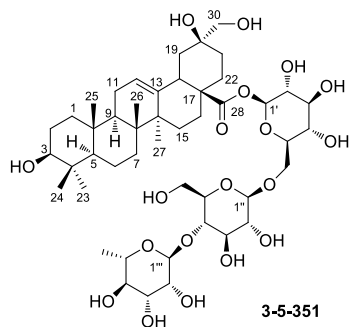
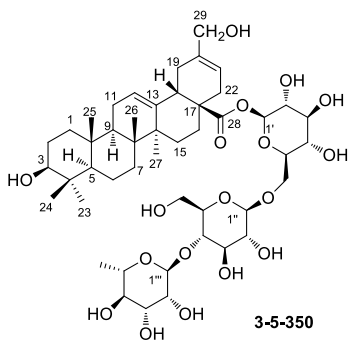
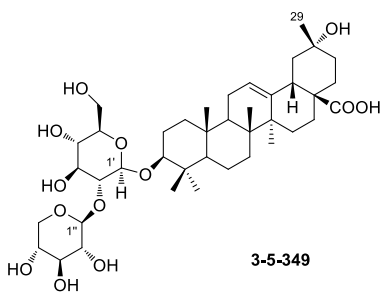
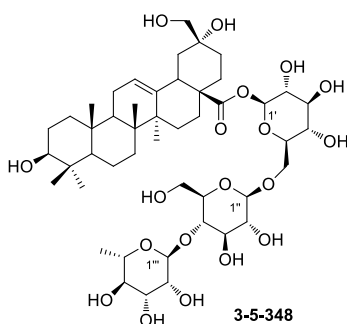
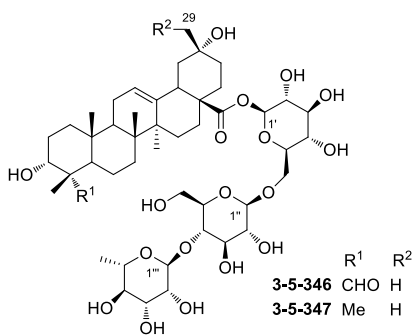
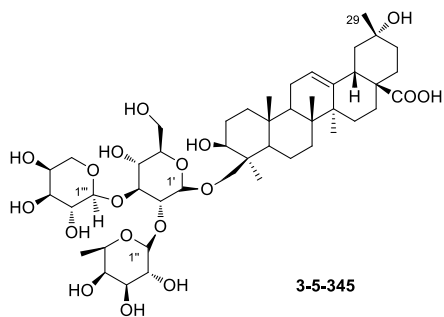


Table 3-5-94: ^1H NMR spectroscopic data of oleanane-type saponins **3-5-327~3-5-331**.

H	3-5-327	3-5-328	3-5-329	3-5-330	3-5-331
2	—	—	4.71 m	4.31 ddd(3.0, 3.7, 4.0)	—
3	—	—	4.46 d(4)	4.11 d(3.7)	—
12	5.40 br s	5.39 br s	5.37 t-like	—	5.39 t
18	3.09 dd	3.08 dd(13.0, 4.5)	2.99 dd(13.5, 4.5)	2.77 dd(4.4, 13.6)	—
19	2.52 t(13.5)	2.49 t(13.5)	α 2.55 br t(13.5)	ax 2.59 dd(13.6, 13.9)	—
	2.13 dd(14.5, 4.0)	2.11 dd(13.5, 4.0)	—	—	—
23	4.21 d 3.70 d	4.19 d 3.69 d	—	—	1.09 s ^①
24	1.05 s	1.04 s	1.89 s	1.43 s	1.24 s ^①
25	1.07 s	1.07 s	1.51 s	1.31 s	1.27 s ^①
26	1.11 s	1.10 s	0.82 s	0.84 s	1.34 s ^① 1.44 s ^①
27	1.12 s	1.09 s	1.20 s	1.23 s	—
29	4.72 s 4.66 s	4.69 s 4.63 s	4.73 br s 4.77 br s	4.65 br(2H)	4.74 br s(2H)
OMe	—	—	3.84 s(OMe-23) 3.65 s(OMe-28) 3.69 s(OMe-6') 3.60 s(OMe-6'')	—	—
1'	6.28 d(8.0)	6.18 d(8.0)	4.94 d(8)	4.44 d(7.8)	4.97 d(8.0)
2'	4.18	—	3.86 dd(8, 9)	3.32 dd(7.8, 9.0)	—
3'	4.26 t-like	—	4.22 t(9)	3.37 dd(9.0, 9.0)	—
4'	4.32 d(9.5)	—	4.26 t(9)	3.39 dd(9.0, 9.0)	—
5'	4.00 d(8.5)	—	4.46 d(9)	3.40 d(9.0)	—
6'	4.38, 4.45 d(11.5)	—	—	—	—
1''	—	4.91 d(7.5)	5.41 d(8)	5.40 d(8.1)	6.31 s
2''	—	—	4.00 dd(8, 9)	3.35 dd(8.1, 9.1)	—
3''	—	—	4.20 t(9)	3.38 dd(9.1, 9.1)	—
4''	—	—	4.37 dd(9, 9.5)	3.58 dd(9.1, 9.1)	—
5''	—	—	4.50 d(9.5)	3.83 m	—
6''	—	—	—	3.35 dd(12.5, 3.0) 3.70 dd(12.5, 4.4)	1.71 d
1'''	—	5.86 br s	—	—	6.26 d(8.1)
6'''	—	1.65 d(6.0)	—	—	—
1''''	—	5.22 d(7.5)	—	—	—

^①The data of methyls in the literature were not assigned, and here, the deployments are only to display the data.

Table 3-5-95: ^1H NMR spectroscopic data of oleanane-type saponins **3-5-332~3-5-334**, **3-5-337**, and **3-5-338**.

H	3-5-332	3-5-333	3-5-334	3-5-337	3-5-338
3	4.19	4.31 dd(11.9, 4.6)	—	—	—
5	1.68 d(9.6)	1.72 d(11.0)	—	—	—
7	—	—	—	—	1.32 ddd(2.4, 3.2, 12.2)
9	—	—	—	—	1.78 dd(6.9, 10.5)
12	5.48 brt(3.2)	5.49 brt(3.4)	5.49 t	5.42 br s	5.46 dd(3.4, 3.4)
15	—	—	—	—	2.27 ddd(3.3, 13.7, 13.7)
18	3.22 dd(13.1, 4.5)	3.23 dd(13.7, 5.0)	3.22 dd(4, 12)	3.10 dd	3.10 dd(4.9, 13.4)
19	—	—	2.60 t(13)	2.52 d, 2.14 d	2.55 dd(13.7, 13.7)
23	3.76 d(10.5) 4.43 d(10.5)	3.74 d(10.5) 4.35 d(10.5)	—	—	—
24	1.09 s	0.94 s	0.92 s ^①	0.93 s	1.65 s
25	0.93 s	0.92 s	0.93 s ^①	0.94 s	1.01 s
26	1.00 s	1.01 s	1.00 s ^①	1.08 s	1.10 s
27	1.21 s	1.21 s	1.21 s ^①	1.13 s	1.16 s
29	4.74 br s 4.79 br s	4.75 br s 4.80 br s	4.75 s 4.80 s	4.72 s 4.66 s	4.68 br s 4.75 br s
1'	4.96 d(7.2)	4.98 d(7.5)	5.00 d(7)	4.94 d(7.5)	6.18 d(7.9)
2'	4.70 dd(7.4, 7.2)	4.60 dd(8.2, 7.5)	—	—	4.09 m
3'	4.12	4.06	—	—	4.19 m
4'	4.47	4.34	—	—	4.27 m
5'	3.52 br d(12.0) 4.12 br d(12.0)	3.65 br d(12.1) 4.18 dd(12.1, 2.0)	—	—	4.05 m
6'	—	—	—	—	4.31 m, 4.64 m
1''	5.32 d(7.5)	5.44 d(7.8)	—	5.31 d(8.0)	4.96 d(7.9)
2''	4.45 dd(8.2, 7.5)	4.04 dd(9.2, 7.8)	—	—	3.94 dd(8.4, 8.5)
3''	4.06	4.29 t(9.2)	—	—	4.14 m
4''	4.17	4.46 t(9.2)	—	—	4.40 dd(9.2, 9.8)
5''	3.47 br d(11.2) 4.19	4.58 d(9.2)	—	—	3.66 ddd (2.4, 3.1, 9.2)
6''	—	—	—	—	4.08 m, 4.21 m
OMe	—	3.73 s(OMe-6'')	—	—	—
1'''	5.38 d(7.8)	—	—	6.19 d(8.0)	5.84 s
2'''	4.05	—	—	—	4.68 m

Table 3-5-95 (continued)

H	3-5-332	3-5-333	3-5-334	3-5-337	3-5-338
3'''	4.31 t(9.0)			—	4.55 dd(3.4, 9.5)
4'''	4.53 t(9.0)			—	4.33 dd(9.2, 9.4)
5'''	4.62 d(9.0)			—	4.95 m
6'''				—	1.70 d(6.1)
1''''				4.98 d(6.0)	
1'''''				5.84 br s	

① The data of methyls in the literature were not assigned, and here, the deployments are only to display the data.

Table 3-5-96: ¹H NMR spectroscopic data of oleanane-type saponins 3-5-335, 3-5-336, and 3-5-339~3-5-341.

H	3-5-335	3-5-336	3-5-339	3-5-340	3-5-341
12	5.49 br s	5.48 br s	5.46 dd(3.4, 3.4)	5.49 br s	5.32 br t(ca 1.0)
18	3.24 dd(4.4, 12)	3.25 m	3.13 dd(4.3, 13.4)	3.61 m	—
19	2.62 t(12)	2.81 t(13.2)	2.59 ddd(13.4, 13.4)	2.81 t(13.2)	—
23	—	—	—	0.88 s ^①	0.79 s ^①
24	0.93 s ^①	0.96 s ^①	1.38 s	0.99 s ^①	0.83 s ^①
25	0.94 s ^①	1.02 s ^①	0.94 s	1.08 s ^①	0.94 s ^①
26	1.01 s ^①	1.06 s ^①	1.07 s	1.28 s ^①	1.04 s ^①
27	1.22 s ^①	1.21 s ^①	1.21 s	1.28 s ^①	1.17 s ^①
29	4.75 s	4.74 s	4.70 br s	4.75 s	4.61 br s
	4.80 s	4.79 s	4.76 br s	4.81 s	
1'	4.98 d(7.4)	5.08 d(6.2)	6.20 d(7.9)	4.89 d(6.2)	4.28 d(7.3)
1''	5.31 d(7.8)	5.11 d(6.7)	4.97 d(7.9)	5.08 d(6.9)	4.50 d(7.5)
1'''			5.85 s		5.36 d(8.0)
6'''			1.71 d(6.1)		—

① The data of methyls in the literature were not assigned, and here, the deployments are only to display the data.

Table 3-5-97: ¹H NMR spectroscopic data of oleanane-type saponins 3-5-342~3-5-344, 3-5-346, and 3-5-347.

H	3-5-342	3-5-343	3-5-344	3-5-346	3-5-347
1	—	1.55 ddd(3.1, 3.1, 13.4)	—	—	—
3	—	—	3.88 s	3.98 s	3.64 s

Table 3-5-97 (continued)

H	3-5-342	3-5-343	3-5-344	3-5-346	3-5-347
12	5.56 t-like	5.50 dd(3.7, 3.7)	5.45 t-like	5.48 t-like	5.47 t-like
18	—	3.24 dd(4.3, 13.8)	3.18 dd(3.7, 14.4)	3.21 dd(14.1, 4.3)	3.20 dd(4.3, 14.3)
19	—	2.40 dd(13.8, 13.8)	—	—	—
23	—	—	—	9.94 s	1.17 s
24	1.06 s ^①	1.36 s	0.73 s	1.08 s	0.86 s
25	1.12 s ^①	0.93 s	0.93 s	0.93 s	0.93 s
26	1.21 s ^①	1.09 s	1.10 s	1.11 s	1.08 s
27	1.22 s ^①	1.21 s	1.10 s	1.12 s	1.12 s
29	1.52 s ^①	1.47 s	1.42 s	1.43 s	1.42 s
1'	6.31 d(8.1)	6.25 d(7.9)	6.19 d(7.9)	6.23 d(8.3)	6.22 d(8.3)
1''	—	4.98 d(7.9)	4.93 d(8.0)	4.95 d(7.9)	4.94 d(7.6)
1'''	5.91 s	5.85 s	5.77 s	5.83 s	5.82 s
6'''	1.76 d(6.2)	1.71 d(6.7)	—	1.64 d(6.1)	1.67(6.1)

^① The data of methyls in the literature were not assigned, and here, the deployments are only to display the data.

Table 3-5-98: ¹H NMR spectroscopic data of oleanane-type saponins 3-5-345 and 3-5-348~3-5-351.

H	3-5-345	3-5-348	3-5-349	3-5-350	3-5-351
1	—	0.90~0.98 m 1.46~1.54 m	—	0.95~1.03 m 1.50~1.58 m	0.93~1.01 m 1.47~1.55 m
2	—	1.75~1.83 m	—	1.77~1.85 m	1.76~1.84 m
3	3.35	3.42 dd(10.2, 5.8)	3.32 dd(11.9, 4.1)	3.42 dd(10.2, 5.8)	3.41 dd(10.2, 5.8)
5	0.83 d(12.6)	0.81 d(10.9)	0.74 d(11.0)	0.83 d(10.9)	0.84 d(10.9)
6	—	1.31~1.39 m 1.47~1.55 m	—	1.34~1.42 m 1.47~1.55 m	1.34~1.42 m 1.48~1.56 m
7	—	1.29~1.37 m 1.41~1.49 m	—	1.29~1.37 m 1.41~1.49 m	1.34~1.42 m 1.46~1.54 m
9	—	1.57~1.65 m	—	1.62~1.70 m	1.61~1.69 m
11	—	1.81~1.89 m	—	1.87~1.95 m	1.83~1.91 m
12	5.53 brt(3.3)	5.45 t(3.8)	5.54 brt(3.2)	5.46 t(3.8)	5.47 t(3.8)
15	—	1.13~1.21 m 2.26~2.34 m	—	1.07~1.15 m 2.31~2.39 m	1.17~1.25 m 2.40 brt(13.3)
16	—	2.01~2.09 m 2.26~2.34 m	—	1.91~1.99 m 1.99~2.07 m	2.04~2.12 m 2.18~2.26 m
18	3.35	3.30 dd(14.3, 4.4)	3.36 dd(13.7, 4.1)	3.22 dd(10.6, 7.5)	3.80~3.88 m
19	—	2.18~2.26 m 2.28~2.36 m	—	2.27~2.35 m 2.52~2.60 m	1.96~2.04 m 2.28 t(14.0)

Table 3-5-98 (continued)

H	3-5-345	3-5-348	3-5-349	3-5-350	3-5-351
21	—	1.89~1.97 m 2.06~2.14 m	—	5.75 br s	1.82~1.90 m
22	—	1.94~2.02 m	—	2.30~2.38 m 2.60~2.68 m	1.93~2.01 m 2.60 td(13.3, 4.8)
23	1.46 s	1.21 s	1.31 s	1.21 s	1.21 s
24	4.12	1.01 s	1.10 s	1.03 s	1.02 s
25	0.71 s	0.90 s	0.84 s	0.94 s	0.92 s
26	0.90 s	1.09 s	1.00 s	1.13 s	1.15 s
27	1.20 s	1.23 s	1.28 s	1.26 s	1.26 s
29	1.58 s	4.03 s	1.58 s	4.29 s	
30					3.86 s
1'	4.80 d(7.4)	6.22 d(8.1)	4.92 d(7.8)	6.22 d(8.1)	6.25 d(8.1)
2'	4.23	4.07~4.15 m	4.15	4.10~4.18 m	4.09~4.17 m
3'	4.21	4.16~4.24 m	4.31 t(8.7)	4.16~4.24 m	4.17~4.25 m
4'	4.09	4.25~4.33 m	4.17	4.23~4.31 m	4.34~4.42 m
5'	3.82 m	4.03~4.11 m	3.93 m	4.06~4.14 m	4.01~4.09 m
6'	4.28	4.27~4.35 m	4.35 dd(12.0, 6.5)	4.28~4.36 m	4.27~4.35 m
	4.44 dd(10.4, 1.6)	4.61~4.69 m	4.54 dd(12.0, 2.0)	4.62~4.70 m	4.62 dd(11.9, 2.1)
1''	5.50 d(7.5)	4.95 d(7.6)	5.27 d(6.9)	5.00 d(7.9)	4.93 d(7.4)
2''	4.32 dd(9.7, 7.5)	3.93 t(8.2)	4.12	3.94 t(8.5)	3.93 t(8.5)
3''	3.96 dd(9.7, 3.0)	4.09~4.17 m	4.13	4.12~4.20 m	4.10~4.18 m
4''	3.91 d(3.0)	4.38 t(9.2)	4.24 m	4.41 t(9.2)	4.40 t(9.2)
5''	3.66 q(6.4)	3.66 br d(9.2)	3.70 dd(11.0, 10.5)	3.68 br d(9.2)	3.65 br d(9.2)
			4.39 dd(11.0, 5.0)		
6''	1.51 d(6.4)	4.05~4.13 m 4.15~4.23 m		4.06~4.14 m 4.17~4.25 m	4.05~4.13 m 4.17~4.25 m
1'''	5.21 d(7.5)	5.83 br s		5.84 br s	5.84 br s
2'''	4.47 dd(8.2, 7.5)	4.63~4.71 m		4.62~4.70 m	4.67 br s
3'''	4.11	4.55 dd(9.2, 3.4)		4.54 dd(9.2, 3.1)	4.55 dd(9.2, 3.1)
4'''	4.25	4.27~4.35 m		4.27~4.35 m	4.28~4.36 m
5'''	3.77 br d(10.3)	4.89~4.97 m		4.90~4.98 m	4.90~4.98 m
	4.26				
6'''		1.68 d(6.2)		1.69 d(6.2)	1.68 d(6.2)

Bibliography

- [69] Shoji N, Umeyama A, Yoshikawa K et al. *Phytochemistry*. 1994;37(5):1397.
- [70] Jia ZH, Koike K, Ohmoto T et al. *Phytochemistry*. 1994;37(5):1389.
- [71] Apers S, Bruyne TED, Claeys M et al. *Phytochemistry*. 1999;52:1121.

- [72] Germonprez N, Puyvelde LV, Maes L et al. *Tetrahedron*. 2004;60:219.
- [73] Lavaud C, Massiot G, Barrera JB et al. *Phytochemistry*. 1994;37(6):1671.
- [74] Huang J, Ogihara Y, Zhang H et al. *Phytochemistry*. 2000;54:817.
- [75] Wen P, Zhang X-M, Yang Z et al. *J Asian Nat Prod Res*. 2008;10(9):873.
- [76] Gromova AS, Lutsky VI, Semenov AA et al. *Phytochemistry*. 1998;47(3):437.
- [77] Mori F, Miyase T, Ueno A. *Phytochemistry*. 1994;36(6):1485.
- [78] Yamamoto A, Suzuki H, Miyase T et al. *Phytochemistry*. 1993;34(2):485.
- [79] Ebata N, Nakajima K, Hayashi K et al. *Phytochemistry*. 1996;41(3):895.
- [80] Sánchez-Contreras S, Díaz-Lanza AM, Bartolomé C et al. *Phytochemistry*. 2000;54:783.
- [81] Luo S-Q, Lin L-Z, Cordell GA. *Phytochemistry*. 1993;33(5):1197.
- [82] Zhao YY, Luo HS, Wang B et al. *Phytochemistry*. 1996;42(6):1673.
- [83] Yamamoto A, Miyase T, Ueno A et al. *Chem Pharm Bull*. 1993;41(7):1270.
- [84] Liu ZM, Li D, Owen NL. *J Nat Prod*. 1995;58(10):1600.
- [85] Melek FR, Miyase T, Abdel-Khalik SM et al. *Phytochemistry*. 2002;60:185.
- [86] Sánchez-Contreras S, Díaz-Lanza A M, Bernabé M. *J Nat Prod*. 2000;63(11):1479.
- [87] Zhang DM, Miyase T, Kuroyanagi M et al. *Chem Pharm Bull*. 1996;44(1):173.
- [88] Udayama M, Kinjo J, Nohara T. *Phytochemistry*. 1998;48(7):1233.
- [89] Iida T, Yoshiki Y, Kahara T et al. *Phytochemistry*. 1997;45(7):1507.
- [90] Iida T, Yoshiki Y, Okubo K et al. *Phytochemistry*. 1999;51:1055.
- [91] Mbafor JT, Ndom J-C, Fomum ZT. *Phytochemistry*. 1997;44(6):1151.
- [92] Mohamed KM, Ohtani K, Kasai R et al. *Phytochemistry*. 1995;40(4):1237.
- [93] Bilia AR, Flammini F, Flamini G et al. *Phytochemistry*. 1993;34(3):847.
- [94] Yesilada E, Takaishi Y. *Phytochemistry*. 1999;51:903.
- [95] Woldemichael GM, Wink M. *Phytochemistry*. 2002;60:323.
- [96] Liu Y, Zhao YY, Chen HB et al. *Fitoterapia*. 2009;80:127.
- [97] Leo MD, Sanogo R, Tommasi ND et al. *J Nat Prod*. 2007;70:979.
- [98] Sakurai T, Nishimura T, Otake N et al. *Bioorg Med Chem Lett*. 2002;12:807.
- [99] Voutquenne L, Kokougan C, Lavaud C et al. *Phytochemistry*. 2002;59:825.
- [100] Voutquenne L, Guinot P, Froissard C et al. *Phytochemistry*. 2005;66:825.
- [101] D'Acquarica I, Giovanni MCD, Gasparrini F et al. *Tetrahedron*. 2002;58:10127.
- [102] Matsushita A, Miyase T, Noguchi H et al. *J Nat Prod*. 2004;67(3):377.
- [103] Huang H-C, Liaw C-C, Zhang L-J et al. *Phytochemistry*. 2008;69:1597.
- [104] Voutquenne L, Lavaud C, Massiot G et al. *Phytochemistry*. 1998;49(7):2081.
- [105] Ye WC, Liu X, Zhang QW et al. *J Nat Prod*. 2001;64(2):232.
- [106] Fu HW, Guo Y, Li W et al. *J Nat Med*. 2010;64:80.
- [107] Wandji J, Tillequin F, Mulholland DA et al. *Phytochemistry*. 2003;64:845.
- [108] Debella A, Haslinger E, Schmid MG et al. *Phytochemistry*. 2000;53:885.
- [109] Miyase T, Shiokawa K-I, Zhang DM et al. *Phytochemistry*. 1996;41(5):1411.
- [110] Lavaud C, Beauviere S, Massiot G et al. *Phytochemistry*. 1996;43(1):189.
- [111] Voutquenne L, Guinot P, Thosion O et al. *Phytochemistry*. 2003;64:781.
- [112] Nigam SK, Gopal M, Uddin R et al. *Phytochemistry*. 1997;44(7):1329.
- [113] Asao Y, Morikawa T, Xie YY et al. *Chem Pharm Bull*. 2009;57(2):198.
- [114] Morikawa T, Xie YY, Asca Y et al. *Phytochemistry*. 2009;70:1166.
- [115] Bang S-C, Kim Y, Lee J-H et al. *J Nat Prod*. 2005;68(2):268.
- [116] Melek FR, Miyase T, El-Gindi OD et al. *Phytochemistry*. 1996;42(5):1405.
- [117] Melek FR, Miyase T, Ghaly NS. *Phytochemistry*. 2003;62:557.
- [118] Khalik SMA, Miyase T, El-Ashaal HA et al. *Phytochemistry*. 2000;54:853.
- [119] Song SJ, Nakamura N, Ma CM et al. *Phytochemistry*. 2001;56:491.
- [120] Bedir E, Kirmızıpekmez H, Sticher O et al. *Phytochemistry*. 2000;53:905.
- [121] Carvalho GJAD, Carvalho MGD, Braz-Filho R. *Phytochemistry*. 1999;52:1617.

- [122] Zhang ZZ, Koike K, Jia ZH et al. *Phytochemistry*. 1999;52:715.
- [123] Hu M, Ogawa K, Sashida Y et al. *Phytochemistry*. 1995;39(1):179.
- [124] Marquina S, Maldonado N, Garduño-Ramírez ML et al. *Phytochemistry*. 2001;56:93.
- [125] Waffo-Tégou P, Voutquenne L, Thoison O et al. *Phytochemistry*. 2004;65:741.
- [126] Chen M, Wu WW, Nanz D et al. *Phytochemistry*. 1997;44(3):497.
- [127] Ye W-C, Zhang Q-W, Zhao S-X et al. *Chem Pharm Bull*. 2001;49(5):632.
- [128] Mimaki Y, Yokosuka A, Hamanaka M et al. *J Nat Prod*. 2004;67(9):1511.
- [129] Teng RW, Xie HY, Liu XK et al. *J Asian Nat Prod Res*. 2003;5(2):75.
- [130] Liu JY, Xiao SY, Shang WF et al. *J Asian Nat Prod Res*. 2005;7(4):643.
- [131] Charrouf Z, Wieruszkeski MJ, Fkih-Tetouani S et al. *Phytochemistry*. 1992;31(6):2079.
- [132] Li XC, Liu YQ, Wang DZ et al. *Phytochemistry*. 1994;37(3):827.
- [133] Nigam SK, Li XC, Wang DZ et al. *Phytochemistry*. 1992;31:3169.
- [134] Lavaud C, Massiot G, Becchi M et al. *Phytochemistry*. 1996;41:887.
- [135] He ZD, Qiao CF, Han QB et al. *Tetrahedron*. 2005;61:2211.
- [136] Burger I, Burger BV, Albrecht CF et al. *Phytochemistry*. 1998;49(7):2087.
- [137] Matsuda H, Morikawa T, Ueda H et al. *Chem Pharm Bull*. 2001;49(10):1368.
- [138] Jossang A, Seuleiman M, Maidou E et al. *Phytochemistry*. 1996;41(2):591.
- [139] Yoshikawa K, Tanaka M, Arihara S et al. *J Nat Prod*. 2000;63(12):1679.
- [140] Nicolas G, Oulad-Ali A, Guillaume D et al. *Phytochemistry*. 1995;38(1):225.
- [141] Schöpke T, Wray V, Nimtz M et al. *Phytochemistry*. 1996;41(5):1399.
- [142] Li W, Asada Y, Koike K et al. *Tetrahedron*. 2005;61:2921.
- [143] Su YF, Koike K, Guo D et al. *Tetrahedron*. 2001;57:6721.
- [144] Asada Y, Ikeno M, Furuya T. *Phytochemistry*. 1994;35(3):757.
- [145] Ngounou FN, Atta-ur-Rahman, Choudhary MI et al. *Phytochemistry*. 1999;52:917.
- [146] Schöpke T, Agha MIH, Wary V et al. *Phytochemistry*. 1994;36(2):449.
- [147] Junkuszew M, Oleszek W, Jurzysta M et al. *Phytochemistry*. 1998;49(1):195.
- [148] Sahu NP, Koike K, Jia ZH et al. *Phytochemistry*. 1997;44(6):1145.
- [149] Schöpke T, Al-Tawaha C, Wray V et al. *Phytochemistry*. 1997;45(1):125.
- [150] Shao Y, Zhou BN, Lin LZ et al. *Phytochemistry*. 1995;38(6):1487.
- [151] Zhang DM, Miyase T, Kuroyanagi M et al. *Chem Pharm Bull*. 1995;43(6):966.
- [152] Liang H, Tong WY, Zhao YY et al. *Bioorg Med Chem Lett*. 2005;15:4493.
- [153] Zou K, Zhao YY, Tu GZ et al. *Carbohydr Res*. 2000;324:182.
- [154] Li GY, Zhang YH, Yang BY et al. *Fitoterapia*. 2010;81:200.
- [155] Cheng DL, Shao Y. *Phytochemistry*. 1994;35(1):173.
- [156] Rosa SD, Iodice C, Mitova M et al. *Phytochemistry*. 2000;54:751.
- [157] Miyakoshi M, Ida Y, Isoda S et al. *Phytochemistry*. 1993;34(6):1599.
- [158] Melek FR, Miyase T, Abdel-Khalik SM et al. *Phytochemistry*. 2004;65:3089.
- [159] Shao Y, Poobrasert O, Ho C-T et al. *Phytochemistry*. 1996;43(1):195.
- [160] Coreia G, Iorizzi M, Lanzotti V et al. *Bioorg Med Chem*. 2004;12:4909.
- [161] Ouyang M-A, Wang HQ, Liu YQ et al. *Phytochemistry*. 1997;45(7):1501.
- [162] Mohammad FV, Noorwala M, Ahmad VU et al. *Phytochemistry*. 1995;40(1):213.
- [163] Noorwala M, Mohammad FV, Ahmad VU et al. *Phytochemistry*. 1994;36(2):439.
- [164] Melek FR, Miyase T, Ghaly NS. *Phytochemistry*. 2004;65:909.
- [165] Baykal T, Bedir E, Calis I et al. *Phytochemistry*. 1999;51:1059.
- [166] Dini I, Tenore GC, Schettino O et al. *J Agric Food Chem*. 2001;49(8):3976.
- [167] Jia ZH, Koike K, Kudo M et al. *Phytochemistry*. 1998;48(3):529.
- [168] Guo SJ, Falk E, Kenne L et al. *Phytochemistry*. 2000;53:861.
- [169] Nyberg NT, Kenne L, Rönnerberg B et al. *Carbohydr Res*. 2000;323:87.
- [170] Lacaille-Dubois M-A, Hanquet B, Cui Z-H et al. *Phytochemistry*. 1995;40(2):509.
- [171] Nord LI, Kenne L. *Carbohydr Res*. 2000;329:817.

- [172] Amimoto K, Yoshikawa K, Arihara S. *Phytochemistry*. 1993;33(6):1475.
- [173] Lavaud C, Voutquenne L, Massiot G et al. *Phytochemistry*. 1998;47(3):441.
- [174] Schröder H, Schubert-Zsilavecz M, Reznicek G et al. *Phytochemistry*. 1993;34(6):1609.
- [175] Sakai K, Nagao T, Okabe H. *Phytochemistry*. 1999;51:309.
- [176] Li H-Y, Koike K, Ohmoto T. *Phytochemistry*. 1994;35(3):751.
- [177] Zhang DM, Miyase T, Kuroyanagi M et al. *Phytochemistry*. 1998;47(3):459.
- [178] Zhang DM, Miyase T, Kuroyanagi M et al. *Chem Pharm Bull*. 1996;44(4):810.
- [179] Kuroda M, Mimaki Y, Sashida Y et al. *Bioorg Med Chem Lett*. 2001;11:371.
- [180] Lu Y, Umeda T, Yagi A et al. *Phytochemistry*. 2000;53:941.
- [181] Zhao WM, Xu JP, Qin GW et al. *Phytochemistry*. 1995;39(1):191.
- [182] Miyakoshi M, Ida Y, Isoda S et al. *Phytochemistry*. 1993;33(4):891.
- [183] Bandara BMR, Jayasinghe L, Karunaratne V et al. *Phytochemistry*. 1989;28(10):2783.
- [184] Guo SJ, Kenne L. *Phytochemistry*. 2000;55:419.
- [185] Miyase T, Kohsaka H, Ueno A. *Phytochemistry*. 1992;31(6):2087.
- [186] Pal BC, Achari B, Yoshikawa K et al. *Phytochemistry*. 1995;38(5):1287.
- [187] Melek FR, Miyase T, Ghaly NS et al. *Phytochemistry*. 2007;68:1261.
- [188] Gafur MA, Obata T, Kiuchi F et al. *Chern Pharrn Bull*. 1997;45(4):620.
- [189] Yayli N, Baltaci C, Zengin A et al. *Phytochemistry*. 1998;48(5):881.
- [190] Ali Z, Khan SI, Khan IA. *Planta Med*. 2009;75:371.
- [191] Yoshikawa M, Morikawa T, Nakano K et al. *J Nat Prod*. 2002;65(11):1638.
- [192] Yoshikawa M, Murakami T, Hirano K et al. *Tetrahedron Lett*. 1997;38(42):7395.
- [193] Yoshikawa M, Murakami T, Matsuda H. *Chern Pharrn Bull*. 1997;45(12):2034.
- [194] Suttisri R, Chung M-S, Kinghorn D et al. *Phytochemistry*. 1993;34(2):405.
- [195] Lavaud C, Massiot G, Men-Olivier LL et al. *Phytochemistry*. 1992;31(9):3177.
- [196] Feng YL, Li HR, Xu LZ et al. *J Asian Nat Prod Res*. 2007;9(6):505.
- [197] Cheng ZH, Yu BY, Yang XW. *Phytochemistry*. 2002;61:379.
- [198] He ZS, Fang SY, Wang P et al. *Phytochemistry*. 1996;42(5):1391.
- [199] Rumbero-Sanchez A, Vazquez P. *Phytochemistry*. 1991;30(2):623.
- [200] Wang CZ, Yu DQ. *Planta Med*. 1998;64:50.
- [201] Yoshikawa M, Morikawa T, Asao Y et al. *Chem Pharm Bull*. 2007;55(4):606.
- [202] Ueckert J, Wray V, Nimtz M et al. *Phytochemistry*. 1998;49(8):2487.
- [203] Gao HM, Wang ZM. *Phytochemistry*. 2006;67:2697.
- [204] Miyase T, Andoh T, Ueno A. *Phytochemistry*. 1995;40(5):1499.
- [205] Kohda H, Tanaka S, Yamaoka Y et al. *Chem Pharm Bull*. 1991;39(10):2609.
- [206] Fu HZ, Koike K, Zheng Q et al. *Chem Pharm Bull*. 2001;49(8):999.
- [207] Ikuta A, Itokawa H. *Phytochemistry*. 1989;28(10):2663.
- [208] Park S-Y, Chang S-Y, Oh O-J et al. *Phytochemistry*. 2002;59:379.
- [209] Konishi M, Hano Y, Takayama M et al. *Phytochemistry*. 1998;48(3):525.
- [210] Miyakoshi M, Shirasuna K, Hirai Y et al. *J Nat Prod*. 1999;62(3):445.
- [211] Miyakoshi M, Isoda S, Sato H et al. *Phytochemistry*. 1997;46(7):1255.
- [212] Gzo H, Wang Z, Yao Z-H et al. *Helv Chim Acta*. 2008;91:451.

3.6 Taraxastane-type Saponins

Table 3-6-1: Cos, MFs, and TSs of taraxastane-type saponins 3-6-1~3-6-4.

No.	Compounds	MFs	Test solvents	References
3-6-1	eclalbasaponin VII	C ₃₆ H ₆₂ O ₈	C ₅ D ₅ N	[213]
3-6-2	eclalbasaponin VIII	C ₃₆ H ₆₂ O ₈	C ₅ D ₅ N	[213]
3-6-3	eclalbasaponin IX	C ₃₆ H ₆₂ O ₁₁ S	C ₅ D ₅ N	[213]
3-6-4	eclalbasaponin X	C ₃₆ H ₆₂ O ₁₁ S	C ₅ D ₅ N	[213]

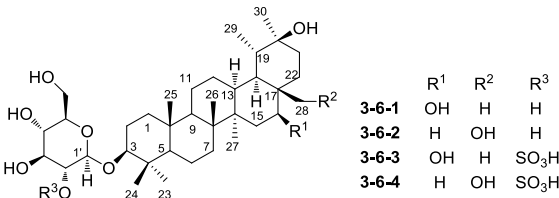


Table 3-6-2: ¹H NMR spectroscopic data of taraxastane-type saponins 3-6-1~3-6-4.

H	3-6-1	3-6-2	3-6-3	3-6-4
1	0.86 m, 1.55 m	0.86 m, 1.57 m	—	—
2	1.87 m, 2.30 m	1.88 m, 2.31 m	—	—
3	3.43 dd(4.5, 11.1)	3.44 dd(4.4, 11.7)	3.36 dd(4.0, 11.7)	3.38 br d(11.0)
5	0.74 m	0.73 d(11.6)	—	—
6	1.28 m, 1.32 m	1.30 m, 1.47 m	—	—
7	1.41 m, 1.44 m	1.33 m(2H)	—	—
9	1.26 m	1.21 m	—	—
11	1.16 m, 1.42 m	1.21 m, 1.46 m	—	—
12	1.29 m, 2.10 m	1.28 m, 1.86 m	—	—
13	1.98 m	1.89 m	—	—
15	1.64 dd(4.9, 12.8)	1.05 m	—	—
	2.02 brt(12.8)	1.99 ddd(4.6, 4.6, 13.5)		
16	3.79 dd(4.5, 11.1)	1.33 m	3.76 dd(4.7, 11.4)	—
18	1.34 dd(10.6, 10.6)	1.83 dd(10.5, 10.5)	—	—
19	2.05 dd(6.4, 10.7)	1.59 m	—	—
21	1.92 ddd(3.3, 11.4, 11.4)	1.89 m	—	—
	2.18 br dt(3.2, 14.0)	2.22 m		
22	1.55 m	1.90 m	—	—
	2.45 ddd(3.4, 3.4, 13.4)	2.24 m		
23	1.33 s	1.34 s	0.74 s	0.76 s
24	1.02 s	1.02 s	0.98 s	0.97 s

Table 3-6-2 (continued)

H	3-6-1	3-6-2	3-6-3	3-6-4
25	0.81 s	0.823 s	1.13 s	0.97 s
26	1.03 s	1.00 s	1.18 s	1.19 s
27	1.16 s	1.00 s	1.23 s	1.42 s
28	1.26 s	4.00 d(11.0), 4.25 d(11.0)	1.36 s	4.22 m
29	1.45 d(6.1)	1.37 d(6.1)	1.47 s	1.35 d(5.5)
30	1.38 s	1.43 s	1.42 d(6.2)	1.50 s
1'	4.99 d(7.6)	5.02 d(7.4)	5.06 d(7.7)	5.05 d(7.5)
2'	4.07 br t(8.6)	4.08 br t(8.3)	5.08 br t(9.2)	5.10 br t(9.0)
3'	4.28 t(8.9)	4.29 br t(8.9)	4.47 t(9.2)	4.51 t(9.0)
4'	4.26 t(8.9)	4.27 br t(8.9)	4.18 t(9.2)	4.22 m
5'	4.05 m	4.05 m	3.96 m	3.97 m
6'	4.44 dd(5.4, 11.7)	4.44 dd(5.5, 11.6)	4.32 dd(5.5, 11.7)	4.32 dd(5.5, 11.5)
	4.63 dd(2.4, 11.7)	4.62 dd(2.4, 11.6)	4.53 br d(11.7)	4.54 br d(11.5)

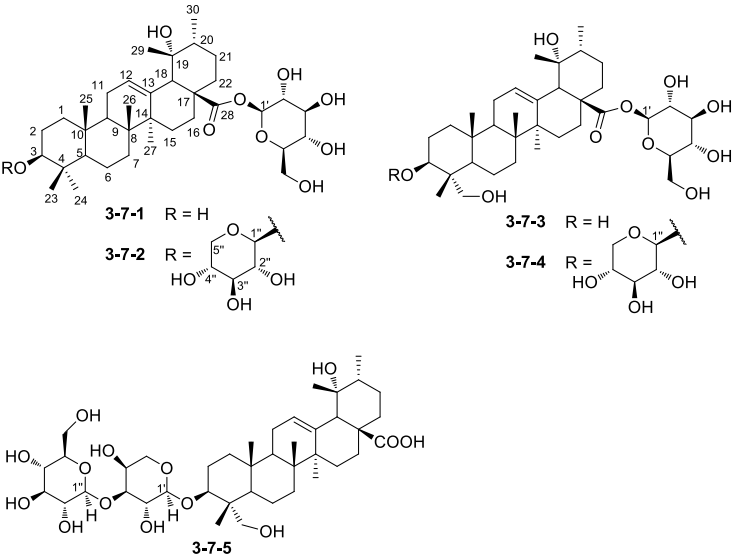
Bibliography

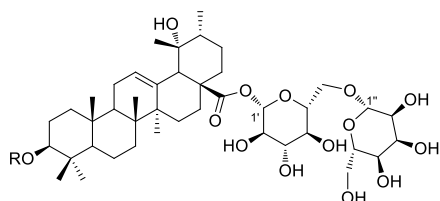
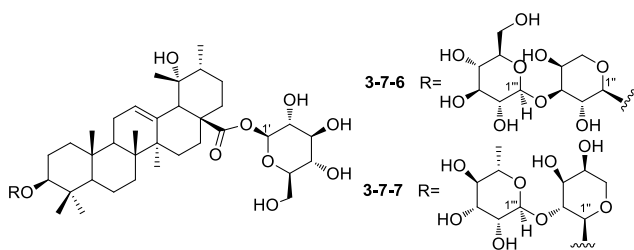
[213] Yahara S, Ding N, Nohara T et al. *Phytochemistry*. 1997;44(1):131.

3.7 Ursane-type Saponins

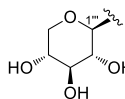
Table 3-7-1: Cos, MFs, and TSs of ursane-type saponins 3-7-1~3-7-20.

No.	Compounds	MFs	Test solvents	Refer-ences
3-7-1	pomolic-acid-28- <i>O</i> - β -D-glucopyranosyl ester	C ₃₆ H ₅₈ O ₉	CD ₃ OD	[214]
3-7-2	oblonganoside H	C ₄₁ H ₆₆ O ₁₃	CD ₃ OD	[214]
3-7-3	rotundic acid-28- <i>O</i> - β -D-glucopyranosyl ester	C ₃₆ H ₅₈ O ₁₀	CD ₃ OD	[214]
3-7-4	oblonganoside I	C ₄₁ H ₆₆ O ₁₄	CD ₃ OD	[214]
3-7-5	randiasaponin II	C ₄₁ H ₆₆ O ₁₄	CD ₃ OD	[215]
3-7-6	randiasaponin III	C ₄₇ H ₇₆ O ₁₈	CD ₃ OD	[215]
3-7-7	randiasaponin IV	C ₄₇ H ₇₆ O ₁₇	CD ₃ OD	[215]
3-7-8	scabrioside A	C ₄₇ H ₇₆ O ₁₈	CD ₃ OD	[216]
3-7-9	scabrioside B	C ₅₃ H ₈₆ O ₂₂	CD ₃ OD	[216]
3-7-10	scabrioside C	C ₅₃ H ₈₆ O ₂₂	CD ₃ OD	[216]
3-7-11	scabrioside D	C ₅₉ H ₉₆ O ₂₇	CD ₃ OD	[216]
3-7-12	indicasaponin A	C ₅₂ H ₈₄ O ₂₁	CD ₃ OD	[217]
3-7-13	28- <i>O</i> - β -D-glucopyranosyl-6 β -hydroxytormentic acid	C ₃₆ H ₅₈ O ₁₁	CD ₃ OD	[218]
3-7-14	28- <i>O</i> - β -D-glucopyranosyl-6 β ,23-dihydroxytormentic acid	C ₃₆ H ₅₈ O ₁₂	CD ₃ OD	[218]
3-7-15	nigaichigoside F1	C ₃₆ H ₅₈ O ₁₁	CD ₃ OD	[214]
3-7-16	zygophyloside G	C ₄₂ H ₆₆ O ₁₈ S	C ₅ D ₅ N	[219]
3-7-17	zygophyloside H	C ₄₇ H ₇₄ O ₁₈	C ₅ D ₅ N	[219]
3-7-18	callianthaside A	C ₃₆ H ₅₈ O ₁₁	CD ₃ OD	[220]
3-7-19	2 α ,3 α ,23-trihydroxyurs-12-en-24,28-dioic acid 28- β -D-glucopyranosyl ester	C ₃₆ H ₅₆ O ₁₃	C ₅ D ₅ N	[221]
3-7-20	oblonganoside J	C ₃₈ H ₆₀ O ₁₁	CD ₃ OD	[214]

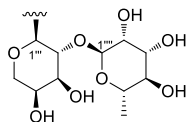




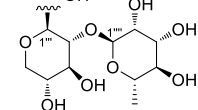
3-7-8 R =



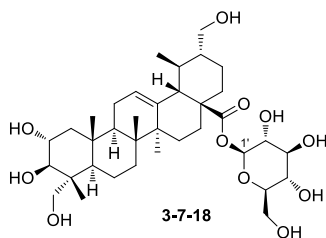
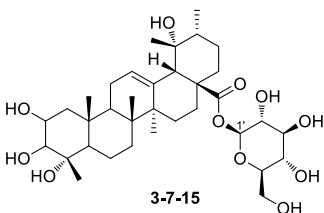
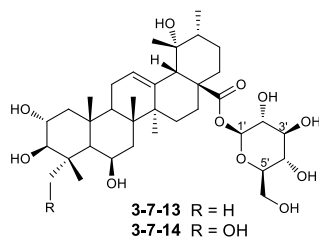
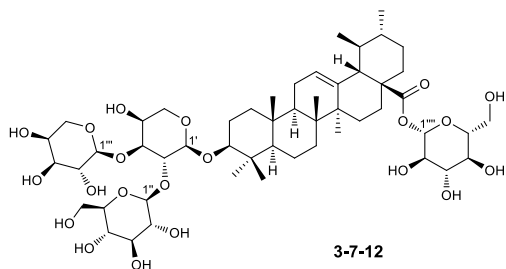
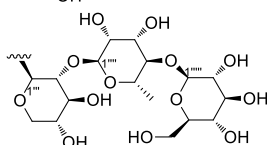
3-7-10 R =

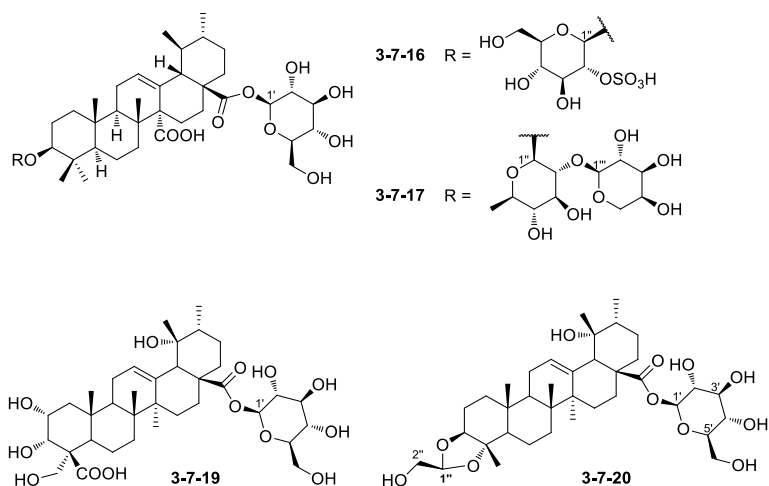


3-7-9 R =



3-7-11 R =



**Table 3-7-2:** ^1H NMR spectroscopic data of ursane-type saponins 3-7-1~3-7-5.

H	3-7-1	3-7-2	3-7-3	3-7-4	3-7-5
1	1.64 m, 0.99 m	1.62 m, 0.98 m	1.72 m, 1.15 m	1.73 m, 1.11 m	1.01 (ov), 1.61 (ov)
2	1.87 m, 1.73 m	1.86 m, 1.68 m	1.86 m, 1.69 m	1.85 m, 1.70 m	1.73 (ov), 1.84 (ov)
3	3.17 (ov)	3.17 (ov)	3.60 dd(11.1, 4.5)	3.61 (ov)	3.61 (ov)
5	0.78 m	0.77 m	0.73 m	0.74 m	1.24 (ov)
6	1.53 m, 1.38 m	1.52 m, 1.38 m	1.51 m, 1.39 m	1.50 m, 1.38 m	1.50 (ov)
7	1.52 m, 1.30 m	1.52 m, 1.30 m	1.53 m, 1.28 m	1.53 m, 1.28 m	1.28 (ov)
9	1.67 m	1.67 m	1.73 m	1.74 m	1.73 (ov)
11	1.96 m	1.97 m	1.97 m	1.96 m	1.97 (ov)
12	5.29 br s	5.29 br s	5.29 br s	5.28 br s	5.28 t(3.4)
15	1.79 m, 1.27 m	1.80 m, 1.28 m	1.84 m, 1.30 m	1.85 m, 1.27 m	1.01 (ov), 1.84 (ov)
16	2.61 m 1.59 m	2.60 dt(13.3, 4.3) 1.60 m	2.60 m 1.63 m	2.60 m 1.58 m	1.50 (ov) 2.50 td (13, 4.0)
18	2.50 s	2.50 s	2.50 s	2.50 s	2.50 s
20	1.34 m	1.34 m	1.33 m	1.43 m	1.30 (ov)
21	2.23 m, 1.87 m	2.22 m, 1.84 m	2.23 m, 1.85 m	2.21 m, 1.86 m	1.71 (ov)
22	1.78 m, 1.62 m	1.78 m, 1.62 m	1.79 m, 1.62 m	1.78 m, 1.62 m	1.64 (ov), 1.73 (ov)
23	0.96 s	1.04 s	3.52 d(11.1)	3.55 d(11.1)	3.30 (ov), 3.63 (ov)
24	0.77 s	0.84 s	3.28 d(11.1) 0.70 s	3.30 d(11.1) 0.70 s	0.72 s

Table 3-7-2 (continued)

H	3-7-1	3-7-2	3-7-3	3-7-4	3-7-5
25	0.94 s	0.95 s	0.97 s	0.94 s	0.98 s
26	0.78 s	0.77 s	0.74 s	0.75 s	0.80 s
27	1.31 s	1.32 s	1.32 s	1.30 s	1.34 s
29	1.19 s	1.19 s	1.19 s	1.19 s	1.19 s
30	0.92 d(6.8)	0.92 d(6.8)	0.92 d(6.8)	0.92 d(6.8)	0.93 d(6.8)
1'	5.31 d(7.7)	5.31 d(7.9)	5.31 d(7.8)	5.34 d(7.9)	4.35 d(7.3)
2'	3.30 m	3.30 m	3.30 m	3.28 m	3.69 (ov)
3'	3.39 m	3.38 m	3.39 m	3.38 m	3.61 (ov)
4'	3.24 m	3.24 m	3.24 m	3.24 m	4.03 br s
5'	3.32 m	3.35 m	3.33 m	3.33 m	3.57 d (11.7) 3.86 dd(12.7, 2.0)
6'	3.79 br d(11.5) 3.67 dd(11.5, 4.2)	3.79 br d(12.3) 3.67 dd(12.3, 4.0)	3.79 br d(12.0) 3.67 dd(12.0, 4.7)	3.80 br d(11.0) 3.67 dd(11.0, 4.9)	
1''		4.26 d(7.6)		4.27 d(7.4)	4.54 d (7.3)
2''		3.18 m		3.15 m	3.29 (ov)
3''		3.26 m		3.28 m	3.31 (ov)
4''		3.45 m		3.47 m	3.34 t(8.8)
5''		3.81 br d(11.1) 3.17 (ov)		3.84 d(11.2) 3.18 (ov)	3.37 t(8.8)
6''					3.69 (ov) 3.83 dd(12.3, 2)

Table 3-7-3: ¹H NMR spectroscopic data of ursane-type saponins 3-7-6~3-7-10.

H	3-7-6	3-7-7	3-7-8	3-7-9	3-7-10
1	0.99 (ov) 1.64 (ov)	0.99 (ov) 1.62 (ov)	1.64 (ov) 1.00 (ov)	1.62 (ov) 0.98 (ov)	1.64 (ov) 1.00 (ov)
2	1.73 (ov) 1.84 (ov)	1.72 (ov) 1.82 (ov)	1.80 (ov) 1.70 (ov)	1.80 (ov) 1.70 (ov)	1.80 (ov) 1.70 (ov)
3	3.15 dd(11.5, 4.0)	3.11 dd(11.2, 3.9)	3.13 (ov)	3.10 ddd(11.4, 4.1)	3.12 dd(11.4, 4.1)
5	0.79 (ov)	0.81 (ov)	0.79 (ov)	0.78 (ov)	0.78 (ov)
6	1.53 (ov)	1.52 (ov)	1.53 (ov)	1.53 (ov)	1.53 (ov)
7	1.33 (ov), 1.54 (ov)	1.33 (ov), 1.52 (ov)	1.34 (ov)	1.33 (ov)	1.32 (ov)
9	1.67 (ov)	1.72 (ov)	1.70 (ov)	1.68 (ov)	1.70 (ov)
11	1.97 (ov)	1.95 (ov)	1.98 (ov), 1.34 (ov)	1.97 (ov), 1.32 (ov)	1.96 (ov), 1.30 (ov)
12	5.33 br s	5.30 t(3.9)	5.29 br s	5.27 br s	5.29 br s

Table 3-7-3 (continued)

H	3-7-6	3-7-7	3-7-8	3-7-9	3-7-10
15	1.02 (ov), 1.83 (ov)	0.99 (ov), 1.77 (ov)	1.85 (ov), 1.03 (ov)	1.85 (ov), 1.00 (ov)	1.85 (ov), 1.02 (ov)
16	1.63 (ov)	1.62 (ov)	2.60 m, 1.65 (ov)	2.57 m, 1.62 (ov)	2.61 m, 1.62 (ov)
	2.61 td(13.5, 4.0)	2.61 td(13.2, 4.4)			
18	2.51 s	2.51 s	2.53 s	2.51 s	2.52 s
20	1.36 (ov)	1.36 (ov)	1.38 (ov)	1.35 (ov)	1.40 (ov)
21	1.71 (ov)	1.72 (ov)	1.70 (ov)	1.70 (ov)	1.70 (ov)
22	1.63 (ov), 1.77 (ov)	1.62 (ov), 1.77 (ov)	1.74 (ov)	1.72 (ov)	1.75 (ov)
23	1.05 s	1.01 s	1.05 s	1.02 s	1.02 s
24	0.85 s	0.84 s	0.84 s	0.84 s	0.84 s
25	0.95 s	0.95 s	0.95 s	0.93 s	0.96 s
26	0.77 s	0.74 s	0.78 s	0.75 s	0.78 s
27	1.33 s	1.33 s	1.32 s	1.30 s	1.32 s
29	1.20 s	1.20 s	1.20 s	1.19 s	1.20 s
30	0.93 d(6.8)	0.92 d(6.8)	0.93 d(6.6)	0.91 d(6.6)	0.93 d(6.6)
1'	5.33 d(8.3)	5.37 d(8.3)	5.28 d(7.9)	5.26 d(7.8)	5.27 d(7.8)
2'	3.33 (ov)	3.38 (ov)	3.33 (ov)	3.34 (ov)	3.35 (ov)
3'	3.35 (ov)	3.34 (ov)	3.42 (ov)	3.42 (ov)	3.40 (ov)
4'	3.37 (ov)	3.38 (ov)	3.45 (ov)	3.45 (ov)	3.45 (ov)
5'	3.42 (ov)	3.40 (ov)	3.50 (ov)	3.48 (ov)	3.49 (ov)
6'	3.70 (ov)	3.70 (ov), 3.82 (ov)	4.10 br d(11.2)	4.08 br d(11.2)	4.10 br d(11.2)
	3.82 dd(11.2, 2.0)		3.74 dd(11.2, 4.5)	3.72 dd(11.2, 4.4)	3.74 (ov)
1''	4.29 d(7.0)	4.55 d(4.4)	4.67 d(7.9)	4.65 d(7.9)	4.67 d(7.9)
2''	3.71 (ov)	3.77 (ov)	3.30 (ov)	3.32 (ov)	3.33 (ov)
3''	3.65 (ov)	3.74 (ov)	4.04 t(2.9)	4.02 t(2.9)	4.04 t(2.9)
4''	4.03 br s	3.79 (ov)	3.49 (ov)	3.48 (ov)	3.49 (ov)
5''	3.55 d(12.5)	3.48 dd(11.8, 3.0)	3.68 (ov)	3.66 (ov)	3.66 (ov)
	3.86 dd(12.5, 2.0)	3.85 (ov)			
6''			3.83 (ov)	3.83 (ov)	3.83 (ov)
			3.66 (ov)	3.65 (ov)	3.67 (ov)
1'''	4.56 d(7.3)	5.09 d(0.9)	4.27 d(7.4)	4.36 d(7.0)	4.56 d(6.7)
2'''	3.31 (ov)	3.88 dd(3.4, 1.5)	3.18 dd(7.4, 8.8)	3.42 (ov)	3.77 (ov)
3'''	3.31 (ov)	3.68 (ov)	3.54 (ov)	3.45 (ov)	3.75 (ov)
4'''	3.37 (ov)	3.38 (ov)	3.45 (ov)	3.43 (ov)	3.80 (ov)
5'''	3.39 (ov)	3.81 (ov)	3.83 (ov), 3.20 (ov)	3.85 (ov)	3.82 (ov)
				3.16 dd(10.5, 9.0)	3.48 dd(10.5, 9.0)
6'''	3.70 (ov)	1.23 d(5.9)			
	3.82 dd (11.2, 2.0)				

Table 3-7-3 (continued)

H	3-7-6	3-7-7	3-7-8	3-7-9	3-7-10
1 ^{'''}				5.30 (ov)	5.10 d(1.7)
2 ^{'''}				3.93 dd(1.7, 3.4)	3.88 dd(1.7, 3.4)
3 ^{'''}				3.72 (ov)	3.70 (ov)
4 ^{'''}				3.40 (ov)	3.40 (ov)
5 ^{'''}				3.92 (ov)	3.80 (ov)
6 ^{'''}				1.18 d(6.2)	1.20 d(6.2)

Table 3-7-4: ¹H NMR spectroscopic data of ursane-type saponins 3-7-11~3-7-15.

H	3-7-11	3-7-12	3-7-13	3-7-14	3-7-15
1	1.64 (ov), 1.00 (ov)	ax 0.98, eq 1.37	0.63 m, 1.9 m	0.88 br t(12) 1.9 dd(12, 3.5)	2.25 m, 2.02 m
2	1.80, 1.70 (ov)	ax 1.73, eq 1.82	3.68 m	3.74 td(11, 3.5)	3.42 m
3	3.10 dd(11.4, 4.0)	3.10	2.85 d(9)	3.3 m	3.67 (ov)
5	0.78 (ov)	0.73	0.82 m	1.3 m	0.80 m
6	1.53 (ov)	ax 1.37, eq 1.50	4.46 br s	4.4 br s	1.52 m, 1.40 m
7	1.33 (ov)	ax 1.50, eq 1.37	1.53 m, 1.73 m	1.48 dd(13, 2) 1.81 br d(13)	1.57 m, 1.32 m
9	1.68 (ov)	1.51	1.76 m	1.8 m	1.76 m
11	1.96 (ov) 1.32 (ov)	ax 1.92 eq 2.07	2.07 m	2.08 m 2.1 m	1.99 m
12	5.26 br s	5.23	5.85 t(3)	5.35 t(3)	5.30 br s
15	1.85 (ov), 1.04 (ov)	ax 1.91, eq 1.10	—	1 m, 1.87 m	1.83 m, 1.09 m
16	2.60 m, 1.62 (ov)	ax 2.15, eq 1.78	—	1.63 m 2.6 td(13.3, 4.1)	2.60 m, 1.62 m
18	2.51 s	2.20 d(11.0)	2.5 br s	2.53 s	2.51 s
19		1.40			
20	1.40 (ov)	0.99	1.38 m	1.34 m	1.35 m
21	1.70 (ov)	ax 1.26, eq 1.38	1.64 m, 2.59 m	1.25 m, 1.70 m	2.24 m, 1.85 m
22	1.75 (ov)	ax 1.74, eq 1.65	1 m, 1.88 m	1.65 m, 1.8 m	1.78 m, 1.60 m
23	1.03 s	1.04 s	1.2 s	3.44 d(11.1) 3.58 d(11.1)	—
24	0.84 s	0.83 s	1.04 s	1.06 s	0.69 s
25	0.94 s	0.96 s	1.35 s	1.39 s	1.03 s
26	0.78 s	0.82 s	1.07 s	1.04 s	0.77 s
27	1.31 s	1.10 s	1.3 s	1.31 s	1.33 s
29	1.18 s	0.89 d(6.6)	1.18 s	1.21 s	1.19 s
30	0.91 d(6.6)	1.32 d(6.1)	0.93 d(6.6)	0.93 d(6.6)	0.92 d(6.5)
1'	5.26 d(7.8)	4.38 d(7.1)	5.3 d(7.2)	5.31 d(7.9)	5.31 d(8.0)
2'	3.32 (ov)	3.86	3.32 m	3.33 m	3.30 m

Table 3-7-4 (continued)

H	3-7-11	3-7-12	3-7-13	3-7-14	3-7-15
3'	3.40 (ov)	3.76	3.32 m	3.3 m	3.39 m
4'	3.45 (ov)	4.02	3.35 m	3.3 m	3.24 m
5'	3.48 (ov)	3.85, 3.53	3.35 m	3.3 m	3.33 m
6'	4.10 br d(11.2)		3.8 dd(12, 2)	3.67 dd(12, 4.1)	3.79 br d(10.0)
	3.74 (ov)		3.68 dd(12, 4.1)	3.8 dd(12, 2)	3.67 br d(10.0)
1''	4.65 d(7.9)	4.57 d(7.6)			
2''	3.32 (ov)	3.30			
3''	4.02 t(2.9)	3.30~3.32			
4''	3.49 (ov)	3.30~3.32			
5''	3.65 (ov)	3.30~3.32			
6''	3.83 (ov)	3.82			
	3.66 (ov)	3.65			
1'''	4.35 d(7.0)	4.67 d(7.8)			
2'''	3.33 (ov)	3.10			
3'''	3.40 (ov)	3.25			
4'''	3.48 (ov)	3.38			
5'''	3.84 (ov)	3.80			
	3.16 dd(11.0, 9.7)	3.08			
1''''	5.26 (ov)	5.32 d(8.2)			
2''''	4.24 dd(1.7, 3.4)	3.32			
3''''	3.91 (ov)	3.30~3.32			
4''''	3.57 (ov)	3.30~3.32			
5''''	3.94 (ov)	3.30~3.32			
6''''	1.22 d(6.2)	3.82~3.65			
1'''''	4.47 d(7.2)				
2'''''	3.31 (ov)				
3'''''	3.40 (ov)				
4'''''	3.34 (ov)				
5'''''	3.35 (ov)				
6'''''	3.86 (ov)				
	3.70 (ov)				

Table 3-7-5: ¹H NMR spectroscopic data of ursane-type saponins 3-7-16~3-7-20.

H	3-7-16	3-7-17	3-7-18	3-7-19	3-7-20
1	ax 0.95, eq 1.42	ax 1.09, eq 1.58	1.95~1.97 m 0.88~0.90 m	α 1.95, β 2.19	1.68 m, 1.10 m
2	ax 1.77, eq 2.10	1.86, 2.10	3.67~3.69 m	5.14 br d(10.9)	1.87 m, 1.71 m
3	3.12 dd(3.7, 11.5)	3.10 dd(4.3, 11.6)	3.35~3.36 m	5.39 br s	3.33 (ov)
5	0.85	0.90	1.26 br s	2.26	0.85 br d, 11.6

Table 3-7-5 (continued)

H	3-7-16	3-7-17	3-7-18	3-7-19	3-7-20
6	ax 1.18, eq 1.42	ax 1.27, eq 1.48	0.79~0.81 m	α 2.38, β 2.10	1.51 m, 1.44 m
7	ax 1.59, eq 1.75	ax 1.66, eq 1.82	1.28~1.30 m 1.59~1.63 m	α 1.82, β 2.11	1.53 m, 1.29 m
9	2.59 dd(5.6, 10.4)	2.68	3.32~3.33 m	2.22	1.74 m
11	1.92~2.10	2.00~2.10	1.96~1.98 m	2.19~2.34	1.97 m
12	5.95		5.32 br s	5.64 br s	5.29 br s
15	ax 2.37, eq 2.50	2.42, 2.53	1.25~1.28 m	α 2.49~2.59 m β 1.33	1.80 m, 1.00 m
16	ax 2.50 eq 2.18	ax 2.53 eq 2.20	1.73~1.75 m	α 2.08 β 3.09~3.19 m	2.60 dt(13.3, 4.3) 1.60 m
18	2.65 d(11.4)	2.68 d(11.3)	2,27 d(11.6)	2.99 s	2.50 s
19	1.35	1.35	1.67~1.68 m		
20	0.85	0.87	0.90~1.03 m	1.44	1.34 m
21	1.19~1.31	1.23~1.30	1.49~1.52 m 1.64~1.67 m	α 1.31, β 2.06	1.69 m, 1.53 m
22	ax 1.70, eq 1.83	ax 1.73, eq 1.86	1.60~1.61 m 1.78~1.82 m	α 2.11, β 1.90	1.76 m, 1.59 m
23	1.28 s	1.12 s	3.25 d(11.4) 3.49 d(11.4)	4.66 d(9.7) 4.80 d(9.7)	3.79 d(10.7) 3.28 d(10.7)
24	1.11 s	1.04 s	0.69 s	—	1.04 s
25	0.80 s	0.91 s	1.04 s	1.39 s	1.00 s
26	1.16 s	1.21 s	0.84 s	1.35 s	0.76 s
27	—	—	1.13 s	1.72 s	1.33 s
29	1.14 d(6.2)	1.16 d(6.1)	0.91 d(6.4)	1.48 s	1.19 s
30	0.73 d(6.3)	0.73 d(6.3)	3.51~3.54 m 3.64 dd(10.8, 3.0)	1.17 s	0.92 d(6.7)
1'	6.34 d(8.2)	6.36 d(8.1)	5.34 d(7.8)	6.29 d(8.0)	5.31 d(7.7)
2'	4.21	4.23	3.32~3.34 m	4.25 t(8.4)	3.30 m
3'	4.30	4.30	3.30~3.33 m	4.34 t(8.7)	3.39 m
4'	4.36	4.36	3.37~3.40 m	4.38 t(9.3)	3.25 m
5'	4.03	4.03	3.28~3.30 m	4.05~4.12 m	3.34 m
6'	4.40 4.46 dd(2.5, 12.0)	4.40, 4.43	3.79 dd(12.0, 1.8) 3.64~3.67 m	4.43 br d(12.0) 4.50 br dd(4.4, 12.0)	3.79 br d(11.0) 3.67 dd(11.0, 3.9)
1''	4.82 d(7.4)	4.65 d(7.6)			4.65 t(5.6)
2''	5.01	4.03			3.57 br d(5.6) 3.50 br d(5.6)

Table 3-7-5 (continued)

H	3-7-16	3-7-17	3-7-18	3-7-19	3-7-20
3''	4.38	4.14			
4''	4.13	3.64			
5''	3.90	3.66			
6''	4.28 4.48(2.4, 11.9)	1.59 d(5.5)			
1'''		5.13 d(6.6)			
2'''		4.53			
3'''		4.19			
4'''		4.29			
5'''		3.75			
		4.32			

Table 3-7-6: Cos, MFs, and TSs of ursane-type saponins 3-7-21 and 3-7-22.

No.	Compounds	MFs	Test solvents	References
3-7-21	brevicuspisaponin 1	C ₃₅ H ₅₆ O ₉	C ₅ D ₅ N	[222]
3-7-22	brevicuspisaponin 2	C ₃₅ H ₅₆ O ₁₀	C ₅ D ₅ N	[222]

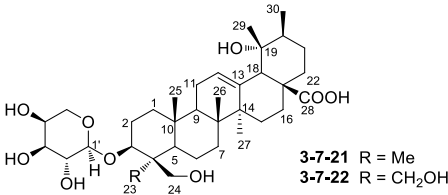


Table 3-7-7: ¹H NMR spectroscopic data of ursane-type saponins 3-7-21 and 3-7-22.

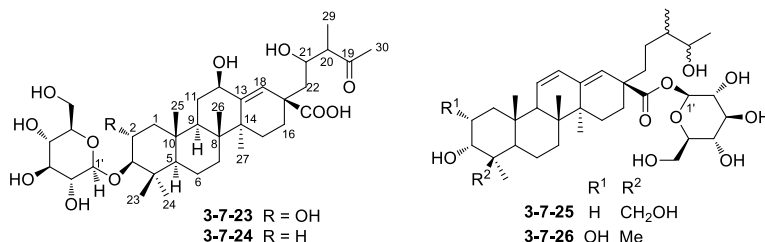
H	3-7-21	3-7-22	H	3-7-21	3-7-22
1	0.89, 1.53	1.03, 1.59	22	1.95, 2.20	1.94, 2.24
2	2.00, 2.20	2.14, 2.31	23	1.48 s	4.33 d(13.0), 4.90 d(13.0)
3	3.51 dd(11.0, 5.0)	4.47 dd(13.0, 6.0)	24	3.58 d(10.0), 4.35 d(10.0)	3.89 d(13.0), 4.59 d(13.0)
5	0.95	1.88	25	0.81	0.91

Table 3-7-7 (continued)

H	3-7-21	3-7-22	H	3-7-21	3-7-22
6	1.35, 1.61	1.51 1.90 t(13.0)	26	1.05	1.08
7	1.35, 1.50	1.37, 1.73 dt(10.0, 4.0)	27	1.73	1.68
9	1.78	1.88	29	1.42 s	1.40 s
11	1.78, 2.00	1.97, 2.05	30	1.11 d(6.0)	1.11 d(7.0)
12	5.50 s	5.52 s	1'	4.73 d(7.0)	5.05 d(8.0)
15	1.25, 2.26	1.22, 2.24	2'	4.40 dd(8.0, 7.0)	4.43 t(8.0)
16	2.06, 3.25 dt(13.0, 4.0)	2.05, 3.17 dt(13.0, 4.0)	3'	4.20 dd(8.0, 7.0)	4.07 dd(8.0, 4.0)
18	3.26 s	3.26 s	4'	4.35	4.24
20	2.00	2.00	5'	3.85 d(10.0), 4.35	3.69 d(10.0), 4.31

Table 3-7-8: Cos, MFs, and TSs of ursane-type saponins 3-7-23~3-7-26.

No.	Compounds	MFs	Test solvents	References
3-7-23	bodinioside A	C ₃₆ H ₅₈ O ₁₂	C ₅ D ₅ N	[223]
3-7-24	bodinioside B	C ₃₆ H ₅₈ O ₁₁	C ₅ D ₅ N	[223]
3-7-25	kakisaponin B	C ₃₆ H ₅₈ O ₁₀	C ₅ D ₅ N	[224]
3-7-26	kakisaponin C	C ₃₆ H ₅₈ O ₁₀	C ₅ D ₅ N	[224]

**Table 3-7-9:** ¹H NMR spectroscopic data of ursane-type saponins 3-7-23~3-7-26.

H	3-7-23	3-7-24	3-7-25	3-7-26
1	α 1.19 (ov) β 2.43 dd(4.6, 12.6)	α 1.16 m, β 1.16 m	1.45 m, 1.48 m	1.83 m, 1.88 m
2	4.03 m	1.42~1.65 m	1.80 m, 1.82 m	4.33 m
3	3.31 d(9.1)	3.38 dd(4.4, 11.7)	4.44 m	3.75 d(2.3)

Table 3-7-9 (continued)

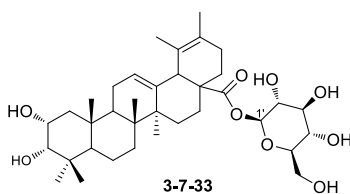
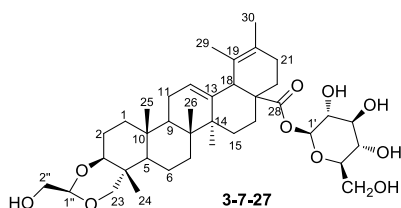
H	3-7-23	3-7-24	3-7-25	3-7-26
5	0.91(ov)	0.87 m	1.92 m	1.71 m
6	α 1.49 m, β 1.29 m	α 1.54 m, β 1.20 m	1.54 m, 1.55 m	1.42 m, 1.44 m
7	1.44 m	1.44 m	1.41 m, 1.43 m	1.40 m, 1.42 m
9	1.66 dd(3.5, 11.5)	1.61 (ov)	2.05 m	2.25 br s
11	α 2.28 m, β 1.68 m	α 2.22 m, β 1.63 (ov)	5.70 d(10.2)	5.75 d(10.0)
12	4.62 dd(1.5, 10.1)	4.61 m	6.04 br d(10.2)	6.04 br d(10.0)
15	α 1.18 m, β 2.87 m	α 1.20 m, β 2.86 m	1.94 m, 1.96 m	1.98 m, 2.00 m
16	α 1.62 m, β 1.93 m	α 1.54 m, β 1.92 m	2.10 m, 2.13 m	2.11 m, 2.13 m
18	6.39 s	6.37 s	5.79 br s	5.79 br s
19			3.84 m	3.86 m
20	2.74 m	2.73 m	1.66 m	1.66 m
21	4.85 m	4.83 m	1.83 m, 1.84 m	1.82 m, 1.83 m
22	1.81 t(12.6)	1.80 m	2.02 m, 2.04 m	2.02 m, 2.04 m
	2.07 dd(5.6, 12.6)	2.06 dd(5.7, 12.7)		
23	1.00 s	0.94 s	1.60 s	1.24 s
24	1.39 s	1.30 s	3.83 d(11.0)	0.88 s
			4.03 d(11.0)	
25	0.87 s	0.79 s	0.92 s	0.90 s
26	1.09 s	1.08 s	0.90 s	0.94 s
27	1.24 s	1.25 s	0.93 s	0.93 s
29	0.92 d(7.1)	0.93 d(6.9)	1.29 d(6.2)	1.29 d(6.2)
30	2.12 s	2.11 s	1.02 d(6.3)	1.02 d(6.3)
1'	4.95 d(7.8)	4.92 d(7.7)	6.34 d(7.6)	6.32 d(7.8)
2'	4.09 (ov)	4.01 (ov)		
3'	4.23 dt(4.8, 8.9)	4.25 dt(4.7, 9.6)		
4'	4.19 dt(4.8, 8.9)	4.22 dt(4.7, 9.6)		
5'	4.08 (ov)	3.99 (ov)		
6'	4.34 dd(5.6, 11.6)	4.37 dd(5.5, 11.7)	4.29 d(9.1)	4.29 d(9.1)
	4.60 (ov)	4.62 dd(2.4, 11.7)	4.40 d(9.1)	4.40 d(9.1)

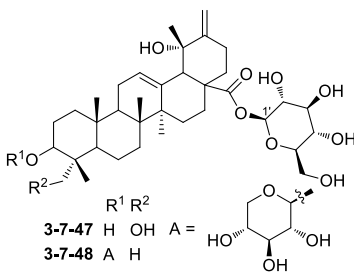
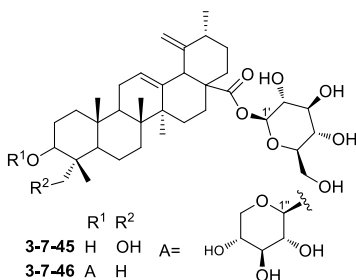
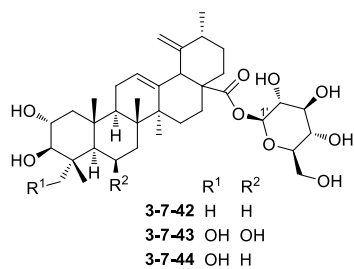
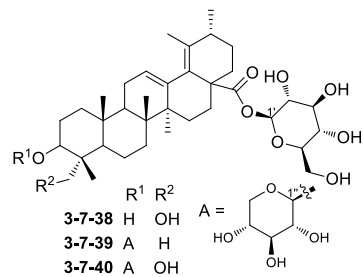
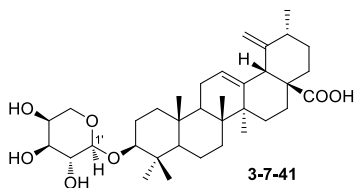
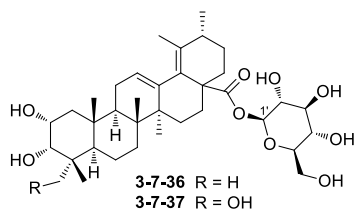
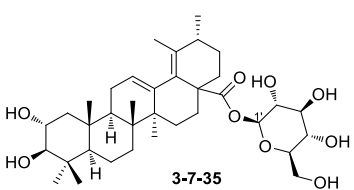
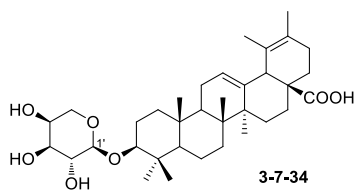
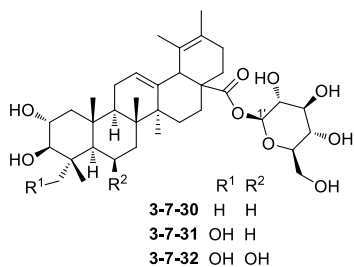
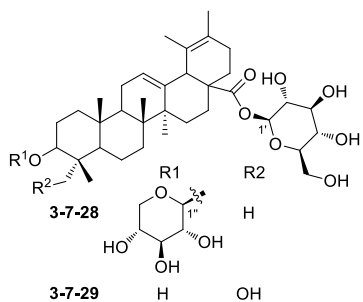
Table 3-7-10: Cos, MFs, and TSs of ursane-type saponins 3-7-27~3-7-51.

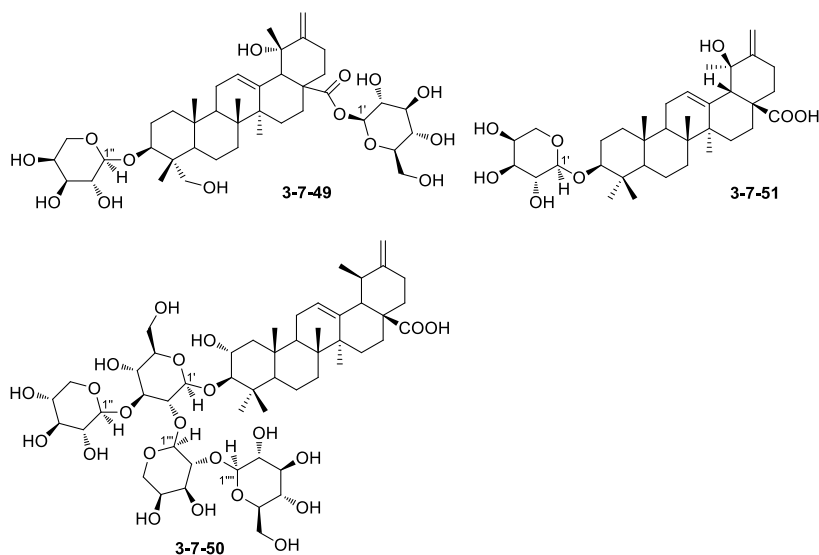
No.	Compounds	MFs	Test solvents	References
3-7-27	oblonganoside A	C ₃₈ H ₅₈ O ₁₀	CD ₃ OD	[225]
3-7-28	oblonganoside B	C ₄₁ H ₆₄ O ₁₂	CD ₃ OD	[225]
3-7-29	3 β ,23-dihydroxyurs-12,19(20)-dien-28-oic acid 28- β -D-glucopyranosyl ester	C ₃₆ H ₅₆ O ₉	CD ₃ OD	[225]
3-7-30	rubuside D	C ₃₆ H ₅₆ O ₉	C ₅ D ₅ N	[226]
3-7-31	2 α ,3 β ,23-trihydroxyurs-12,19-dien-28-oic acid 28-O- β -D-glucopyranoside	C ₃₆ H ₅₆ O ₁₀	C ₅ D ₅ N	[227]
3-7-32	quadranoside VI	C ₃₆ H ₅₆ O ₁₁	C ₅ D ₅ N	[227]

Table 3-7-10 (continued)

No.	Compounds	MFs	Test solvents	References
3-7-33	rubuside E	C ₃₆ H ₅₆ O ₉	C ₅ D ₅ N	[226]
3-7-34	3β-[(α-L-arabinopyranosyl)oxy]-urs-12,19(20)-dien-28-oic acid	C ₃₅ H ₅₄ O ₇	C ₅ D ₅ N	[221]
3-7-35	rubuside A	C ₃₆ H ₅₆ O ₉	C ₅ D ₅ N	[226]
3-7-36	rubuside B	C ₃₆ H ₅₆ O ₉	C ₅ D ₅ N	[226]
3-7-37	rubuside C	C ₃₆ H ₅₆ O ₁₀	C ₅ D ₅ N	[226]
3-7-38	3β,23-dihydroxyursa-12,18(19)-dien-28-oic acid 28-β-D-glucopyranosyl ester	C ₃₆ H ₅₆ O ₉	CD ₃ OD	[225]
3-7-39	3-O-β-D-xylopyranosyl-3β-hydroxyurs-12,18(19)-dien-28-oic acid-28-β-D-glucopyranosyl ester	C ₄₁ H ₆₄ O ₁₂	CD ₃ OD	[225]
3-7-40	oblonganoside C	C ₄₁ H ₆₄ O ₁₃	CD ₃ OD	[225]
3-7-41	3β-[(α-L-arabinopyranosyl)oxy]-urs-12,19(29)-dien-28-oic acid	C ₃₅ H ₅₄ O ₇	C ₅ D ₅ N	[221]
3-7-42	rubuside F	C ₃₆ H ₅₆ O ₁₁	C ₅ D ₅ N	[226]
3-7-43	quadranoside VII	C ₃₆ H ₅₆ O ₉	C ₅ D ₅ N	[227]
3-7-44	quadranoside VIII	C ₃₆ H ₅₆ O ₁₀	C ₅ D ₅ N	[227]
3-7-45	3β,23-dihydroxyurs-12,19(29)-dien-28-oic acid 28-β-D-glucopyranosyl ester	C ₃₆ H ₅₆ O ₉	CD ₃ OD	[225]
3-7-46	oblonganoside D	C ₄₁ H ₆₄ O ₁₂	CD ₃ OD	[225]
3-7-47	oblonganoside E	C ₃₆ H ₅₆ O ₁₀	CD ₃ OD	[225]
3-7-48	oblonganoside F	C ₄₁ H ₆₄ O ₁₃	CD ₃ OD	[225]
3-7-49	randiasaponin I	C ₄₁ H ₆₄ O ₁₄	CD ₃ OD	[215]
3-7-50	2α,3β-dihydroxyurs-12,20(30)-dien-28-oic acid 3-O-{O-β-D-glucopyranosyl-(1→2)-O-α-L-arabinopyranosyl-(1→2)-O-[β-D-xylopyranosyl-(1→3)]β-D-glucopyranoside}	C ₅₂ H ₈₂ O ₂₂	CD ₃ OD	[228]
3-7-51	3β-[(α-L-arabinopyranosyl)oxy]-19β-hydroxyurs-12,20(30)-dien-28-oic acid	C ₃₅ H ₅₄ O ₈	C ₅ D ₅ N	[221]





**Table 3-7-11:** ^1H NMR spectroscopic data of ursane-type saponins 3-7-27~3-7-31.

H	3-7-27	3-7-28	3-7-29	3-7-30	3-7-31
1	1.12 m, 1.78 m	0.99 m, 1.68 m	1.00 m, 1.70 m	1.31 t(12.4) 2.30 dd(12.4, 4.2)	1.38 m 2.34 dd(12.2, 3.9)
2	1.93 m, 1.97 m	1.93 m, 1.96 m	1.78 m, 1.94 m	4.11 ddd(12.4, 9.4, 4.2)	4.27 m
3	3.37 (ov)	3.13 (ov)	3.61 (ov)	3.40 d(9.4)	4.24 m
5	0.83 br d(12.2)	0.76 br d(12.2)	1.13 br d(12.2)	1.01 br d(11.4)	1.78 m
6	1.17 m, 1.42 m	1.36 m, 1.52 m	1.36 m, 1.39 m	1.36 qd(11.0, 3.2) 1.53 dt(11.0, 3.5)	1.68 m
7	1.35 m, 1.53 m	1.39 m, 1.50 m	1.33 m, 1.58 m	1.57 br dd(11.0, 3.5) 1.40 m	1.36 m
9	1.53 m	1.43 m	1.48 m	1.65 br d(8.5)	1.72 m
11	1.95 m	1.93 m	1.93 m	2.01 br td(8.5, 3.6)	2.02 m
12	5.47 br s	5.4 t(3.5)	5.47 br s	5.64 t(3.2)	5.63 t(2.5)
15	1.21 m, 1.56 m	1.26 m, 1.53 m	1.22 m, 1.51 m	2.39 td(13.0, 5.5) 1.22 dt(13.0, 2.3)	1.13 m, 2.34 m
16	1.61 m, 1.09 m	1.79 m, 1.65 m	1.69 m, 1.60 m	2.05 m	1.99 m

Table 3-7-11 (continued)

H	3-7-27	3-7-28	3-7-29	3-7-30	3-7-31
18	3.18 s	3.19 s	3.19 s	3.35 br s	3.51 s
21	2.25 m, 1.87 m	2.22 m, 1.84 m	2.23 m, 1.85 m	2.22 m, 1.75 m	1.74 m, 2.18 m
22	1.82 m, 1.66 m	1.82 m, 1.65 m	1.81 m, 1.67 m	1.79 m, 1.95 m	1.66 m
23	3.79 d(10) 3.27 d(10)	1.04 s	3.51 d(11.1) 3.28 d(11.1)	1.26 s	3.70 d(10.5) 4.23 d(10.5)
24	1.05 s	0.84 s	0.68 s	1.08 s	1.05 s
25	1.03 s	0.98 s	1.00 s	1.03 s	1.10 s
26	0.87 s	0.87 s	0.87 s	1.14 s	1.15 s
27	1.00 s	0.98 s	0.99 s	1.08 s	0.98 s
29	1.56 s	1.56 s	1.56 s	1.63 s	1.60 s
30	1.63 s	1.63 s	1.63 s	1.59 s	1.57 s
1'	5.38 d(7.8)	5.39 d(7.8)	5.38 d(7.6)	6.34 d(8.0)	6.33 d(8.0)
2'	3.31 m	3.30 m	3.30 m	4.21 t(8.3)	4.19 m
3'	3.39 m	3.40 m	3.39 m	4.29 t(8.9)	4.28 m
4'	3.25 m	3.24 m	3.25 m	4.38 t(9.4)	4.38 m
5'	3.33 m	3.34 m	3.34 m	4.02 ddd (9.4, 4.1, 2.8)	4.00 m
6'	3.80 br d(2.0)	3.80 br d(11.6)	3.80 br d(11.6)	4.39 dd (11.9, 4.1)	4.42 m
	3.67 dd(11.6, 3.2)	3.66 dd(11.6, 4.0)	3.67 dd(11.8, 4.3)	4.44 dd (11.9, 2.7)	4.45 m
1''	4.64 br s	4.25 d(7.7)			
2''	3.78 br d(7.2) 3.27 br d(7.2)	3.19 m			
3''		3.26 m			
4''		3.50 m			
5''		3.81 br d(11.6) 3.17 (ov)			

Table 3-7-12: ¹H NMR spectroscopic data of ursane-type saponins 3-7-32~3-7-36.

H	3-7-32	3-7-33	3-7-34	3-7-35	3-7-36
1	1.47 m 2.42 dd(12.7, 5.5)	1.29 t(12.4) 1.96 dd(11.5, 4.2)	α 0.99 β 1.66	1.31 t(12.6) 2.34 dd(12.6, 4.6)	1.77 t(12.1) 2.00 dd(12.1, 4.3)
2	4.39 m	4.31 ddd (11.5, 4.2, 2.5)	α 2.27 β 1.98	4.12 ddd (12.6, 9.4, 4.6)	4.32 (ov)
3	4.23 d(9.3)	3.76 d(2.5)	3.44 dd(12.0, 4.2)	3.41 d(9.4)	3.76 d(1.8)
5	1.98 m	1.60 br d(11.6)	0.89	1.02 (ov)	1.65 br d(12.0)
6	5.43 br s	1.32 qd(12.6, 2.7)	α 1.55	1.38 qd(12.5, 3.0)	1.33 qd(12.0, 2.0)

Table 3-7-12 (continued)

H	3-7-32	3-7-33	3-7-34	3-7-35	3-7-36
		1.45 br d(12.6)	β 1.34	1.56 br dd (12.5, 3.4)	1.49 br d(12.0)
7	1.81 m	1.58 (ov)	α 1.47	1.63 td(12.5, 3.4)	1.64 (ov)
	2.01 m	1.38 dt(12.6, 2.7)	β 1.62	1.48 dt(12.5, 3.0)	1.48 (ov)
9	1.87 m	1.72 br d(11.9)	1.60	1.63 br d(13.8)	1.73 br d(8.5)
11	2.15 m	2.01 m	1.91~2.02	2.07 m	2.07 br dd (8.5, 2.5)
	2.28 m				
12	5.72 t(2.5)	5.63 t(3.4)	5.77 br s	5.70 t(3.7)	5.69 t(3.5)
15	1.26 m	2.37 td(13.5, 4.6)	α 2.33	2.45 td(13.6, 3.5)	2.43 td(13.5, 3.7)
	2.49 m	1.19 dt(13.5, 3.0)	β 1.36	1.24 dt(13.6, 3.4)	1.22 dt(13.5, 3.0)
16	2.00 m	2.02 m	2.16	1.53 td(13.6, 3.4)	1.49 td(13.5, 3.0)
				2.58 dt(13.6, 3.5)	2.56 dt(13.5, 3.4)
18	3.55 s	3.51 br s	3.72 s		
20				2.13 m	2.10 m
21	1.72 m	2.21 m	α 1.93	2.09 m	2.08 (ov)
	1.75 m	1.73 m	β 2.41	1.27 (ov)	1.25 m
22	1.93 m	1.76 m	2.08	1.71 td(13.7, 2.5)	1.69 br t(13.7)
		1.94 m		2.19 dt(13.7, 3.0)	2.18 dt(13.7, 3.4)
23	4.03 d(10.5) 4.39 d(10.5)	1.25 s	1.36 s	1.27 s	12.7 s
24	1.73 s	0.90 s	1.04 s	1.08 s	0.91 s
25	1.80 s	1.00 s	0.96 s	1.05 s	1.02 s
26	1.69 s	1.14 s	1.10 s	1.18 s	1.18 s
27	1.00 s	0.96 s	1.27 s	1.10 s	1.00 s
29	1.63 s	1.59 s	1.80 s	1.80 s	1.77 s
30	1.57 s	1.58 s	1.73 s	1.04 d(6.7)	1.02 d(5.3)
1'	6.31 d(8.1)	6.33 d(8.2)	4.86 d(7.0)	6.32 d(8.0)	6.32 d(8.4)
2'	4.18 dd(8.8, 8.1)	4.20 t(9.0)	4.53 t(7.6)	4.16 t(8.6)	4.15 t(8.4)
3'	4.27 dd(9.0, 8.8)	4.29 t(9.0)	4.25 dd(9.0, 2.9)	4.26 t(8.6)	4.26 t(9.0)
4'	4.37 m	4.37 t(9.4)	4.42	4.32 t(9.4)	4.32 t(9.0)
5'	3.98 m	4.01 ddd(9.4, 3.9, 2.5)	4.40	3.99 ddd(9.4, 4.2, 2.8)	3.98 ddd(9.0, 4.0, 2.8)
			3.91 d(10.9)		
6'	4.39 m	4.38 dd(11.7, 3.9)		4.36 dd(11.7, 4.2)	4.36 dd(11.7, 4.0)
	4.43 m	4.43 dd(11.7, 2.5)		4.40 dd(11.6, 2.8)	4.40 dd(11.7, 2.8)

Table 3-7-13: ^1H NMR spectroscopic data of ursane-type saponins **3-7-37~3-7-41**.

H	3-7-37	3-7-38	3-7-39	3-7-40	3-7-41
1	1.22 t(12.8) 2.03 dd(12.1, 4.1)	1.73 m 1.01 m	1.64 m 1.01 m	1.75 m 1.02 m	α 1.05 β 1.61
2	4.29 (ov)	1.95 m, 1.80 m	1.97 m, 1.82 m	1.92 m, 1.88 m	α 2.28, β 1.97
3	4.14 d(2.5)	3.61 (ov)	3.14 (ov)	3.61 (ov)	3.46 dd(11.4, 3.7)
5	2.05 (ov)	1.16 br d(13.0)	0.89 br d(12.3)	1.25 br d(12.0)	0.92
6	1.37 td(12.4, 2.3) 1.58 br d(12.4)	1.74 m 1.65 m	1.53 m 1.38 m	1.45 m 1.30 m	α 1.57 β 1.38
7	1.77 (ov) 1.48 br dd(12.4, 3.4)	1.63 m, 1.43 m	1.55 m, 1.40 m	1.67 m, 1.45 m	α 1.41, β 1.58
9	1.80 br d(8.0)	1.47 m	1.43 m	1.42 m	1.81~1.88 m
11	2.09 m	1.95 m	1.94 m	1.95 m	1.98~2.11
12	5.63 t(3.9)	5.38 br s	5.39 br s	5.38 br s	5.65 br s
15	2.43 td(13.5, 2.5) 1.19 (ov)	1.95 m, 1.14 m	1.93 m, 1.19 m	1.93 m, 1.14 m	α 2.31, β 1.26
16	1.48 td(13.5, 3.4) 2.55 dt(13.5, 3.0)	1.90 m, 1.78 m	1.83 m, 1.58 m	1.65 m, 1.63 m	1.98
18					4.06 s
20	2.09 m	1.43 m	1.47 m	1.45 m	2.09
21	2.07 m 1.26 br d(13.5)	2.21 m 1.86 m	2.24 m 1.82 m	2.24 m 1.82 m	α 1.46 (ov) β 1.63 (ov)
22	1.68 td(13.5, 3.0) 2.18 dt (13.5, 3.2)	2.24 br d(13.1) 2.17 m	2.24 br d(13.0) 2.17 m	2.25 br d(13.0) 2.16 m	α 2.18 (ov) β 2.11 (ov)
23	3.75 d(10.8) 3.91 d(10.8)	3.52 d(11.0) 3.30 d(11.0)	1.04 s	3.61 d(11.6) 3.27 d(11.6)	1.36 s
24	0.87 s	0.70 s	0.82 s	0.70 s	1.03 s
25	1.07 s	1.02 s	1.00 s	1.03 s	0.94 s
26	1.20 s	0.92 s	0.92 s	0.92 s	1.10 s
27	1.02 s	1.00 s	0.98 s	1.00 s	1.40 s
29	1.78 s	1.74 s	1.66 s	1.74 s	5.15 s, 5.29 s
30	1.01 d(7.3)	1.09 d(7.0)	1.09 d(7.2)	1.09 d(7.0)	1.20 d(6.2)
1'	6.32 d(8.2)	5.38 d(7.7)	5.38 d(7.7)	5.38 d(7.8)	4.86 d(6.9)
2'	4.16 t(8.2)	3.28 m	3.30 m	3.30 m	4.51 t(7.8)
3'	4.26 t(8.9)	3.38 m	3.38 m	3.40 m	4.25 dd(8.7, 2.6)
4'	4.33 t(9.2)	3.24 m	3.24 m	3.24 m	4.42
5'	3.99 ddd (9.2, 4.4, 2.8)	3.33 m	3.33 m	3.33 m	4.39 3.90 d(12.0)
6'	4.37 dd(11.9, 4.4) 4.40 dd(11.9, 2.8)	3.80 br d(12.0) 3.67 dd(12.0, 3.9)	3.79 br d(11.5) 3.67 dd(11.5, 3.9)	3.80 br d(12.1) 3.67 br d(12.1)	
1''			4.26 d(7.2)	4.33 d(7.6)	
2''			3.17 m	3.14 m	
3''			3.28 m	3.27 m	
4''			3.48 m	3.49 m	
5''			3.82 d(11.5) 3.17 (ov)	3.82 d(11.1) 3.19 (ov)	

Table 3-7-14: ^1H NMR spectroscopic data of ursane-type saponins **3-7-42~3-7-46**.

H	3-7-42	3-7-43	3-7-44	3-7-45	3-7-46
1	1.85 t(11.7)	1.49 m	1.38 m	1.67 m, 1.05 m	1.66 m, 1.04 m
	2.25 dd(12.4, 4.4)	2.37 dd(12.5, 4.1)	2.27 dd(12.5, 3.6)		
2	4.11 ddd (12.4, 9.4, 4.4)	4.42 m	4.18 m	1.77 m, 1.73 m	1.80 m, 1.73 m
3	3.42 d(9.4)	4.25 m	4.17 m	3.61 br d(11.3)	3.13 (ov)
5	1.06 (ov)	1.97 m	1.81 m	1.18 br d(11.8)	0.81 br d(12.1)
6	1.40 m, 1.54 m	5.08 br s	1.68 m	1.40 m, 1.38 m	1.52 m, 1.40 m
7	1.55 m, 1.44 m	1.88 m, 1.98 m	1.36 m, 1.65 m	1.59 m, 1.30 m	1.47 m, 1.32 m
9	1.88 (ov)	2.13 m	1.96 m	1.44 m	1.46 m
11	2.06 m	2.15 m, 2.30 m	2.05 m	1.99 m	1.98 m
12	5.53 t(3.3)	5.62 t(2.6)	5.50 t(2.6)	5.32 br s	5.30 br s
15	2.43 td(14.0, 3.0)	1.15 m, 2.49 m	1.38 m, 2.38 m	1.88 m, 1.07 m	1.88 m, 1.14 m
	1.17 dt(14.2, 3.9)				
16	1.82 td(14.0, 3.9)	1.75 m, 1.85 m	1.69 m, 1.86 m	1.63 m, 1.59 m	1.63 m, 1.59 m
	1.93 br d(14.0)				
18	3.80 s	3.81 s	3.76 s	3.44 s	3.44 s
20	1.87 m	1.81 m	1.79 m	1.98 m	1.98 m
21	1.27 (ov), 1.45 (ov)	1.43 m	1.25 m, 1.43 m	1.63 m, 1.32 m	1.84 m, 1.68 m
22	1.84 td(13.6, 3.5)	1.81 m, 1.98 m	1.79 m, 1.97 m	1.88 m, 1.77 m	1.88 m, 1.77 m
	2.01 dt(13.6, 2.7)				
23	1.27 s	4.06 d(10.4) 4.39 d(10.4)	3.69 d(9.6) 4.17 d(9.6)	3.51 d(10.8) 3.27 d(10.8)	0.85 s
24	1.09 s	1.76 s	1.05 s	0.70 s	1.05 s
25	1.04 s	1.82 s	1.09 s	1.00 s	0.98 s
26	1.16 s	1.74 s	1.15 s	0.84 s	0.83 s
27	1.24 s	1.18 s	1.14 s	1.16 s	1.15 s
29	5.05 br s 5.12 br s	5.05 br s 5.20 br s	5.00 br s 5.12 br s	5.00 d(2) 4.96 d(2)	4.99 d(2) 4.95 d(2)
30	1.07 d(6.4)	1.05 d(5.8)	1.03 d(6.7)	1.13 d(6.3)	1.12 d(6.5)
1'	6.32 d(8.2)	6.28 d(8.0)	6.29 d(8.2)	5.39 d(7.9)	5.38 d(8.0)
2'	4.22 t(9.0)	4.18 dd(8.7, 8.0)	4.18 m	3.30 m	3.30 m
3'	4.30 t(9.0)	4.26 dd(8.9, 8.7)	4.27 t(9.2)	3.40 m	3.41 m
4'	4.36 t(9.2)	4.34 dd(9.2, 8.9)	4.33 t(9.2)	3.25 m	3.24 m
5'	4.05 ddd (9.2, 4.4, 2.4)	4.02 m	4.02 ddd (9.2, 4.4, 2.6)	3.34 m	3.34 m
6'	4.40 dd(11.9, 4.4) 4.48 dd(11.9, 2.4)	4.35 m, 4.45 m	4.37 m, 4.45 m	3.80 br d(11.6) 3.66 br d(11.3)	3.80 br d(11.3) 3.67 br d(11.3, 3.2)

Table 3-7-14 (continued)

H	3-7-42	3-7-43	3-7-44	3-7-45	3-7-46
1''					4.26 d(7.6)
2''					3.17 m
3''					3.26 m
4''					3.50 m
5''					3.81 d(11.4)
					3.17 (ov)

Table 3-7-15: ¹H NMR spectroscopic data of ursane-type saponins 3-7-47~3-7-51.

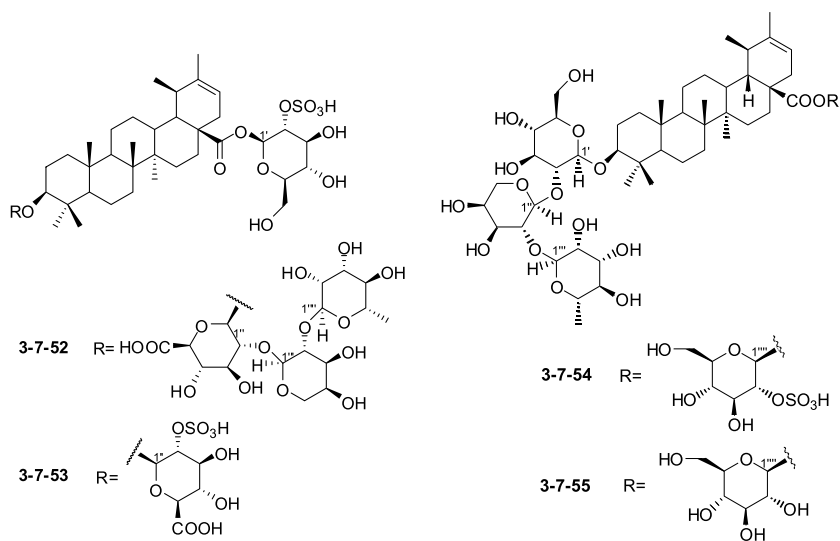
H	3-7-47	3-7-48	3-7-49	3-7-50	3-7-51
1	1.67 m 1.04 m	1.67 m 1.02 m	0.99 (ov) 1.65 (ov)	1.20 dd(4.0, 11.0) 1.96 dd(12.5, 4.0)	α 1.02 β 1.56
2	1.77 m 1.73 m	1.81 m 1.65 m	1.76 (ov) 1.87 (ov)	3.84 ddd (10.0, 12.5, 4.0)	α 2.26 β 1.96
3	3.60 (ov)	3.13 (ov)	3.61 (ov)	3.10 d(10.0)	3.46 dd(11.8, 4.3)
5	1.17 br d(12,1)	0.79 br d(12.0)	1.27 (ov)	0.90 br dd(9.0)	0.92
6	1.40 m 1.36 m	1.53 m 1.41 m	1.46 (ov)	1.25 m 1.48 m	α 1.58 β 1.37
7	1.59 m 1.30 m	1.49 m 1.33 m	1.32 (ov) 1.68 (ov)	1.26 m 1.62 m	α 1.42 β 1.59
9	1.74 m	1.71 m	1.76 (ov)	1.54 br s	1.83
11	1.99 m	1.98 m	1.97 (ov)	1.90 m	1.92~2.08
12	5.34 br s	5.36 br s	5.33 (ov)	5.28 m	5.58 br s
15	1.93 m 1.20 m	1.94 m 1.20 m	1.06 (ov) 1.82 (ov)	1.08 m 1.85 m	α 2.32 β 1.30
16	1.71 m 1.65 m	1.71 m 1.65 m	1.76 (ov) 2.74 td(13.5, 4.5)	1.80 m 1.55	2.08
18	3.86 s	3.72 s	2.65 s	2.42 d(13.0)	4.57 s
19				2.38 dd(13.0, 6.4)	
21	2.07 m 1.93 m	2.06 m 1.93 m	2.10 dt(13.7, 4.9) 2.77 td(13.5, 5.0)	1.60 t(12.5) 2.00 m	1.94 2.40
22	1.56 m 1.03 m	1.63 m 1.56 m	1.71 (ov) 1.95 (ov)	1.81 1.52	2.79~2.90 m 2.00
23	3.52 d(10.4) 3.26 d(10.4)	0.84 s	3.29 d(3.4) 3.61 (ov)	1.00	1.37 s
24	0.71 s	1.04 s	0.71 s	0.90 s	1.03 s
25	1.00 s	0.97 s	0.99 s	1.02 s	0.92 s
26	0.83 s	0.82 s	0.79 s	1.87 s	1.10 s
27	1.13 s	1.12 s	1.34 s	1.22 s	1.42 s
29	1.40 s	1.41 s	1.37 s	0.98 d(6.4)	1.82 s

Table 3-7-15 (continued)

H	3-7-47	3-7-48	3-7-49	3-7-50	3-7-51
30	5.29 d(1.9)	5.35 d(1.4)	4.70 br s	4.70 br s	5.63 s
	5.10 d(1.9)	5.28 d(1.4)	4.89 br s	4.76 br s	5.70 s
1'	5.37 d(8.3)	5.37 d(8.3)	5.34 d(8.3)	4.50 d(7.5)	4.87 d(7.0)
2'	3.30 m	3.30 m	3.31 (ov)	3.43 dd(7.5, 9.5)	4.51 t(7.8)
3'	3.39 m	3.41 m	3.33 (ov)	3.50 t(9.5)	4.24 dd(8.5, 2.8)
4'	3.25 m	3.24 m	3.35	3.32 t(9.5)	4.40
5'	3.34 m	3.34 m	3.40 t(8.8)	3.28 m	4.39
					3.91 d(10.8)
6'	3.80 br d(11.0)	3.80 br d(9.8)	3.68 (ov)	3.89 dd(12.0, 5.0)	
	3.67 br d(11.6)	3.67 br d(11.0)	3.80 (ov)	3.65 dd(12.0, 3.5)	
1''		4.25 d(7.6)	4.32 d(6.8)	4.47 d(7.5)	
2''		3.19 m	3.54 (ov)	3.20 dd(7.5, 9.0)	
3''		3.26 m	3.50	3.38 t(9.0)	
4''		3.50 m	3.79 (ov)	3.52 m	
5''		3.81 d(11.3)	3.54 (ov)	3.92 dd(10.0, 5.0)	
		3.17 (ov)	3.84 dd(12.2, 2.9)	3.16 dd(10.0, 2.0)	
1'''				4.42 d(7.2)	
2'''				3.78 dd(7.2, 9.0)	
3'''				3.83 dd(9.0, 3.5)	
4'''				4.00 m	
5'''				4.03 dd(12.0, 3.0)	
				3.61 dd(12.0, 2.0)	
1''''				4.60 d(7.6)	
2''''				3.45 dd(7.6, 9.5)	
3''''				3.55 t(9.5)	
4''''				3.34 t(9.5)	
5''''				3.30 m	
6''''				3.87 dd(12.0, 5.0)	
				3.68 dd(12.0, 3.5)	

Table 3-7-16: Cos, MFs, and TSs of ursane-type saponins 3-7-52~3-7-55.

No.	Compounds	MFs	Test solvents	References
3-7-52	(3 β)-3-[[6-deoxy- α -L-mannopyranosyl-(1 $\rightarrow$ 2)- α -L-arabinopyranosyl-(1 $\rightarrow$ 2)- β -D-glucopyranurosonyl]oxy]urs-20-en-28-oic acid 28-(2-O-sulfo- β -D-glucopyranosyl) ester	C ₅₃ H ₈₄ O ₂₅ S	C ₅ D ₅ N	[229]
3-7-53	(3 β)-3-[[2-O-sulfo- β -D-glucopyranurosonyl]oxy]urs-20-en-28-oic acid 28-(2-O-sulfo- β -D-glucopyranosyl) ester	C ₄₂ H ₆₆ O ₂₀ S ₂	C ₅ D ₅ N	[229]
3-7-54	zygophyloside I	C ₅₃ H ₈₆ O ₂₄ S	CD ₃ OD	[230]
3-7-55	zygophyloside L	C ₅₃ H ₈₆ O ₂₁	CD ₃ OD	[230]

**Table 3-7-17:** ¹H NMR spectroscopic data of ursane-type saponins 3-7-52~3-7-55.

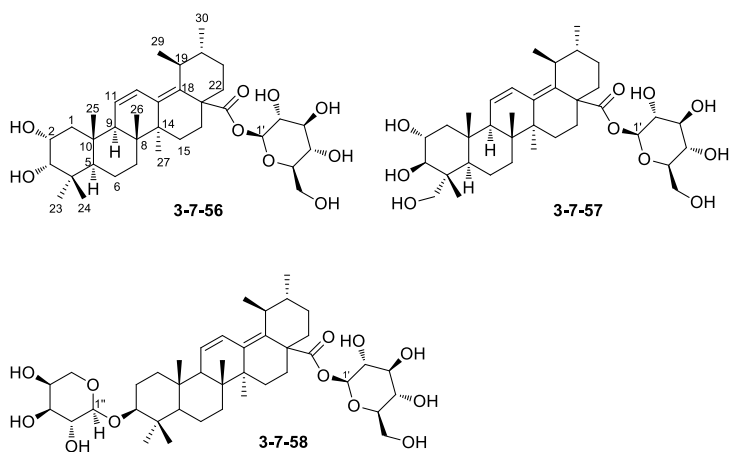
H	3-7-52	3-7-53	3-7-54	3-7-55
1	0.75, 1.44	0.72, 1.46	1.17 m, 1.88 m	1.02 m, 1.72 m
2	1.82, 2.32	1.86, 2.22	1.08 m, 1.80 m	1.05 m, 1.78 m
3	3.25 dd(11.4, 3.8)	3.28 dd(11.2, 3.8)	3.20 dd(11.1, 4.5)	3.20 dd(11.2, 4.5)
5	0.56	0.63	0.75 m	0.75 m
6	1.25, 1.32	1.20, 1.37	1.35 m, 1.55 m	1.10 m, 1.55 m
7	1.15, 1.55	—	1.36 m, 1.53 m	1.32 m, 1.50 m
9	1.19	1.23	1.37 m	1.40 m
11	1.07, 1.31	1.39 (ov)	1.73 m, 1.95 m	1.35 m, 1.92 m
12	1.02, 1.62	1.16, 1.74	1.22 m, 1.32 m	1.27 m, 1.33 m
13	—	—	2.42 dt(12.0, 3.4)	2.41 dt(12.2, 3.4)
15	1.45	1.55, 2.09	1.05 m, 1.11 m	1.05 m, 1.27 m
16	1.44	1.52	1.36 ddd	1.45 br s
	2.80	2.91	(13.0, 12.0, 5.0)	2.10 ddd(12.2, 5.2, 3.2)
			2.31 ddd(12.0, 5.0, 3.1)	
18	1.20	1.29	1.23 br s	1.26 br
19	2.26 dd(12.7, 6.5)	2.40 dd(11.5, 5.9)	2.16 dd(11.5, 6.5)	2.15 dd(11.5, 6.5)
21	5.28 dd(6.7, 1.5)	5.37 dd(6.5, 1.4)	5.27 dd(6.0, 1.5)	5.27 dd(6.0, 1.5)
22	1.82	1.87	1.82 dd(12.0, 1.5)	1.87 dd(12.2, 1.5)
	2.59	2.68	2.36 dd(12.0, 6.0)	2.32 dd(12.2, 6.2)
23	1.15 s	1.36 s	0.85 s	0.85 s
24	0.98 s	1.10 s	1.08 s	1.08 s
25	0.61 s	0.67 s	1.01 s	1.00 s

Table 3-7-17 (continued)

H	3-7-52	3-7-53	3-7-54	3-7-55
26	1.07 s	1.17 s	0.90 s	0.90 s
27	0.89 s	0.99 s	1.00 s	1.03 s
29	0.97 d(6.5)	1.07 d(5.9)	1.04 d(6.5)	1.04 d(6.5)
30	1.60 s	1.69 s	1.63 s	1.63 s
1'	6.03 d(8.1)	6.18 d(8.1)	4.49 d(7.8)	4.48 d(7.5)
2'	4.96 t(8.4)	5.12 t(8.4)	3.42 dd(9.0, 7.8)	3.43 dd(9.0, 7.5)
3'	4.26 t(8.8)	4.40 t(8.8)	3.63 t(9.0)	3.60 t(9.0)
4'	4.08 t(9.4)	4.23 t(9.3)	3.52 t(9.0)	3.51 t(9.0)
5'	3.80	3.90	3.64 ddd(9.0, 4.5, 3.0)	3.60 ddd(9.0, 4.5, 3.5)
6'	4.02	4.15 dd(11.9, 4.6)	3.70 dd(12.0, 4.5)	3.72 dd(12.0, 4.5)
	4.17	4.29	3.85 dd(12.0, 3.0)	3.84 dd(12.0, 3.5)
1''	4.79 d(7.4)	4.91 d(7.1)	5.00 d(5.2)	5.03 d(5.2)
2''	4.03 t(8.3)	4.99 t(8.1)	3.92 dd(5.2, 8.5)	3.92 dd(5.2, 8.5)
3''	4.15	4.42 t(8.3)	3.82 dd(8.5, 3.0)	3.83 dd(8.5, 3.0)
4''	4.14	4.34	3.80 m	3.82 m
5''	4.24 d(8.6)	4.30	3.45 dd(12.0, 3.0)	3.45 dd(12.0, 2.5)
			3.95 dd(12.0, 2.0)	3.97 dd(12.0, 2.0)
1'''	5.51 d(6.0)		5.05 d(1.5)	5.05 d(1.5)
2'''	4.45		3.88 dd(1.5, 2.0)	3.88 dd(1.5, 2.5)
3'''	4.15		3.71 dd(2.0, 8.5)	3.71 dd(2.5, 8.6)
4'''	4.17		3.45 t(8.5)	3.41 t(8.6)
5'''	3.65 d(10.7)		3.87 dd(8.5, 6.6)	3.88 dd(8.6, 6.5)
	4.33 dd(10.7, 5.9)			
6'''			1.30 d(6.6)	1.30 d(6.5)
1'''	5.66 br s		5.52 d(7.6)	5.47 d(7.5)
2'''	4.47 br s		4.20 dd(9.0, 7.5)	3.30 dd(9.5, 7.5)
3'''	4.42 dd(9.5, 3.1)		3.76 t(9.0)	3.43 t(9.5)
4'''	4.17		3.53 t(9.0)	3.57 t(9.5)
5'''	4.54 qd(9.4, 6.0)		3.40 m	3.37 m
6'''	1.64 d(6.0)		3.73 dd(12.2, 5.0)	3.70 dd(12.2, 4.5)
			3.84 dd(12.2, 3.5)	3.85 dd(12.2, 3.5)

Table 3-7-18: Cos, MFs, and TSs of ursane-type saponins 3-7-56~3-7-58.

No.	Compounds	MFs	Test solvents	References
3-7-56	rubuside G	C ₃₆ H ₅₆ O ₉	C ₅ D ₅ N	[226]
3-7-57	rubuside H	C ₃₆ H ₅₆ O ₁₀	C ₅ D ₅ N	[226]
3-7-58	3β-[(α-L-arabinopyranosyl)oxy]-urs-11,13(18)-dien-28-oic acid-β-D-glucopyranosyl ester	C ₄₁ H ₆₄ O ₁₂	C ₅ D ₅ N	[221]

**Table 3-7-19:** ^1H NMR spectroscopic data of ursane-type saponins 3-7-56~3-7-58.

H	3-7-56	3-7-57	3-7-58
1	1.45 t(12.4) 2.28 dd(11.7, 3.9)	1.82 t(12.1) 2.63 dd(12.4, 3.9)	α 1.10 β 1.95 br d(13.1)
2	4.41 ddd(11.7, 3.9, 2.0)	4.35 (ov)	α 2.34, β 2.05
3	3.81 d(2.0)	4.25 d(9.2)	3.47 dd(11.4, 4.2)
5	1.75 br d(10.1)	1.88 br d(11.7)	0.92
6	1.40 qd(12.6, 5.3) 1.53 qd(12.6, 5.3)	1.51 qd(12.1, 3.0) 1.78 br d(12.1)	α 1.58 β 1.43
7	1.38 td(12.6, 5.3), 1.32 m	1.41 td(12.1, 3.0), 1.30 dt(12.1, 2.5)	α 1.30, β 1.56
9	2.27 br s	2.25 br s	2.09
11	6.51 dd(10.5, 2.9)	6.51 dd(10.5, 2.8)	6.61 dd(10.8, 2.7)
12	5.87 dd(10.5, 0.7)	5.86 br d(10.5)	5.81 d(10.4)
15	0.98 (ov), 2.09 br d(11.6)	0.94 td(13.5, 3.4), 2.06 m	α 2.18, β 1.09
16	1.66 m 2.15 dt(11.6, 3.2)	1.65 td(13.5, 2.5) 2.13 dt(13.5, 3.0)	α 1.78 t(12.6) β 2.25 br d(13.6)
19	2.84 m	2.84 dq(14.2, 7.1)	2.87~2.96 m
20	2.33 m	2.33 m	2.41 m
21	2.05 m, 1.24 (ov)	2.04 m, 1.21 (ov)	α 1.31, β 2.23
22	1.48 td(9.4, 4.4) 2.46 dd(13.3, 9.4)	1.43 td(13.3, 4.2) 2.45 br dd(13.3, 9.4)	α 1.56 β 2.51~2.59 m
23	1.26 s	3.73 d(10.3), 4.23 d(10.3)	1.35 s
24	0.92 s	1.07 s	1.03 s
25	1.03 s	1.12 s	0.99 s
26	1.20 s	1.21 s	1.25 s
27	0.90 s	0.91 s	1.11 s
29	0.99 d(7.1)	0.99 d(7.1)	1.08 d(7.0)
30	0.80 d(6.7)	0.80 d(6.6)	0.86 d(6.6)

Table 3-7-19 (continued)

H	3-7-56	3-7-57	3-7-58
1'	6.32 d(8.3)	6.30 d(8.3)	6.39 d(8.2)
2'	4.17 t(8.9)	4.16 t(8.3)	4.24
3'	4.25 t(8.9)	4.25 t(9.2)	4.33t(8.8)
4'	4.31 t(9.2)	4.30 t(9.2)	3.37 t(8.9)
5'	4.01 ddd(9.2, 4.4, 2.8)	4.02 ddd(9.2, 4.4, 2.8)	4.07~4.13 m
6'	4.36 dd(11.9, 4.4)	4.35 dd(11.3, 4.4)	4.43, 4.51
	4.45 dd(11.9, 2.8)	4.44 br d(11.3)	
1''			4.88 d(6.9)
2''			4.54
3''			4.24
4''			4.43
5''			4.41
6''			3.92 d(11.0)

Table 3-7-20: Co, MF, and TS of ursane-type saponin 3-7-59.

No.	Compound	MF	Test solvent	Reference
3-7-59	zygophyloside N	C ₄₇ H ₇₆ O ₁₆	CD ₃ OD	[231]

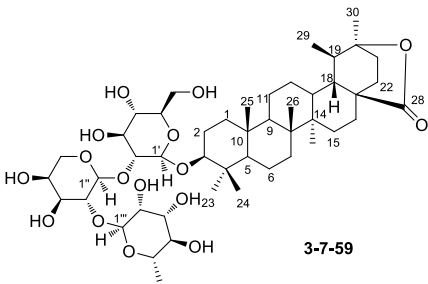


Table 3-7-21: ¹H NMR spectroscopic data of ursane-type saponin 3-7-59.

H	3-7-59	H	3-7-59
1	0.98 m, 1.69 m	27	0.97 s
2	1.01 m, 1.71 m	29	1.05 d(6.5)
3	3.18 dd(11.1, 4.5)	30	1.32 s
5	0.75 m	1'	4.43 d(7.8)
6	1.35 m, 1.53 m	2'	3.40 dd(9.0, 7.8)

Table 3-7-21 (continued)

H	3-7-59	H	3-7-59
7	1.41 m	3'	3.55 t(9.0)
9	1.38 m	4'	3.47 t(9.0)
11	1.91 m	5'	3.56 ddd(9.0, 4.5, 3.0)
12	0.93 m, 1.31 m	6'	3.72 dd(12.0, 4.5)
			3.84 dd(12.0, 3.0)
13	1.18 dt(12.0, 3.4)	1''	5.01 d(5.2)
15	1.03 m, 1.14 m	2''	3.88 dd(5.2, 8.5)
16	1.85 ddd(13.0, 4.5, 3.1)	3''	3.80 dd(8.5, 3.0)
	2.02 ddd(13.0, 4.5, 3.1)		
18	1.16 br m	4''	3.78 m
19	1.55 dd(11.5, 6.5)	5''	3.43 dd(12.0, 3.0)
			3.93 dd(12.0, 2.0)
21	1.57 m, 1.65 m	1'''	5.03 d(1.5)
22	1.67 m	2'''	3.84 dd(1.5, 2.0)
23	0.84 s	3'''	3.67 dd(2.0, 8.5)
24	1.09 s	4'''	3.37 t(8.5)
25	0.95 s	5'''	3.84 dd(8.5, 6.6)
26	0.87 s	6'''	1.29 d(6.6)

Table 3-7-22: Cos, MFs, and TSs of ursane-type saponins 3-7-60 and 3-7-61.

No.	Compounds	MFs	Test solvents	References
3-7-60	11,21-dioxo-2 β ,3 β ,15 α -trihydroxyurs-12-ene-2- <i>O</i> - β -D-glucopyranoside	C ₃₆ H ₅₆ O ₁₀	C ₅ D ₅ N	[232]
3-7-61	11,21-dioxo-3 β ,15 α ,24-trihydroxyurs-12-ene-24- <i>O</i> - β -D-glucopyranoside	C ₃₆ H ₅₆ O ₁₀	C ₅ D ₅ N	[232]

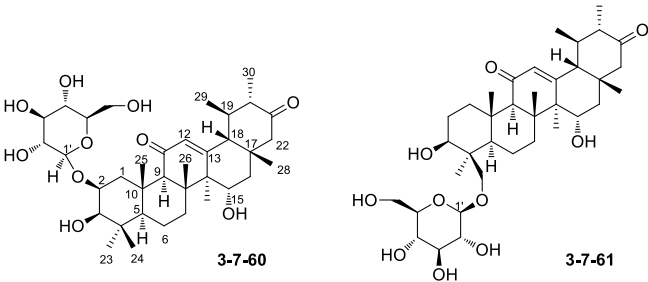


Table 3-7-23: ^1H NMR spectroscopic data of ursane-type saponins **3-7-60** and **3-7-61**.

H	3-7-60	3-7-61	H	3-7-60	3-7-61
1 α	1.45 dd(17.4, 30)	1.23 dd(13.1, 4.7)	20	2.16 m	2.13 m
1 β	3.93 dd(17.4, 1.5)	3.15 br d(13.3)	22 α	2.31 d(12.6)	2.30 d(12.8)
2 α	4.41 dd(3.6, 4.2)	2.03 m	22 β	2.43 d(12.6)	2.42 d(12.8)
2 β		2.22 m	23	1.25 s	1.61 s
3	3.50 d(4.2)	3.64 dd(11.8, 3.9)	24	1.39 s	4.37 br d(10.1), 4.44 m
5	1.04 m	1.08 m	25	1.86 s	1.38 s
6 α	1.70 m	1.75 m	26	1.33 s	1.28 s
6 β	1.64 m	1.50 m	27	1.57 s	1.57 s
7 α	2.26 m	2.09 m	28	1.01 s	0.99 s
7 β	2.14 m	2.17 m	29	0.99 d(6.6)	0.95 d(6.4)
9	2.59 s	2.65 s	30	1.09 d(6.6)	1.08 d(6.4)
12	5.95 s	5.96 s	1'	5.10 d(7.8)	5.03 d(7.8)
15	4.48 dd(10.8, 5.4)	4.46 br d(10.1)	2'	4.09 m	4.04 m
16 α	2.07 m	2.10 m	3'	4.22 t(9.0)	4.28 m
16 β	1.77 dd(13.2, 4.2)	1.77 m	4'	4.15 t(9.0)	4.27 m
18	2.12 m	2.08 m	5'	3.97 m	4.01 m
19	2.02 m	2.01 m	6'	4.35 dd(12.0, 6.0)	4.44 m
				4.57 dd(11.4, 2.4)	4.58 dd(11.9, 2.2)

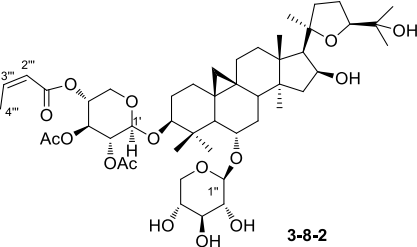
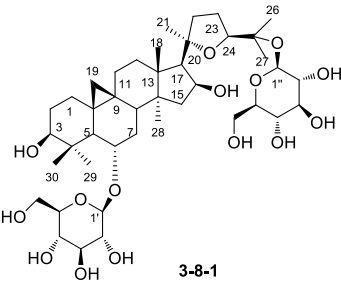
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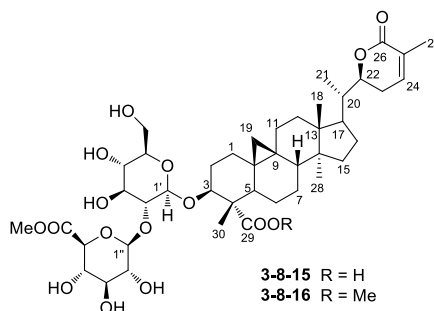
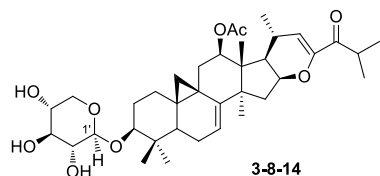
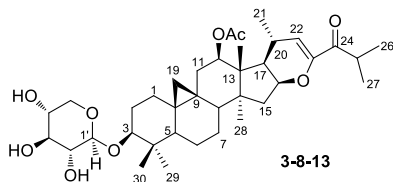
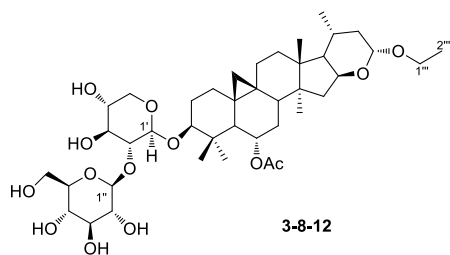
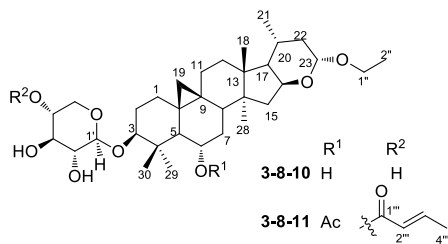
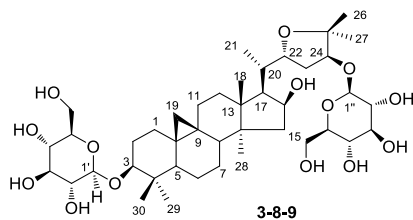
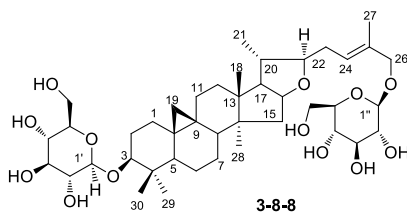
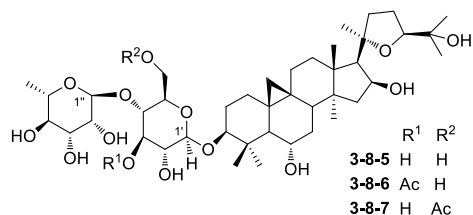
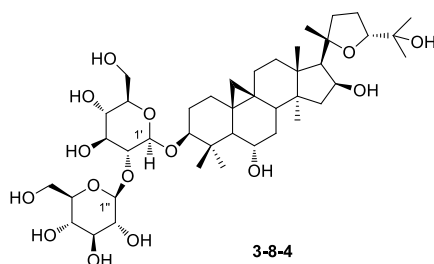
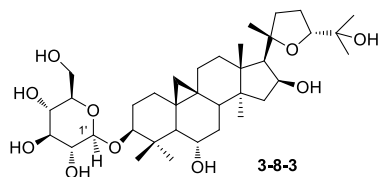
- [214] Wu ZJ, Ouyang MA, Wang CZ et al. *J Agric Food Chem.* 2007;55:1712.
- [215] Sahpaz S, Gupta MP, Hostettmann K. *Phytochemistry.* 2000;54:77.
- [216] Baykal T, Panayir T, Tasdemir D et al. *Phytochemistry.* 1998;48:867.
- [217] Shaker KH, Bernhardt M, Elgamal MHA et al. *Phytochemistry.* 1999;51:1049.
- [218] Dijoux M-G, Lavaud C, Massiot G et al. *Phytochemistry.* 1993;34:497.
- [219] Pöllmann K, Gagel S, Elgamal MHA et al. *Phytochemistry.* 1997;44:485.
- [220] Chen YL, Tan CH, Tan JJ et al. *Helv Chim Acta.* 2007;90:2421.
- [221] Liu X, Cui YX, Yu Q et al. *Phytochemistry.* 2005;66:1671.
- [222] Cardoso Taketa AT, Schmittmann-Schlager T, Guillaume D et al. *Phytochemistry.* 2000;53:901.
- [223] Li RT, Li JT, Wang JK et al. *Helv Chim Acta.* 2005;88:252.
- [224] Chen G, Wang ZQ, Jia JM. *Chem Pharm Bull.* 2009;57:532.
- [225] Wu ZJ, Ouyang MA, Wang CZ et al. *Chem Pharm Bull.* 2007;55:422.
- [226] Li W, Fu HW, Bai H et al. *J Nat Prod.* 2009;72:1755.
- [227] Adnyaya IK, Tezuka Y, Awale S et al. *Chem Pharm Bull.* 2000;48:1114.
- [228] Sanoko R, Speranza G, Pizza C et al. *Phytochemistry.* 1999;51:1043.
- [229] Smati D, Mitaine-Offer A-C, Miyamoto T et al. *Helv Chim Acta.* 2007;90:712.
- [230] Safir O, Fkih-Tetouani S, Tommasiv ND et al. *J Nat Prod.* 1998;61:130.
- [231] Aquino R, Tortora S, Fkih-Tetouani S et al. *Phytochemistry.* 2001;56:393.
- [232] Zhou KL, Zhao F, Liu ZH et al. *J Nat Prod.* 2009;72:1563.

3.8 Cycloartane-type Saponins

Table 3-8-1: Cos, MFs, and TSs of cycloartane-type saponins 3-8-1~3-8-20.

No.	Compounds	MFs	Test solvents	Refer-ences
3-8-1	astramembranoside A	C ₄₂ H ₇₀ O ₁₅	C ₅ D ₅ N	[233]
3-8-2	kahiricoside I	C ₄₈ H ₇₄ O ₁₆	C ₅ D ₅ N	[234]
3-8-3	sieberoside I	C ₃₆ H ₆₀ O ₁₀	C ₅ D ₅ N	[235]
3-8-4	sieberoside II	C ₄₂ H ₇₀ O ₁₅	C ₅ D ₅ N	[235]
3-8-5	astraverrucin IV	C ₄₇ H ₇₀ O ₁₄	C ₅ D ₅ N	[236]
3-8-6	astraverrucin V	C ₄₄ H ₇₂ O ₁₅	C ₅ D ₅ N	[236]
3-8-7	astraverrucin VI	C ₄₄ H ₇₂ O ₁₅	C ₅ D ₅ N	[236]
3-8-8	depressoside C	C ₄₂ H ₆₈ O ₁₃	CD ₃ OD	[237]
3-8-9	depressoside D	C ₄₂ H ₇₀ O ₁₄	CD ₃ OD	[237]
3-8-10	deacetyltomentoside I	C ₃₃ H ₅₄ O ₈	C ₅ D ₅ N	[238]
3-8-11	tomentoside III	C ₃₉ H ₆₀ O ₁₀	C ₅ D ₅ N	[238]
3-8-12	tomentoside IV	C ₄₁ H ₆₆ O ₁₄	C ₅ D ₅ N	[238]
3-8-13	asiaticoside A	C ₃₇ H ₅₆ O ₉	C ₅ D ₅ N	[239]
3-8-14	asiaticoside B	C ₃₇ H ₅₄ O ₉	C ₅ D ₅ N	[239]
3-8-15	3β-O-[β-D-methylglucuronopyranosyl-(1→2)-β-D-glucopyranosyl]-(20S,22S)-3β,22-dihydroxyl-9,19-cycloanost-24-en-26,29-dioic acid δ-lactone	C ₄₃ H ₆₄ O ₁₆	C ₅ D ₅ N	[240]
3-8-16	3β-O-[β-D-methylglucuronopyranosyl-(1→2)-β-D-glucopyranosyl]-(20S,22S)-3β,22-dihydroxyl-9,19-cycloanost-24-en-26,29-dioic acid δ-lactone	C ₄₄ H ₆₆ O ₁₆	C ₅ D ₅ N	[240]
3-8-17	25-O-ethylcimigenol-3-O-β-D-xylopyranoside	C ₃₇ H ₆₀ O ₉	C ₅ D ₅ N	[239]
3-8-18	3'-O-acetyl cimigenol 3-O-β-D-xylopyranoside	C ₃₇ H ₅₈ O ₁₀	C ₅ D ₅ N	[241]
3-8-19	2'-O-acetylactein	C ₃₉ H ₅₈ O ₁₁	C ₅ D ₅ N	[242]
3-8-20	2'-O-acetyl-27-deoxyactein	C ₃₉ H ₅₈ O ₁₀	C ₅ D ₅ N	[242]





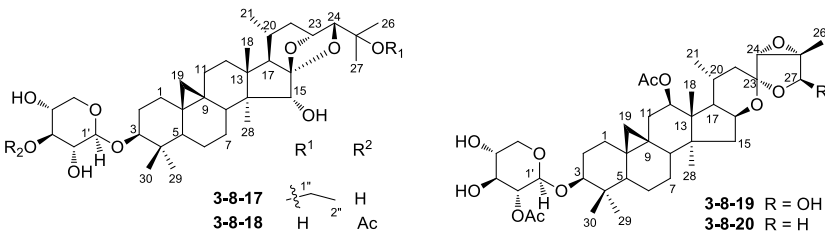


Table 3-8-2: ¹H NMR spectroscopic data of cycloartane-type saponins 3-8-1-3-8-5.

H	3-8-1	3-8-2	3-8-3	3-8-4	3-8-5
1	1.26 (ov), 1.59 (ov)	ax 1.504, eq 1.258	eq 1.10	ax 1.51, eq 1.10	ax 1.58, eq 1.15
2	1.97 (ov), 2.03 (ov)	ax 2.174, eq 1.90	eq 2.47	ax 1.94, eq 2.42	ax 1.92, eq 2.4
3	3.63 dd(4.6, 10.8)	ax 3.34 dd (4.6, 11.7)	ax 3.65	ax 3.57	ax 3.63 dd (4.6, 11.8)
5	1.92 d(9.2)	ax 1.825 d	—	ax 1.67	ax 1.75
6	3.91 (ov)	ax 3.76 m	ax 3.74	ax 3.74	ax 3.75
7	1.84 (ov), 2.29 (ov)	ax 1.906, eq 2.114	—	ax 1.62, eq 1.79	ax 1.6, eq 1.8
8	1.93 (ov)	ax 2.01	—	ax 1.97	1.9
11	1.27 (ov), 1.86 (ov)	ax 1.72, eq 1.36	—	ax 1.22, eq 1.90	ax 2.05, eq 2.32
12	1.60 (ov)	ax 1.556, eq 1.65	—	ax 1.82, eq 1.70	ax 1.7, eq 3.1
15	1.73 dd(6.5, 12.4)	α 2.294, β 1.821	—	ax 1.80, eq 2.13	ax 1.78, eq 2.17
16	2.27 dd(7.2, 12.4)				
16	4.89 m	ax 5.04 m	ax 4.76	ax 4.81	α 5.02
17	2.44 d(7.8)	ax 2.55 d(7.8)	ax 2.22	ax 2.24	α 2.55 d(7.5)
18	1.38 s	1.392 s	1.63 s	1.65 s	1.35
19	0.27 d(3.7)	0.18 d, 0.56 d	0.22, 0.54	0.21, 0.56	α 0.25 d(3.8)
	0.64 d(3.7)				β 0.6 d(3.8)
21	1.29 s	1.312 s	1.30 s	1.33 s	1.30
22	2.82 dd(11.4, 20.2)	α 3.097, β 1.673	α 2.47	α 2.49, β 1.68	ax 1.3, eq 1.7
	1.60 (ov)				
23	1.95 (ov), 2.35 (ov)	α 2.27, β 2.02	—	α 1.90, β 2.23	ax 2.05, eq 2.38
24	3.90 (ov)	α 3.89 dd(5.4, 8.9)	β 3.95	β 3.94	3.93
26	1.43 s	1.580 s	1.51 s ^①	1.50 s ^①	1.6 s

Table 3-8-2 (continued)

H	3-8-1	3-8-2	3-8-3	3-8-4	3-8-5
27	1.67 s	1.312 s	1.28 s ^①	1.27 s ^①	1.3 s
28	1.98 s	1.666 s	2.00 s	1.96 s	2.05 s
29	1.43 s	1.20 s	1.35 s	1.42 s	1.35 s
30	0.92 s	1.06 s	0.98 s	1.00 s	1.0 s
OH	5.80 d(4.4)(3-OH) 4.85 s(16-OH)				
1'	4.96 d(7.9)	4.87 d(7.6)	4.96 d(7.4)	4.97 d(8.1)	4.9 d(7.6)
2'	4.06 (ov)	5.45 dd(7.4, 9.3)	4.05 dd(9.4, 7.4)	4.24 t(9.0)	4.05 dd(7.6, 8.2)
3'	4.26 (ov)	5.75 t(9.3)	4.22 t(9.4)	4.26 m	4.2 dd(8.2, 9.3)
4'	4.24 (ov)	5.35 ddd (5.4, 9.8, 9.0)	4.18 m	4.16 m	4.42 dd(9.3, 8.9)
5'	3.96 m	4.37 dd(5.5, 11.6) 3.68 m	3.94 m	3.86 m	3.7 m
6'	4.33 dd(3.5, 11.6)		4.52 dd(12.0, 3.3)	4.52 dd(10.2, 7.0)	4.12, 4.35
	4.49 br d(11.6)		4.38 dd(12.0, 5.6)	4.35 dd(10.2, 3.3)	
OAc		2.01 s(2'-OAc) 2.03 s(3'-OAc)			
1''	5.09 d(7.6)	4.84 d(7.3)		5.38 d(8.1)	5.8 br s
2''	4.06 (ov)	4.00 t(7.8)		4.12 t(9.1)	4.7 d(3.0)
3''	4.21 (ov)	4.14 t(8.4)		4.22 t(7.9)	4.58 dd(3.0, 9.3)
4''	4.18 t(9.5)	4.17 m		4.29 m	4.35 t(9.3, 9.6)
5''	3.90 (ov)	4.30 dd(4.7, 11.1)		3.94 m	5.00 dq(9.6, 6.1)
		3.68 m			
6''	4.44 br d(12.4)			4.48 dd(10.5, 7.7)	1.7 d(6.1)
	4.32 (ov)			4.42 dd(10.5, 3.0)	
2'''		5.85 dd(15.5, 1.7)			
3'''		7.02 dq(15.5, 6.9)			
4'''		1.64 dd(6.9, 1.6)			

^① The data of methyls in the literature were not assigned, and here, the deployments are only to display the data.

Table 3-8-3: ¹H NMR spectroscopic data of cycloartane-type saponins **3-8-6~3-8-10**.

H	3-8-6	3-8-7	3-8-8	3-8-9	3-8-10
1	—	—	1.25, 1.52	1.15, 1.53	1.24 m, 1.62 m
2	—	—	1.70, 2.05	1.75, 2.05	2.04 m, 2.42 m
3	3.50 m	ax 3.55 dd (4.2, 12)	3.21 dd(4.4, 11.5)	3.23 dd(4.4, 11.3)	3.63 dd(5.9, 11.3)
5	—	1.70 m	1.33 dd(3.5, 12.5)	1.31 dd(3.4, 12.2)	1.76 dd(8.4, 11.1)
6	3.65 m ^① , 3.72 m	—	0.81, 1.60	0.82, 1.62	3.72 m
7	—	—	1.05, 1.32	1.02, 1.32	1.82 m
8	—	—	1.69 dd(4.4, 12.6)	1.60 dd(4.4, 12.0)	1.76 m
11	—	—	1.14, 2.05	1.13, 2.05	1.65 m
12	—	eq 3.05 m	1.45, 1.67	1.38, 1.65	1.48 m
15	—	—	1.45, 1.80	1.36, 1.95	1.57 m, 1.94 m
16	—	5.00 m	4.42 ddd (6.1, 7.6, 7.6)	4.53 ddd (5.6, 8.0, 8.1)	4.41 m
17	2.52 d(7.6)	2.51 d(7.7)	2.14 dd(5.6, 8.2)	1.97 dd(7.0, 12.0)	1.90 m
18	1.37 s	1.38 s	1.15 s	1.17 s	1.55 s
19	0.21 d(3.4) 0.54 d(3.5)	0.21 m 0.54 m	0.31 d(4.0) 0.64 d(4.0)	0.35 d(4.0) 0.59 d(4.0)	0.22 d(4.8) 0.55 d(4.8)
20	—	—	1.95 m	2.30 m	1.88 m
21	1.28 s	1.30 s	1.00 d(6.6)	0.92 d(7.0)	0.87 d(6.4)
22	—	—	3.43 ddd (4.5, 7.0, 8.2)	4.05 ddd (2.5, 7.5, 7.5)	1.52 m
23	—	—	2.32 ddd (4.5, 6.0, 12.5) 2.40 ddd (6.0, 7.0, 12.5)	2.20 2.30	4.92 m
24	4.80 m	3.86 m	5.56 br t(7.0)	4.02 dd(3.5, 7.0)	—
26	1.56 s	1.6 s	4.05 d(11.6) 4.21 d(11.6)	1.30 s	—
27	1.28 s	1.30 s	1.70 s	1.22 s	—
28	1.96 s	1.97 s	1.08 s	1.07 s	0.98 s
29	1.40 s	1.56 s	0.88 s	0.89 s	1.97 s
30	0.97 s	0.99 s	0.94 s	0.95 s	1.31 s
1'	4.9	4.9	4.48 d(7.6)	4.48 d(7.6)	4.91 d(7.4)
2'	4.05	4.25	4.05 dd(9.1, 7.6)	4.08 dd(9.0, 7.6)	4.07 t(8.4)
3'	5.75	4.15	3.65 t(9.1)	3.65 t(9.0)	4.16 t(8.4)
4'	4.45	4.20	3.28 t(9.1)	3.25 t(9.0)	4.23 dt(5.2, 8.4)
5'	3.65	3.95	3.25 ddd (2.5, 5.5, 9.1)	3.25 t(9.0)	4.35 d(8.4) 4.37 d(5.2)
6'	4.12 4.35	4.78 4.84	3.68 dd(5.2, 12.0) 3.82 d(2.5, 12.0)	3.68 dd(5.5, 11.6) 3.85 dd(2.5, 11.6)	—
OAc	2.19 s (3'-OAc)	2.1 s (6'-OAc)	—	—	—
1''	5.75	6.5	4.23 d(7.7)	4.32 d(7.7)	3.46 q(7.1) 3.83 q(7.0)

Table 3-8-3 (continued)

H	3-8-6	3-8-7	3-8-8	3-8-9	3-8-10
2''	4.63	4.8	3.20 dd(7.7, 9.2)	3.20 dd(7.7, 9.2)	1.18 dd(1.6, 7.0)
3''	4.55	4.68	3.65 t(9.2)	3.68 t(9.2)	
4''	4.3	4.32	3.41 t(9.2)	3.40 t(9.2)	
5''	4.85	4.88	3.32 ddd (2.5, 5.4, 9.2)	3.35 ddd (2.5, 5.3, 9.2)	
6''	1.66 d(5.7)	1.68 d(6.1)	3.64 dd(5.4, 11.8) 3.85 dd(2.5, 11.8)	3.71 dd(5.3, 12.0) 3.89 dd(2.5, 12.0)	

① Typographic error exists in the literature, giving one more data of H-6.

Table 3-8-4: ¹H NMR spectroscopic data of cycloartane-type saponins **3-8-11~3-8-15**.

H	3-8-11	3-8-12	3-8-13	3-8-14	3-8-15
1	1.25 m, 1.62 m	1.23 m, 1.60 m	1.09 m, 1.51 m	1.13 m, 1.59 m	—
2	1.93 m, 2.32 m	1.92 m, 2.32 m	1.85 m, 2.28 m	1.85 m, 2.28 m	—
3	3.50 dd(6.0, 10.8)	3.43 dd(4.4, 11.6)	3.45 dd(4.0, 11.6)	3.43 dd(4.0, 11.6)	4.96 dd(4, 12)
5	1.53 dd(7.6, 10.4)	1.52 m	1.28 m	1.18 m	—
6	4.97 m	4.93 m	0.75 m, 1.51 m	1.57 m, 1.85 m	—
7	1.29 m, 1.78 m	1.25 m, 1.82 m	1.02 m, 1.32 m	5.16 d(6.8)	—
8	1.78 m	1.76 m	1.68 dd(11.5, 4.4)	—	—
11	1.75 m	1.74 m	1.15 (ov) 2.64 dd(16, 9.2)	1.21 (ov) 2.85 dd(16, 9.2)	—
12	1.46 m, 1.76 m	1.43 m, 1.78 m	5.29 dd(4.0, 9.2)	5.38 br d(8.4)	—
15	1.53 m, 1.81 m	1.48 m, 1.83 m	2.06, 1.93	2.25, 2.63	—
16	4.41 ddd (5.5, 8.6, 14.8)	4.40 m	4.27 m	4.34 m	—
17	1.80 m	1.91 m	2.12	2.07	—
18	1.13 s	1.08 s	1.22 s	1.24 s	1.02 s
19	0.19 d(4.8) 0.50 d(4.8)	0.16 d(4.4) 0.47 d(4.4)	0.19 d(4.0) 0.61 d(4.0)	0.47 d(3.6) 0.86 d(3.6)	0.67 d(3.8) 0.37 d(3.8)
20	1.53 m	1.62 m	2.49 m	2.50 m	—
21	0.87 d(6.4)	0.85 d(6.0)	1.16 d(6.4)	1.13 d(6.4)	1.07 d(7)
22	1.54 m	1.49 m	6.21 d(4.0)	6.22 d(3.6)	4.53~4.60 (ov)
23	4.93 m	4.93 m			2.52 bt(15.5)
24					6.59 m
25			3.32 m	3.29 m	
26			1.15 d(6.8)	1.11 d(6.4)	
27			1.14 d(6.8)	1.12 d(6.4)	2.01 s
28	0.94 s	0.93 s	0.90 s	1.07 s	0.87 s
29	1.39 s	1.34 s	1.32 s	1.32 s	
30	1.09 s	1.26 s	1.01 s	1.01 s	1.79 s

Table 3-8-4 (continued)

H	3-8-11	3-8-12	3-8-13	3-8-14	3-8-15
OAc	2.04 s(6-OAc)	2.00 s(6-OAc)	2.15 s(12-OAc)	2.18 s(12-OAc)	
1'	4.87 d(7.6)	4.85 d(6.8)	4.82 d(7.6)	4.72 d(7.6)	5.37 d(7.2)
2'	4.32 t(8.5)	4.22 t(6.8)	4.00 t(8.0)	4.02 t(8.0)	4.19~4.24 (ov)
3'	4.06 t(8.5)	4.23 m	4.13 t(8.4)	4.14 t(8.4)	4.19~4.24 (ov)
4'	5.48 dt(5.4, 8.6)	4.15 dt(5.2, 8.4)	4.21 m	4.21 m	4.19~4.24 (ov)
5'	3.68 d(8.6)	3.70 d(5.2)	3.71 t(10.4)	3.71 t(10.4)	—
	4.40 d(5.4)	4.30 d(10)	4.33 dd(11.2, 5.2)	4.33 dd(11.2, 5.2)	
6'					4.53~4.60 (ov)
					4.40 dd(5, 12)
1''	3.49 q(7.0)	5.34 d(7.6)			5.45 d(7.5)
	3.87 q(7.2)				
2''	1.20 t(7.2)	4.19 dd(7.6, 9.5)			4.19~4.24 (ov)
3''		3.93 t(9.5)			4.29 t(9)
4''		4.32 m			4.53~4.60 (ov)
					4.40
5''		3.94 m			4.61 d(9.5)
6''		4.44 dd(12, 3.0)			
		3.84 dd(12, 5)			
OMe					3.92 s(6''-OMe)
1'''		3.48 q(7.2)			
		3.88 q(6.8)			
2'''	5.88 dd(1.6, 15.6)	1.19 t(6.8)			
3'''	6.97 m				
4'''	1.58 dd(1.8, 6.8)				

Table 3-8-5: ¹H NMR spectroscopic data of cycloartane-type saponins 3-8-16~3-8-20.

H	3-8-16	3-8-17	3-8-18	3-8-19	3-8-20
1	—	1.24 m, 1.31 m	—	1.17 m, 1.56 m	1.17 m, 1.56 m
2	—	1.96 m, 2.36 m	—	1.86 m, 2.25 m	1.86 m, 2.24 m
3	—	3.51 dd(4.0, 11.6)	3.46 dd(11.5, 4.2)	3.41 dd(11.0, 3.8)	3.45 dd(11.0, 4.0)
5	—	1.35 m	—	—	—
6	—	0.71 m, 1.52 m	—	0.80 m, 1.34 m	0.81 m, 1.44 m
7	—	1.06 m, 1.20 m	—	0.98 m, 1.30 m	1.00 m, 1.29 m
8	—	1.69 dd(11.5, 4.6)	—	1.65 m	1.66 m
11	—	1.13 (ov)	—	1.26 m	1.28 m
		2.08 m		2.70 dd(16.2, 9.0)	2.28 dd(16.0, 9.0)
12	—	1.55, 1.66	—	5.17 dd(8.8, 4.0)	5.13 dd(8.9, 3.4)
15	—	4.22 s	4.23 m	1.67 m, 2.04 m	1.78 m, 1.94 m
16	—			4.68 m	4.33 m

Table 3-8-5 (continued)

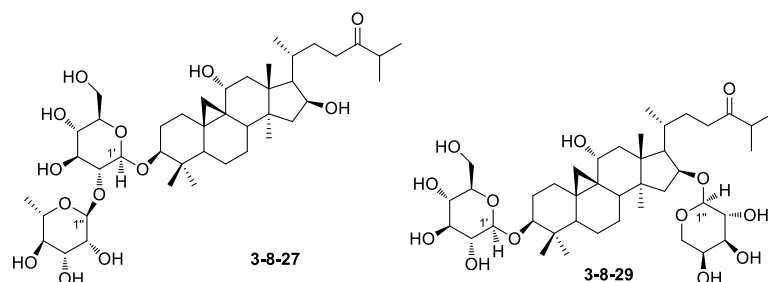
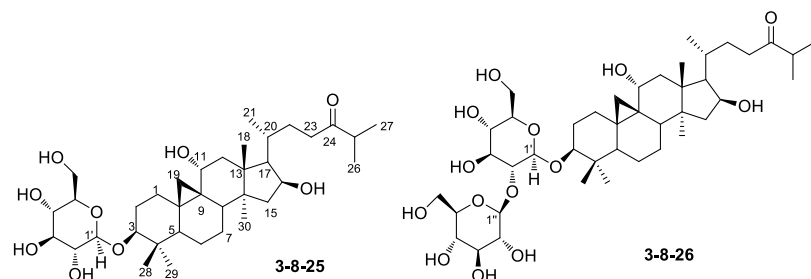
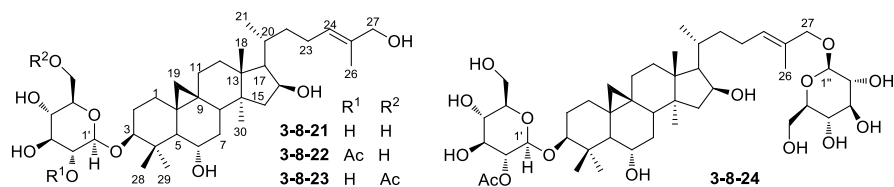
H	3-8-16	3-8-17	3-8-18	3-8-19	3-8-20
17	—	1.45	—	1.86 m	1.79 m
18	0.90 s	1.13 s	1.13 s	1.35 s	1.55 s
19	0.50 d(3.6)	0.27 d(3.6)	0.28 d(3.9)	0.29 d(4.0)	0.24 d(4.2)
	0.35 d(3.5)	0.52 d(3.6)	0.50 d(3.9)	0.62 d(4.0)	0.56 d(4.2)
20	—	1.62	—	1.90 m	2.30 m
21	0.96 d(7)	0.83 d(6.4)	0.83 d(6.4)	1.05 d(6.1)	1.12 d(6.0)
22	—	0.94, 2.22	—	1.75 m, 2.30 m	1.57 m, 1.70 m
23	—	4.64 d(9.2)	4.73 d(9.3)		
24	6.48 m	3.66 s	3.77 s	4.04 s	3.77 s
26		1.28 s	1.49 s	1.88 s	1.50 s
27	1.89 s	1.28 s	1.46 s	5.83 s	3.72 d(10.3)
					4.15 d(10.3)
28	0.78 s	1.17 s	1.17 s	0.88 s	0.93 s
29		1.31 s	1.24 s	1.20 s	1.16 s
30	1.50 s	1.05 s	1.00 s	1.00 s	0.99 s
OMe	3.79 s(29-OMe) 3.82 s(6'-OMe)				
OAc			1.98 s (3'-OAc)	2.26 s(12-OAc) 2.28 s(2'-OAc)	2.22 s(12-OAc) 2.25 s(2'-OAc)
1'	5.01 d(7.2)	4.86 d(7.6)	4.83 d(7.3)	4.88 d(7.9)	4.87 d(7.9)
2'	—	4.02 t(8.0)	4.03 m	5.60 m	5.61 m
3'	—	4.15 t(8.4)	5.72 t(9.2)	4.25 m	4.25 m
4'	—	4.20 m	—	4.27 m	4.27 m
5'	—	3.73 t(10.4)	3.74 m, 4.30 m	3.90 dd(10.5, 10.5)	3.80 m
		4.35 dd(11.2, 5.2)		4.42 dd(10.4, 5.0)	4.42 dd(10.2, 5.0)
1''	5.25 d(7.5)	3.41 m			
2''	—	1.11 t(6.8)			

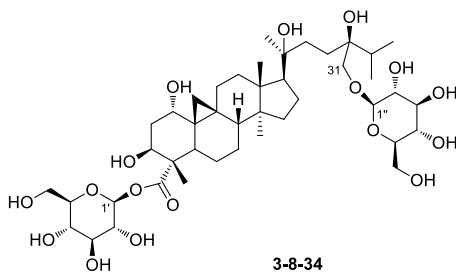
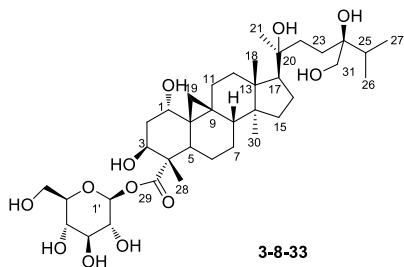
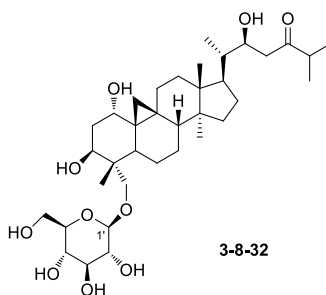
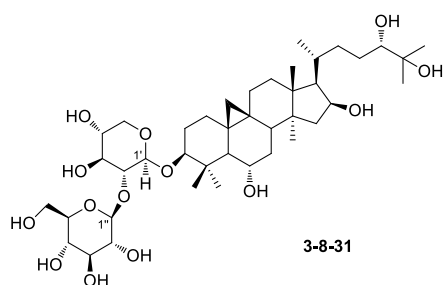
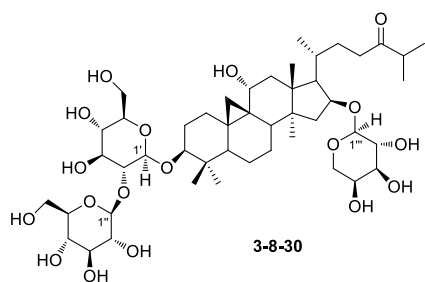
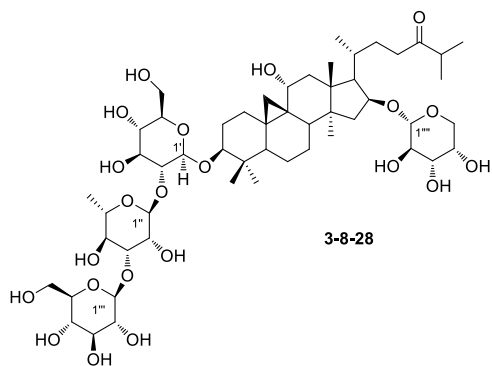
Table 3-8-6: Cos, MFs, and TSs of cycloartane-type saponins 3-8-21~3-8-40.

No.	Compounds	MFs	Test solvents	References
3-8-21	kahiricoside II	C ₃₆ H ₆₀ O ₉	C ₅ D ₅ N	[243]
3-8-22	kahiricoside III	C ₃₈ H ₆₂ O ₁₀	C ₅ D ₅ N	[243]
3-8-23	kahiricoside IV	C ₃₈ H ₆₂ O ₁₀	C ₅ D ₅ N	[243]
3-8-24	kahiricoside V	C ₄₂ H ₇₀ O ₁₅	C ₅ D ₅ N	[243]
3-8-25	curculigosaponin A	C ₃₆ H ₆₀ O ₉	C ₅ D ₅ N	[244]
3-8-26	curculigosaponin D	C ₄₂ H ₇₀ O ₁₄	C ₅ D ₅ N	[244]
3-8-27	curculigosaponin G	C ₄₂ H ₇₀ O ₁₃	C ₅ D ₅ N	[245]
3-8-28	curculigosaponin J	C ₅₃ H ₈₈ O ₂₂	C ₅ D ₅ N	[245]
3-8-29	curculigosaponin C	C ₄₁ H ₆₈ O ₁₃	C ₅ D ₅ N	[244]
3-8-30	curculigosaponin E	C ₄₇ H ₇₈ O ₁₈	C ₅ D ₅ N	[244]
3-8-31	astramembranoside B	C ₄₁ H ₇₀ O ₁₄	C ₅ D ₅ N	[233]

Table 3-8-6 (continued)

No.	Compounds	MFs	Test solvents	References
3-8-32	cyclopassifloside VI	C ₃₆ H ₆₀ O ₁₀	C ₅ D ₅ N	[246]
3-8-33	cyclopassifloside IV	C ₃₇ H ₆₂ O ₁₂	C ₅ D ₅ N	[246]
3-8-34	cyclopassifloside V	C ₄₃ H ₇₂ O ₁₇	C ₅ D ₅ N	[246]
3-8-35	cyclopassifloside I	C ₃₇ H ₆₂ O ₁₂	C ₅ D ₅ N	[246]
3-8-36	cyclopassifloside II	C ₃₇ H ₆₂ O ₁₀	C ₅ D ₅ N	[246]
3-8-37	cyclopassifloside III	C ₄₃ H ₇₂ O ₁₆	C ₅ D ₅ N	[246]
3-8-38	mussaendoside O (acetate)	C ₈₀ H ₁₁₅ NO ₂₃	CDCl ₃	[247]
3-8-39	mussaendoside U	C ₇₂ H ₁₁₅ NO ₃₂	C ₅ D ₅ N	[248]
3-8-40	mussaendoside P	C ₆₀ H ₉₅ NO ₂₃	C ₅ D ₅ N	[247]





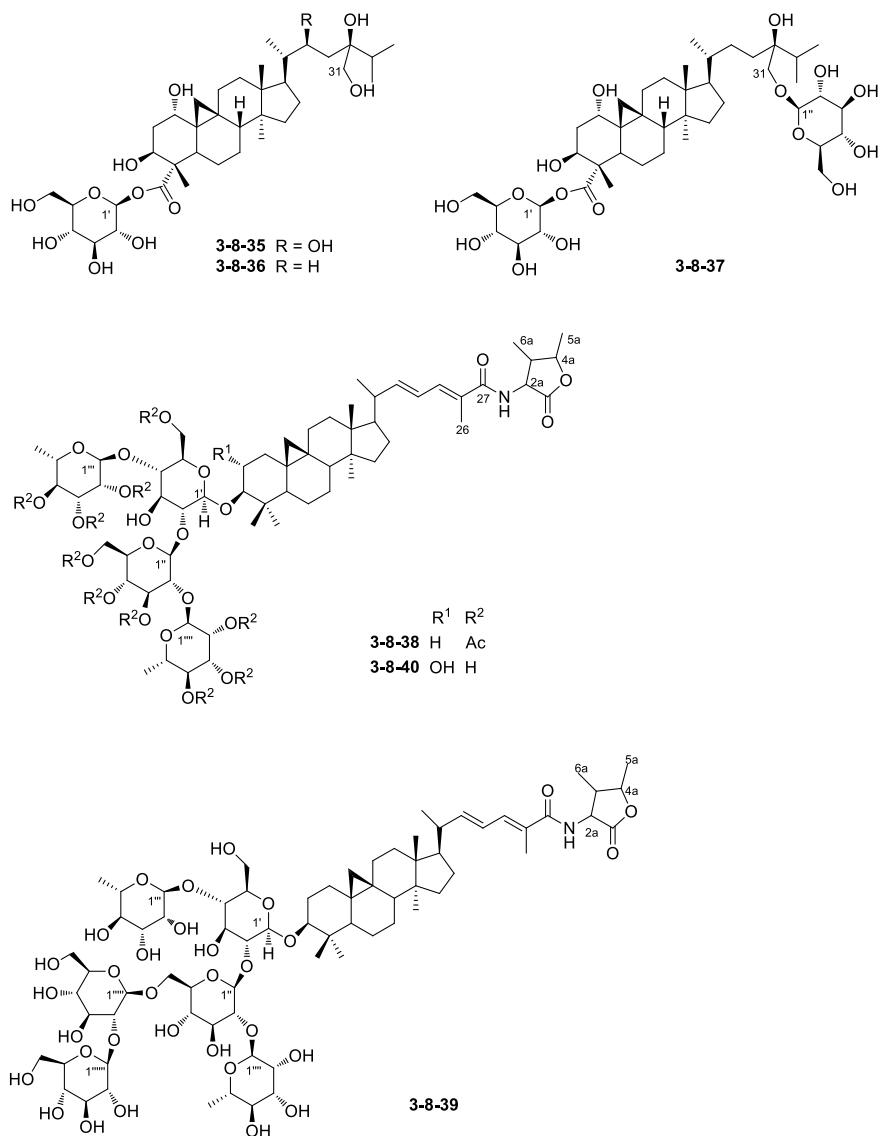


Table 3-8-7: ¹H NMR spectroscopic data of cycloartane-type saponins 3-8-21~3-8-25.

H	3-8-21	3-8-22	3-8-23	3-8-24	3-8-25
1	1.08 m, 1.50 m	1.15 m, 1.50 m	1.28 m	1.32 m, 1.54 m	—
2	1.90 m, 2.48 m	2.11 m, 2.36 m	2.00 m, 2.48 m	1.92 m, 2.47 m	—
3	3.67 dd(4.2, 11.8)	3.51 dd(4.4, 11.6)	3.65 dd(4.4, 11.6)	3.65 dd(4.4, 11.6)	—

Table 3-8-7 (continued)

H	3-8-21	3-8-22	3-8-23	3-8-24	3-8-25
5	1.71 d(8.4)	1.72 d(8.8)	1.77 d(8.8)	1.73 d(9.2)	—
6	3.75 m	3.76 m	3.76 m	3.76 m	—
7	1.69 m, 1.81 m	1.60 m, 1.80 m	1.70 m, 1.84 m	1.64 m, 1.80 m	—
8	1.96 m	1.94 m	1.94 m	1.98 m	—
11	1.23 m, 1.90 m	1.20 m, 1.91 m	1.24 m, 1.91 m	1.20 m, 1.88 m	—
12	1.68 m	1.68 m	1.70 m	1.70 m	—
15	1.75 m	1.65 m	1.75 m	1.76 m	—
	2.15 dd(5.2, 12.8)	2.18 m	2.20 m	2.14 m	
16	4.66 m	4.66 m	4.65 m	4.63 m	—
17	1.81 m	1.83 m	1.82 m	1.80 m	—
18	1.41 s	1.40 s	1.40 s	1.39 s	1.03 s
19	0.22 d(4.0)	0.19 d(4.0)	0.20 d(4.0)	0.22 d(4.4)	0.34 d(3.5)
	0.55 d(4.0)	0.50 d(4.0)	0.55 d(4.0)	0.54 d(4.4)	0.41 d(3.5)
20	2.34 m	2.34 m	2.16 m	2.27 m	—
21	1.08 d(6.8)	1.08 d(6.8)	1.08 d(6.8)	1.05 d(6.6)	—
22	1.30 m	1.33 m, 2.19 m	1.36 m	1.26 m, 2.1 m	—
23	2.26 m, 2.35 m	2.25 m	2.34 m	2.13 m, 2.27 m	—
24	5.78 t(6.8)	5.78 t(6.8)	5.79 t(6.8)	5.72 t(6.0)	
25					2.52 dq(6.5)
26	1.83 s	1.78 s	1.82 s	1.78 s	0.96 d(6.5)
27	4.26 bs	4.26 bs	4.27 bs	4.26 bs	0.98 d(6.5)
				4.48 bs	
28	2.01 s	1.82 s	1.99 s	2.01 s	1.28 s
29	1.34 s	1.26 s	1.31 s	1.31 s	1.31 s
30	1.05 s	1.04 s	1.06 s	1.04 s	1.36 s
1'	5.01 d(7.6)	4.98 d(7.6)	4.94 d(7.6)	5.00 d(8.0)	4.91 d(7.8)
2'	4.09 m	5.62 t(8.0)	4.09 m	4.08 m	—
3'	4.24 m	4.20 m	4.20 t(8.7)	4.29 m	—
4'	4.25 m	4.25 m	4.01 m	4.29 m	—
5'	4.96 m	3.95 m	4.02 m	3.95 m	—
6'	4.42 m, 4.56 m	4.38 m, 4.54 m	4.85 dd(5.8, 11.6)	4.39 m, 4.57 m	—
			4.91 m		
OAc		2.12 s(2'-OAc)	2.04 s(6'-OAc)		
1''				4.88 d(7.6)	
2''				4.07 m	
3''				4.29 m	
4''				4.39 m	
5''				4.95 m	
6''				4.36 m, 4.56 m	

Table 3-8-8: ^1H NMR spectroscopic data of cycloartane-type saponins **3-8-26~3-8-30**.

H	3-8-26	3-8-27	3-8-28	3-8-29	3-8-30
18	1.16 s	1.20 s	1.19 s	1.04 s	1.09 s
19	0.27 d(4), 0.43 d(4)	0.25 d(4), 0.43 d(4)	0.26 d(4), 0.43 d(4)	0.30 d(3.7), 0.47 d(3.7)	0.28 d(4), 0.48 d(4)
21	1.37 d(6.8)	—	—	—	—
25	2.54 dq(7.2)	2.53 dq(6.8)	2.67 dq(6.8)	2.68 dq(6.5)	2.68 dq(6.8)
26	0.97 d(7.2)	0.95 d(6.8)	1.04 d(6.8)	0.97 d(6.5)	1.06 d(6.8)
27	0.99 d(7.2)	0.98 d(6.8)	1.06 d(6.8)	0.99 d(6.5)	1.08 d(6.8)
28	1.30 s	1.23 s	1.28 s	1.28 s	1.20 s
29	1.32 s	1.29 s	1.30 s	1.32 s	1.29 s
30	1.38 s	1.33 s	1.34 s	1.37 s	1.35 s
1'	5.38 d(7.0)	4.90 d(7.8)	4.86 d(7.2)	4.95 d(7.8)	5.40 d(7.0)
1''	5.79 d(7.0)	6.52 s	6.68 s	4.59 d(6.8)	5.60 d(7.0)
6''	—	1.66 d(6.0)	1.61 d(6.0)	—	—
1'''	—	—	5.52 d(7.8)	—	4.92 d(7.3)
1''''	—	—	4.53 d(7.0)	—	—

Table 3-8-9: ^1H NMR spectroscopic data of cycloartane-type saponins **3-8-32~3-8-36**.

H	3-8-32	3-8-33	3-8-34	3-8-35	3-8-36
1	3.87 br s	3.87 br s	3.87 br s	3.86 br s	3.88 br s
2	α 2.44 ddd (11.0, 4.0, 2.5) β 2.24 ddd (11.0, 11.0, 2.5)	α 2.45 ddd (12.0, 4.0, 2.5)	α 2.44 ddd (12.0, 4.0, 2.5) β 2.24 ddd (12.0, 12.0, 2.5)	α 2.43 ddd (12.0, 4.0, 2.5) β 2.24 ddd (12.0, 12.0, 2.5)	—
3	5.56 dd(4.0, 11.0)	5.53 dd(4.0, 12.0)	5.54 dd(4.0, 12.0)	5.59 dd(4.0, 12.0)	5.58 dd(4.0, 12.0)
5	α 3.35 dd (10.0, 5.0)	α 3.32 dd (12.0, 4.5)	α 3.32 dd (12.0, 4.5)	α 3.36 dd (12.0, 4.5)	α 3.35 dd (11.0, 4.0)
11	α 2.75 m	α 2.75 m	α 2.75 m	α 2.76 m	α 2.75 m
18	1.01 s	1.48 s	1.49 s	1.03 s	1.00 s
19	0.53 d(4.0) 0.74 d(4.0)	0.49 d(4.0) 0.70 d(4.0)	0.49 d(4.0) 0.70 d(4.0)	0.53 d(4.0) 0.73 d(4.0)	0.53 d(4.5) 0.75 d(4.5)
21	1.14 d(6.0)	1.53 s	1.50 s	1.22 d(6.0)	1.00 d(6.0)
22	4.66 dd(11.0, 2.0)	—	—	4.57 m	—
23	2.85 dd(12.0, 5.0) 2.54 d(12.0)	—	—	2.03 m(2H)	—
25	2.82 qq(7.0)	—	—	2.40 qq(7.0)	—
26	1.13 d(7.0)	1.16 d(7.0)	1.07 d(7.0)	1.21 d(7.0)	1.20 d(7.0)
27	1.17 d(7.0)	1.18 d(7.0)	1.11 d(7.0)	1.27 d(7.0)	1.23 d(7.0)

Table 3-8-9 (continued)

H	3-8-32	3-8-33	3-8-34	3-8-35	3-8-36
28	1.67 s	1.64 s	1.65 s	1.68 s	1.69 s
30	0.87 s	0.92 s	0.93 s	0.87 s	0.88 s
31		3.97 d(11.5)	3.87 d(11.0)	4.13 d(11.0)	4.00 d(11.0)
		4.04 d(11.5)	4.30 d(11.0)	4.20 d(11.0)	4.03 d(11.0)
1'	6.48 d(8.0)	6.40 d(8.0)	6.41 d(8.0)	6.53 d(8.0)	6.52 d(8.0)
2'	4.15 dd(8.0, 8.0)	4.15 dd(8.0, 8.0)	4.12 dd(8.0, 8.0)	4.18 dd(8.0, 8.0)	4.17 dd(8.0, 8.0)
3'	4.26 dd(8.0, 8.0)	4.25 dd(8.0, 8.0)	4.26 dd(8.0, 8.0)	4.29 dd(8.0, 8.0)	4.29 dd(8.0, 8.0)
4'	4.34 dd(8.0, 8.0)	4.38 dd(8.0, 8.0)	4.30 dd(8.0, 8.0)	4.38 dd(8.0, 8.0)	4.36 dd(8.0, 8.0)
5'	4.00 m	4.00 m	4.00 m	4.03 m	4.02 m
6'	4.38 m(2H)	4.40 m(2H)	4.35 m(2H)	4.40 m(2H)	4.40 m(2H)
1''			4.91 d(8.0)		
2''			4.20 m		
3''			4.02 dd(8.0, 8.0)		
4''			4.20 m		
5''			3.95 m		
6''			4.35 m		
			4.52 dd(12.0, 2.5)		

Table 3-8-10: ¹H NMR spectroscopic data of cycloartane-type saponins 3-8-31 and 3-8-37~3-8-40.

H	3-8-31	3-8-37	3-8-38	3-8-39	3-8-40
1	1.28 (ov), 1.65 (ov)	3.87 br s	α 1.50 m, β 1.25 m	1.13 m, 1.50 m	α 1.71 m β 1.77 dd (13.2, 5.2)
2	2.02 (ov), 2.38 (ov)	α 2.42 ddd (12.0, 4.0, 3.0) β 2.23 ddd (12.0, 12.0, 3.0)	α 1.93 m, β 1.68 m	1.98 m, 2.32 m	β 3.94 m
3	3.58 dd(4.5, 12.0)	5.57 dd(4.0, 12.0)	3.10 dd(11.5, 4.0)	3.45 dd(10.8, 4.8)	3.30 d(9.0)
5	1.75 d(9.0)	α 3.35 dd(11.0, 4.0)	1.29 m	1.34 m	1.37 m
6	3.77 ddd (4.5, 9.0, 9.0)	—	α 1.57 m, β 0.78 m	0.82 m, 1.62 m	α 1.53 m, β 0.72 m
7	1.65 (ov), 1.82 (ov)	—	α 1.06 m, β 1.32 m	1.07 m, 1.27 m	α 1.06 m, β 1.29 m
8	1.95 (ov)	—	1.51 m	1.45 m	1.47 dd (12.5, 5.0)
11	1.16 (ov), 1.88 (ov)	α 2.75 m	α 2.00 m, β 1.13 m	1.05 m 1.95 m	α 1.94 m β 1.08 m
12	1.66 (ov), 2.30 (ov)	—	α , β 1.65 m	1.56 m	α , β 1.51 m
15	1.77 dd(4.5, 12.5) 2.18 dd(7.5, 12.5)	—	α , β 1.28 m	1.27 m	α , β 1.25 m

Table 3-8-10 (continued)

H	3-8-31	3-8-37	3-8-38	3-8-39	3-8-40
16	4.74 m	—	α 1.26 m, β 1.76 m	1.23 m, 1.58 m	α 1.23 m, β 1.57 m
17	1.81 dd(3.5, 7.5)	—	1.69 m	1.60 m	1.56 m
18	1.41 s	0.99 s	1.01 s	0.99 s	0.95 s
19	0.28 d(4.0)	0.53 d(4.5)	en 0.33 d(3.9)	0.29 br s	en 0.25 d (4.1)
	0.58 d(3.5)	0.75 d(4.5)	ax 0.55 d(3.9)	0.55 br s	ax 0.49 d (4.1)
20	2.39 (ov)		2.24 m	2.18 m	2.13 m
21	1.10 d(6.5)	0.97 d(6.0)	1.04 d(6.5)	1.01 d(6.5)	0.96 d(7.0)
22	1.46 (ov), 2.30 (ov)	—	5.94 dd(14.8, 8.8)	5.65 dd (14.8, 8.9)	5.62 m
23	1.72 (ov), 2.00 (ov)	—	6.26 dd(14.8, 11.0)	6.44 dd (14.8, 11.1)	6.40 dd (14.4, 11.5)
24	3.98 dt(3.5, 9.5)		6.90 d(11.0)	7.29 d(11.1)	7.25 d(11.5)
26	1.47 s	1.12 d(7.0)	1.98 s	2.21 br s	2.17 d(1.1)
27	1.49 s	1.14 d(7.0)			
28	1.95 s	1.68 s	1.01 s	1.27 s	1.39 s
29	1.43 s		0.85 s	1.47 s	1.18 s
30	1.05 s	0.87 s	0.90 s	0.90 s	0.87 s
31		3.96 d(11.0) 4.32 d(11.0)			
NH			6.18 d(4.9)	9.11 d(7.7)	9.03 d(7.6)
OH	5.77 br d(2.5) (24-OH)				
1'	4.93 d(6.5)	6.49 d(8.0)	4.45 m	4.89 d(7.6)	4.92 d(7.8)
2'	4.27 t(9.0)	4.15 dd(8.0, 8.0)	3.88 dd(7.7, 7.6)	4.60 m	4.40 m
3'	4.22 (ov)	4.26 dd(8.0, 8.0)	5.18 m	4.49 m	4.54 m
4'	4.14 (ov)	4.35 dd(8.0, 8.0)	3.84 m	4.38 m	4.24 m
5'	3.65 dd(9.6, 10.8) 4.29 (ov)	4.07 m	3.68 m	3.64 m	3.76 m
6'		4.38 m(2H)	4.24 br d(9.1) 4.46 m	4.07 m 4.17 m	4.02 m 4.22 m
1''	5.42 d(8.0)	4.96 d(8.0)	4.64 d(7.6)	5.76 d(7.4)	5.79 d(7.6)
2''	4.14 t(9.0)	4.22 m	3.66 m	4.32 m	4.30 m
3''	3.96 t(9.3)	4.07 dd(8.0, 8.0)	5.19 m	4.32 m	3.89 m
4''	4.36 t(9.5)	4.22 m	4.96 dd(9.7, 9.6)	4.28 m	4.05 m
5''	4.20 m	3.98 m	3.67 m	4.18 m	4.25 m
6''	4.48 br d(9.5) 4.52 br d(9.5)	4.38 m 4.55 dd(12.0, 2.5)	4.09 br d(12.0) 4.30 dd(12.0, 4.1)	4.31 m 4.64 m	4.30 m 4.52 m
1'''			4.80 s	5.80 br s	5.70 s
2'''			5.03 m	4.63 m	4.57 br s
3'''			5.18 m	4.51 m	4.58 m
4'''			5.05 m	4.28 m	4.26 m
5'''			3.83 m	4.82 m	4.82 m

Table 3-8-10 (continued)

H	3-8-31	3-8-37	3-8-38	3-8-39	3-8-40
6'''			1.17 d(6.2)	1.69 d(6.1)	1.68 d(6.2)
1'''			4.91 s	6.39 br s	6.40 s
2'''			5.07 m	4.74 br s	4.76 br s
3'''			5.33 dd(9.8, 3.3)	4.63 m	4.62 m
4'''			5.07 m	4.33 m	4.30 m
5'''			4.20 dq(9.7, 6.2)	5.02 m	4.96 m
6'''			1.21 d(6.2)	1.86 d(6.0)	1.81 d(6.2)
OAc			1.98~2.17		
1''''				5.37 d(7.7)	
2''''			4.78 m	4.14 m	
3''''			3.01 m	4.50 m	
4''''			4.71 m	4.24 m	
5''''			1.39 d(6.4)	4.08 m	
6''''			0.79 d(7.0)	4.41 m, 4.55 m	
1'''''				5.34 d(6.8)	
2'''''				4.20 m	
3'''''				4.21 m	
4'''''				4.23 m	
5'''''				3.95 m	
6'''''				4.35 m, 4.55 m	
2a				5.69 dd(7.4, 7.4)	5.36 dd(7.5, 7.4)
3a				2.94 m	2.90 m
4a				4.70 m	4.65 m
5a				1.19 d(6.5)	1.16 d(6.5)
6a				0.88 d(7.2)	0.85 d(7.3)

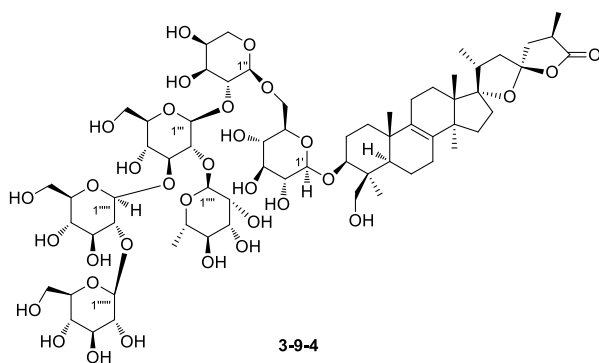
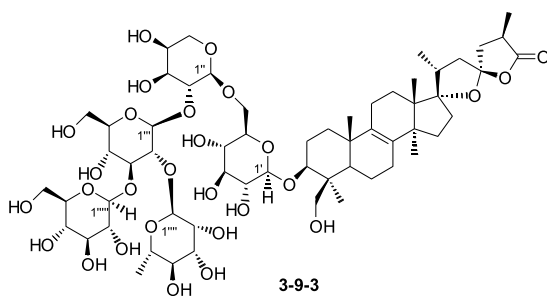
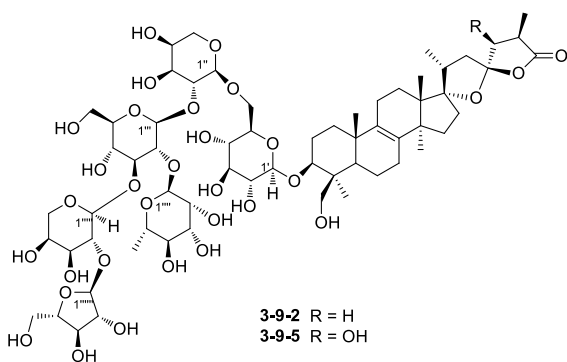
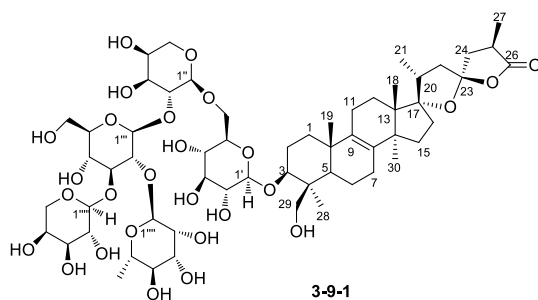
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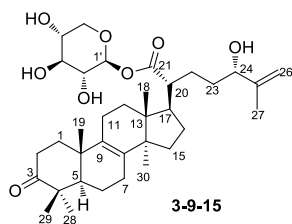
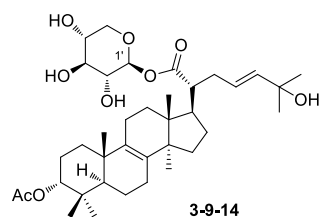
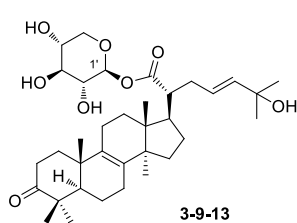
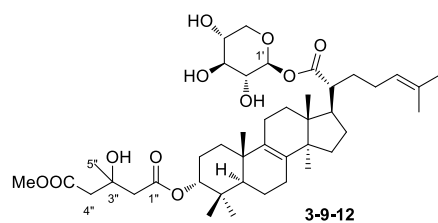
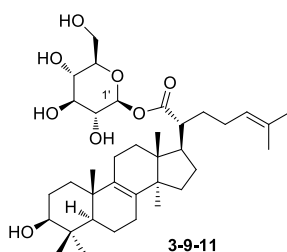
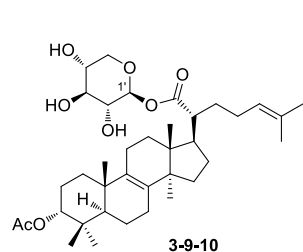
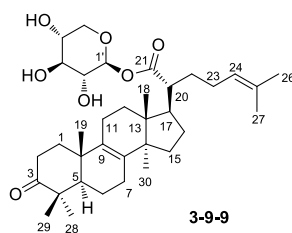
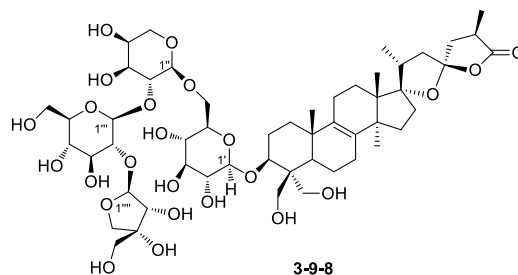
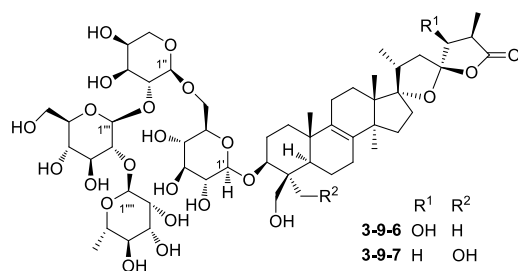
- [233] Kim JS, Yean M-H, Lee E-J et al. *Chem Pharm Bull.* 2008;56(1):105.
- [234] Verotta L, Guerrini M, El-Sebakhy NA et al. *Planta Med.* 2002;68:986.
- [235] Verotta L, Tato M, El-Sebakhy NA et al. *Phytochemistry.* 1998;48(8):1403.
- [236] Pistelli L, Pardossi S, Bertoli A et al. *Phytochemistry.* 1998;49(8):2467.
- [237] Ahmad VU, Ali A, Ali Z et al. *Chem Pharm Bull.* 2000;48(11):1597.
- [238] Radwan MM, Farooq A, El-Sebakhy NA et al. *J Nat Prod.* 2004;67(3):487.
- [239] Gao JC, Huang F, Zhang JC et al. *J Nat Prod.* 2006;69(10):1500.
- [240] Kennelly EJ, Cai LN, Kim NC et al. *Phytochemistry.* 1996;41(5):1381.
- [241] Zhang QW, Ye WC, Che CT et al. *J Asian Nat Prod Res.* 1999;2(2):45.
- [242] Zhu NQ, Jiang Y, Wang MF et al. *J Nat Prod.* 2001;64(5):627.
- [243] Radwan MM, El-Sebakhy NA, Asaad AM et al. *Phytochemistry.* 2004;65:2909.
- [244] Xu JP, Xu RS, Li XY. *Phytochemistry.* 1992;31(1):233.
- [245] Xu JP, Xu RS, Li XY. *Planta Med.* 1992;58:208.
- [246] Yoshikawa K, Katsuta S, Mizumori J et al. *J Nat Prod.* 2000;63(9):1229.
- [247] Zhao WM, Xu JP, Qin GW et al. *J Nat Prod.* 1994;57(12):1613.
- [248] Zhao WM, Wolfender J-L, Hostettmann K et al. *Phytochemistry.* 1997;45(5):1073.

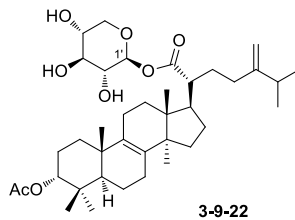
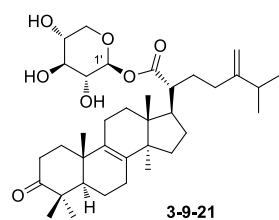
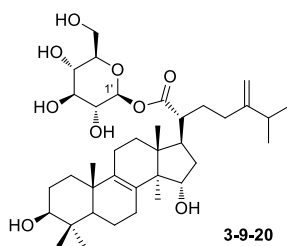
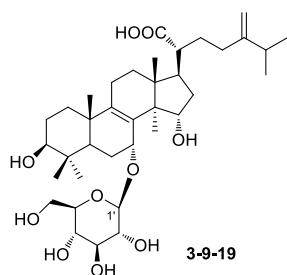
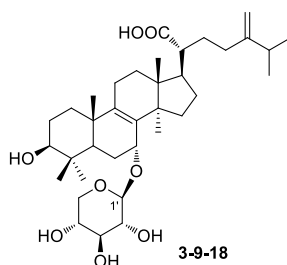
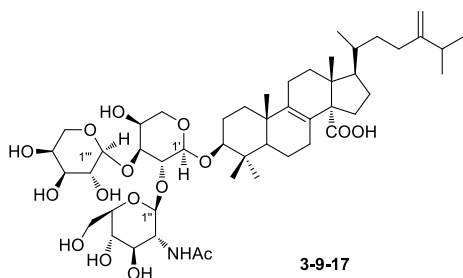
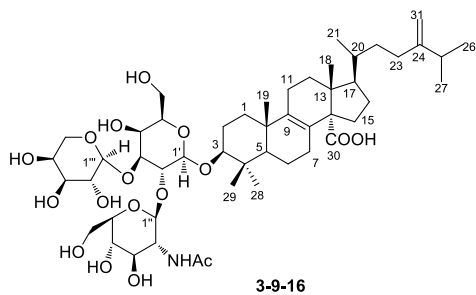
3.9 Lanostane-type Saponins

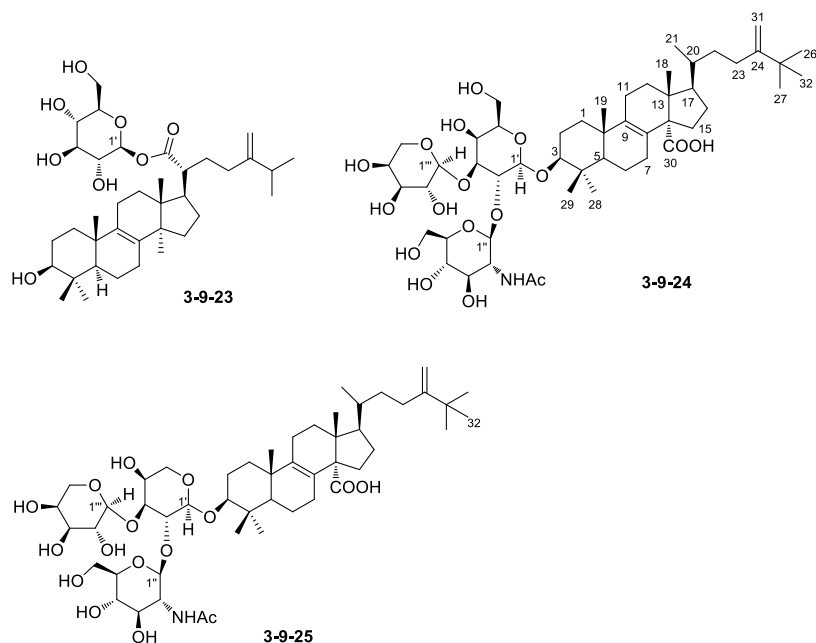
Table 3-9-1: Cos, MFs, and TSs of lanostane-type saponins **3-9-1~3-9-25**.

No.	Compounds	MFs	Test solvents	References
3-9-1	scillasaponin E	C ₅₈ H ₉₂ O ₂₇	C ₅ D ₅ N	[249]
3-9-2	scillasaponin F	C ₆₃ H ₁₀₀ O ₃₁	C ₅ D ₅ N	[249]
3-9-3	(23 <i>S</i> ,25 <i>R</i>)-17 α ,23-epoxy-29-hydroxy-3 β -[<i>(O</i> - α -L-rhamnopyranosyl-(1 $\rightarrow$ 2)- <i>O</i> -[β -D-glucopyranosyl-(1 $\rightarrow$ 3)]- <i>O</i> - β -D-glucopyranosyl-(1 $\rightarrow$ 2)- α -L-arabinopyranosyl-(1 $\rightarrow$ 6)- β -D-glucopyranosyl)oxy]lanost-8-en-23,26-olide	C ₅₉ H ₉₄ O ₂₈	C ₅ D ₅ N	[250]
3-9-4	scillasaponin C	C ₆₅ H ₁₀₄ O ₃₃	C ₅ D ₅ N	[251]
3-9-5	scillasaponin G	C ₆₃ H ₁₀₀ O ₃₂	C ₅ D ₅ N	[249]
3-9-6	scillasaponin D	C ₅₃ H ₈₄ O ₂₄	C ₅ D ₅ N	[251]
3-9-7	(23 <i>S</i> ,25 <i>R</i>)-3 β ,30,31-trihydroxy-17 α ,23-epoxy-5 α -lanost-5-en-23,26-olactone 3- <i>O</i> -{ <i>O</i> - α -L-rhamnopyranosyl-(1 $\rightarrow$ 2)- <i>O</i> - β -D-glucopyranosyl-(1 $\rightarrow$ 2)- <i>O</i> - α -L-arabinopyranosyl-(1 $\rightarrow$ 6)- β -D-glucopyranoside}	C ₅₃ H ₈₄ O ₂₄	C ₅ D ₅ N	[252]
3-9-8	(23 <i>S</i> ,25 <i>R</i>)-3 β ,30,31-trihydroxy-17 α ,23-epoxy-5 α -lanost-5-en-23,26-olactone 3- <i>O</i> -{ <i>O</i> - β -D-apio-D-furanosyl-(1 $\rightarrow$ 2)- <i>O</i> - β -D-glucopyranosyl-(1 $\rightarrow$ 2)- <i>O</i> - α -L-arabinopyranosyl-(1 $\rightarrow$ 6)- β -D-glucopyranoside}	C ₅₂ H ₈₂ O ₂₄	C ₅ D ₅ N	[252]
3-9-9	fomitoside C	C ₃₅ H ₅₄ O ₇	C ₅ D ₅ N	[253]
3-9-10	fomitoside F	C ₃₇ H ₅₈ O ₈	C ₅ D ₅ N	[253]
3-9-11	fomitoside I	C ₃₆ H ₅₈ O ₈	C ₅ D ₅ N	[253]
3-9-12	fomitoside H	C ₄₂ H ₆₆ O ₁₁	C ₅ D ₅ N	[253]
3-9-13	fomitoside A	C ₃₅ H ₅₄ O ₈	C ₅ D ₅ N	[253]
3-9-14	fomitoside E	C ₃₇ H ₅₈ O ₉	C ₅ D ₅ N	[253]
3-9-15	fomitoside B	C ₃₅ H ₅₄ O ₈	C ₅ D ₅ N	[253]
3-9-16	eryloside G	C ₅₀ H ₈₁ NO ₁₇	CD ₃ OD	[254]
3-9-17	eryloside H	C ₄₉ H ₇₉ NO ₁₆	CD ₃ OD	[254]
3-9-18	laetiposide E	C ₃₆ H ₅₈ O ₈	C ₅ D ₅ N	[255]
3-9-19	laetiposide F	C ₃₇ H ₆₀ O ₁₀	C ₅ D ₅ N	[255]
3-9-20	laetiposide G	C ₃₇ H ₆₀ O ₉	C ₅ D ₅ N	[255]
3-9-21	fomitoside D	C ₃₆ H ₅₆ O ₇	C ₅ D ₅ N	[253]
3-9-22	fomitoside G	C ₃₈ H ₆₀ O ₈	C ₅ D ₅ N	[253]
3-9-23	fomitoside J	C ₃₇ H ₆₀ O ₈	C ₅ D ₅ N	[253]
3-9-24	eryloside I	C ₅₁ H ₈₃ NO ₁₇	CD ₃ OD	[254]
3-9-25	eryloside J	C ₅₀ H ₈₁ NO ₁₆	CD ₃ OD	[254]







**Table 3-9-2:** ^1H NMR spectroscopic data of lanostane-type saponins 3-9-1~3-9-3, 3-9-5, and 3-9-7.

H	3-9-1	3-9-2	3-9-3	3-9-5	3-9-7
18	0.88 s	0.87 s	0.87 s	0.90 s	0.89 s
19	0.94 s	0.92 s	0.92 s	0.94 s	1.04 s
21	1.01 d(6.8)	1.00 d(6.7)	1.00 d(6.8)	1.09 d(6.8)	1.00 d(6.8)
22	2.66 dd(13.4, 6.6) 1.72 br d(13.4)	—	—	2.53 dd(14.1, 6.4) 2.69 br d(14.1)	—
24	—	—	—	4.40 d(4.8)	—
25	—	—	—	3.32 m	—
27	1.23 d(7.2)	1.23 d(7.3)	1.23 d(6.9)	1.50 d(7.2)	1.21 d(7.2)
28	1.54 s	1.55 s	1.54 s	1.55 s	—
30	1.24 s	1.24 s	1.24 s	1.28 s	1.18 s
1'	5.19 d(7.6)	4.98 d(7.8)	4.96 d(7.8)	4.97 d(7.8)	5.11 d(7.8)
1''	5.30 d(3.5)	5.29 d(3.3)	5.33 br s	5.29 d(3.3)	5.29 d(3.2)
1'''	4.94 d(7.8)	5.20 d(6.8)	5.19 d(7.7)	5.19 d(6.8)	5.13 d(7.7)
1''''	6.22 br s	5.98 br s	6.36 br s	5.96 br s	6.34 br s
6''''	1.73 d(6.2)	1.77 d(6.1)	1.75 d(6.2)	1.74 d(6.1)	1.73 d(6.2)
1'''''	4.84 d(7.3)	5.18 d(5.8)	5.03 d(7.8)	5.16 d(5.8)	—
1''''''	—	6.05 br s	—	6.04 br s	—

Table 3-9-3: ^1H NMR spectroscopic data of lanostane-type saponins **3-9-4**, **3-9-6**, and **3-9-8~3-9-10**.

H	3-9-4	3-9-6	3-9-8	3-9-9	3-9-10
3	—	3.57 dd(11.4, 4.2)	—	—	4.84 br s
17	—	—	—	2.41 m	2.48 m
18	0.88 s	0.90 s	0.89 s	1.06 s	1.07 s
19	0.94 s	0.94 s	1.04 s	0.96 s	—
20	2.12 m	2.21 m	—	2.72 dt(9.4, 3.3)	2.72 dt (9.4, 3.3)
21	1.02 d(6.7)	1.08 d(6.7)	1.00 d(6.8)	—	—
22	2.65 dd(13.6, 6.5) 1.73 br d(13.6)	2.71 br d(14.1) 2.54 dd(14.1, 6.4)	—	—	—
24	1.95 dd(12.5, 12.5) 2.44 dd(12.5, 8.1)	4.38 d(4.7)	—	5.28 m	5.27 m
25	3.02 m	3.31 dq(7.2, 4.7)	—	—	—
26	—	—	—	1.64 s	1.63 s
27	1.23 d(7.5)	1.51 d(7.2)	1.21 d(7.2)	1.64 s	1.63 s
28	1.53 s	1.55 s	—	1.13 s	0.92 s
29	—	—	—	1.03 s	0.86 s
30	1.24 s	1.28 s	1.18 s	0.94 s	0.83 s
OAc	—	—	—	—	1.94 s(3-OAc)
1'	4.95 d(7.9)	4.97 d(7.7)	5.08 d(7.7)	6.27 d(8.0)	6.26 d(8.0)
2'	3.95	4.00	—	—	—
3'	4.15	4.20	—	—	—
4'	4.18	4.20	—	—	—
5'	3.97	4.03	—	—	—
6'	4.50, 4.25	4.50 dd(10.2, 4.1) 4.23	—	—	—
1''	5.28 br s	5.35 d(2.7)	5.16 d(2.6)	—	—
2''	4.68	4.64	—	—	—
3''	4.67	4.67	—	—	—
4''	4.50	4.64	—	—	—
5''	4.35	4.39 dd(11.1, 8.0)	—	—	—
	3.92 dd(11.1, 3.5)	3.93 dd(11.1, 4.0)	—	—	—
1'''	5.13 d(7.6)	5.17 d(7.6)	5.12 d(7.6)	—	—
2'''	4.23	4.24	—	—	—
3'''	4.02	4.18	—	—	—
4'''	4.08	4.18	—	—	—
5'''	3.57	3.69	—	—	—
6'''	4.25, 4.10	4.34, 4.26	—	—	—
1''''	6.45 br s	6.37 br s	6.35 d(2.0)	—	—
2''''	4.69	4.75	—	—	—
3''''	4.54	4.65	—	—	—
4''''	4.22	4.31 dd(9.6, 9.6)	—	—	—
5''''	4.92	4.90 dq(9.6, 6.1)	—	—	—
6''''	1.81 d(6.0)	1.75 d(6.1)	—	—	—

Table 3-9-3 (continued)

H	3-9-4	3-9-6	3-9-8	3-9-9	3-9-10
1''''	4.98 d(7.5)				
2''''	4.53				
3''''	4.11				
4''''	4.29				
5''''	4.02				
6''''	4.28, 4.25				
1'''''	5.21 d(7.7)				
2'''''	4.31				
3'''''	4.08				
4'''''	4.42				
5'''''	3.63				
6'''''	4.41, 4.28				

Table 3-9-4: ¹H NMR spectroscopic data of lanostane-type saponins 3-9-11~3-9-15.

H	3-9-11	3-9-12	3-9-13	3-9-14	3-9-15
3	3.42 dd(11.2, 4.4)	4.84 br s		4.84 br s	
17	—	2.39 m	2.45 m	—	2.39 m
18	1.06 s	1.06 s	1.04 s	1.05 s	1.05 s
19	0.98 s	0.91 s	0.96 s	0.92 s	0.96 s
20	2.75 dt(9.4, 3.3)	2.72 dt(11.3, 3.3)	2.75 dt(9.4, 3.3)	2.74 dt(9.4, 3.3)	2.72 dt(11.3, 3.3)
23	—	—	6.25 ddd (15.4, 7.1, 7.1)	6.25 ddd (15.4, 7.1, 7.1)	—
24	5.20 m	5.27 m	6.16 d(15.4)	6.14 d(15.2)	4.45 t(5.7)
26	1.62 s	1.62 s	1.55 s	1.54 s	4.93 br s 5.26 br s
27	1.64 s	1.62 s	1.56 s	1.55 s	1.91 s
28	1.09 s	0.98 s	1.14 s	0.92 s	1.21 s
29	0.94 s	0.86 s	1.03 s	0.84 s	1.02 s
30	1.24 s	0.84 s	0.93 s	0.84 s	0.92 s
1'	6.40 d(8.0)	6.27 d(8.0)	6.25 d(8.0)	6.24 d(8.0)	6.27 d(8.0)
2''		2.96 d(14.7)			
		3.00 d(14.7)			
4''		3.01 d(14.7)			
		3.07 d(14.7)			
5''		1.66 s			
OAc				1.94 s(3-OAc)	
OMe		3.60 s(6''-OMe)			

Table 3-9-5: ^1H NMR spectroscopic data of lanostane-type saponins **3-9-16~3-9-18, 3-9-24, and 3-9-25.**

H	3-9-16	3-9-17	3-9-18	3-9-24	3-9-25
1	1.76 m, 1.29 m	1.75 m, 1.30 m	—	1.76 m, 1.30 m	1.76 m, 1.30 m
2	2.00 m, 1.74 m	1.90 m, 1.78 m	—	1.99 m, 1.74 m	1.90 m, 1.74 m
3	3.18 dd(11.7, 4.4)	3.15 dd(11.7, 4.4)	3.13 dd(11, 4.4)	3.18 dd(11.7, 4.4)	3.15 dd(11.7, 4.4)
5	1.10 dd(12.7, 2.3)	1.10 dd(12.8, 2.3)	—	1.12 dd(12.7, 2.0)	1.12 dd(12.7, 2.0)
6	1.70 m, 1.53 m	1.70 m, 1.53 m	—	1.70 m, 1.54 m	1.69 m, 1.54 m
7	2.11 m, 1.98 m	2.00 m, 2.10 m	4.62 br s	2.10 m, 2.01 m	2.10 m, 2.00 m
11	2.14 m, 2.11 m	2.15 m, 2.12 m	—	2.10 m, 2.15 m	2.10 m, 2.15 m
12	2.25 m, 1.70 m	2.24 m, 1.70 m	—	2.25 m, 1.70 m	2.24 m, 1.69 m
15	2.06 m, 1.40 m	2.07 m, 1.39 m	—	2.07 m, 1.40 m	2.07 m, 1.39 m
16	2.06 m, 1.58 m	2.07 m, 1.58 m	—	2.07 m, 1.58 m	2.07 m, 1.56 m
17	1.55 m	1.55 m	—	1.60 m	1.60 m
18	0.80 s	0.79 s	0.99 s	0.80 s	0.80 s
19	1.05 s	1.04 s	0.99 s	1.05 s	1.05 s
20	1.48 m	1.47 m	—	1.49 m	1.49 m
21	0.94 d(6.3)	0.94 d(6.4)	—	0.96 d(6.4)	0.96 d(6.4)
22	1.55 m, 1.12 m	1.55 m, 1.13 m	—	1.58 m, 1.17 m	1.58 m, 1.17 m
23	2.08 m 1.90 ddd (14.2, 10.7, 5.9)	2.10 m 1.90 m	—	2.12 m 1.89 ddd (15.1, 11.2, 4.9)	2.12 m 1.90 m
25	2.20 m	2.20 m	—		
26	1.02 d(6.8)	1.02 d(6.8)	1.00 d(6.2)	1.05 s	1.05 s
27	1.01 d(6.8)	1.01 d(6.8)	1.00 d(6.2)	1.05 s	1.05 s
28	1.08 s	1.07 s	1.48 s	1.07 s	1.07 s
29	0.90 s	0.90 s	1.10 s	0.90 s	0.90 s
30			1.45 s		
31	4.71 br s 4.64 d(1.0)	4.71 br s 4.64 br s	4.80 br s 4.86 br s	4.84 br s 4.65 d(1.0)	4.84 br s 4.65 d(1.0)
32				1.05 s	1.05 s
NAc	2.02 s	2.01 s		2.02 s	2.01 s
1'	4.37 d(8.3)	4.35 d(7.8)	4.88 d(7.7)	4.40 d(8.3)	4.35 d(7.8)
2'	3.95 dd(9.8, 8.3)	3.93 dd(9.3, 7.8)	3.95 dd(8.4, 7.7)	3.96 dd(9.8, 8.3)	3.93 dd(9.3, 7.8)
3'	3.65 dd(9.8, 3.4)	3.67 dd(9.3, 3.4)	4.19 dd(8.4, 8.4)	3.65 dd(9.8, 3.4)	3.66 dd(9.3, 3.4)
4'	4.12 m	4.05 m	4.23 m	4.12 br d(3.4)	4.05 m
5'	3.51 m	3.83 dd(12.7, 2.0) 3.53 br d(12.7)	3.79 dd (10.5, 10.5) 4.40 dd(10.5, 4.8)	3.50 m	3.83 dd(12.7, 2.0) 3.53 br d(12.7)
6'	3.70 d(5.9)(2H)			3.70 d(5.9)(2H)	

Table 3-9-5 (continued)

H	3-9-16	3-9-17	3-9-18	3-9-24	3-9-25
1''	4.91 d(8.3)	4.89 d(8.3)		4.91 d(8.8)	4.89 d(8.3)
2''	3.73 dd(10.3, 8.3)	3.73 dd(10.3, 8.3)		3.73 dd(10.3, 8.8)	3.73 dd(10.3, 8.3)
3''	3.24 dd(10.3, 9.3)	3.25 dd(10.3, 8.8)		3.24 dd(10.3, 8.8)	3.25 dd(10.3, 8.8)
4''	3.10 dd(9.3, 9.3)	3.11 dd(9.8, 8.8)		3.10 dd(9.8, 8.8)	3.11 dd(9.8, 8.8)
5''	3.27 ddd (9.3, 7.7, 1.5)	3.30 ddd (9.8, 7.8, 1.5)		3.27 ddd (9.8, 7.8, 2.4)	3.30 ddd (9.8, 8.3, 2.0)
6''	3.83 dd(12.1, 1.5)	3.83 dd(12.2, 1.5)		3.55 dd(12.2, 7.8)	3.55 dd(12.2, 8.3)
	3.55 dd(12.1, 7.7)	3.55 dd(12.2, 7.8)		3.84 dd(12.2, 2.4)	3.83 dd(12.2, 2.0)
1'''	4.38 d(7.8)	4.40 d(7.8)		4.41 d(7.8)	4.40 d(7.3)
2'''	3.68 dd(9.8, 7.8)	3.69 dd(9.8, 7.8)		3.68 dd(9.8, 7.8)	3.69 dd(9.8, 7.3)
3'''	3.50 dd(9.8, 3.4)	3.50 dd(9.8, 3.4)		3.50 dd(9.8, 3.4)	3.50 dd(9.8, 3.4)
4'''	3.82 m	3.81 m		3.83 m	3.81 m
5'''	3.86 dd(11.7, 2.4)	3.85 dd(12.2, 2.4)		3.85 dd(12.8, 2.4)	3.85 dd(12.2, 2.4)
	3.57 br d(11.7)	3.56 br d(12.2)		3.57 br d(12.8)	3.56 br d(12.2)

Table 3-9-6: ¹H NMR spectroscopic data of lanostane-type saponins 3-9-19~3-9-23.

H	3-9-19	3-9-20	3-9-21	3-9-22	3-9-23
3	3.14 t(7.5)	3.44 t(8.1)		4.84 br s	3.43 dd(11.2, 4.4)
7	4.87 br s	—	—	—	—
15	4.74 dd(9.5, 5.5)	4.62 dd(9.5, 6.0)	—	—	—
17	—	—	—	2.48 m	—
18	1.05 s	1.21 s	1.08 s	1.06 s	1.06 s
19	0.97 s	1.01 s	0.97 s	0.92 s	0.98 s
20	—	—	2.74 dt(9.4, 3.3)	2.72 dt(9.4, 3.3)	2.75 dt(11.4, 3.3)
26	1.00 d(6.8)	1.00 d(6.8)	1.03 d(6.3)	1.02 d(6.3)	1.02 d(6.3)
27	1.00 d(6.8)	1.00 d(6.8)	1.03 d(6.3)	1.02 d(6.3)	1.02 d(6.3)
28	1.50 s	1.23 s	1.13 s	0.92 s	1.09 s
29	1.09 s	1.06 s	1.04 s	0.87 s	0.97 s
30	1.49 s	1.36 s	0.97 s	0.83 s	1.24 s
31	4.91 br s	4.81 br s	4.89 br s	4.87 br s	4.85 br s
	4.86 br s	4.87 br s	4.95 br s	4.93 br s	4.92 br s
OAc				1.93 s(3-OAc)	
1'	5.13 d(7.4)	6.44 d(8.1)	6.23 d(8.3)	6.27 d(8.3)	6.42 d(8.0)

Table 3-9-6 (continued)

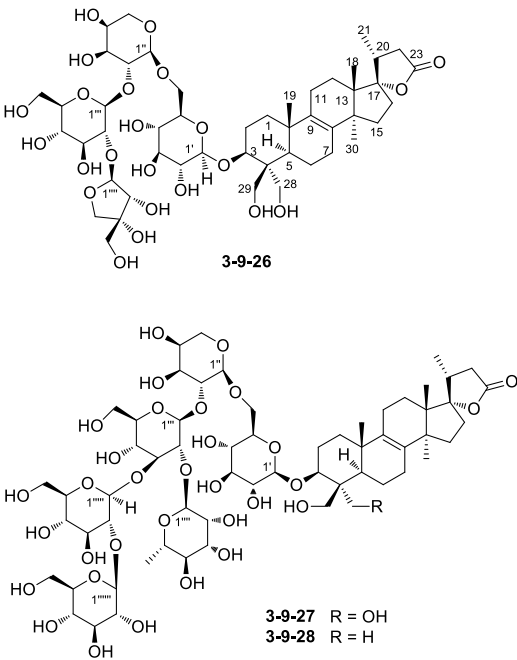
H	3-9-19	3-9-20	3-9-21	3-9-22	3-9-23
2'	3.97 dd(8.8, 7.4)	4.23 dd(9.1, 8.1)	—	—	—
3'	4.27 dd(9.0, 8.8)	4.29 dd(9.4, 9.1)	—	—	—
4'	4.11 dd(9.0, 8.8)	4.35 dd(9.4, 8.8)	—	—	—
5'	4.15 m	4.05 m	—	—	—
6'	4.41 dd(11.7, 5.6)	4.26 dd(11.3, 4.4)			—
	4.88 dd(11.7, 2.2)	4.46 dd(11.3, 2.3)			

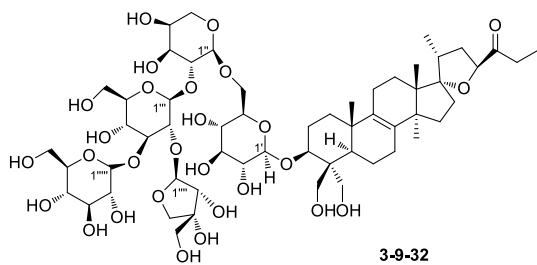
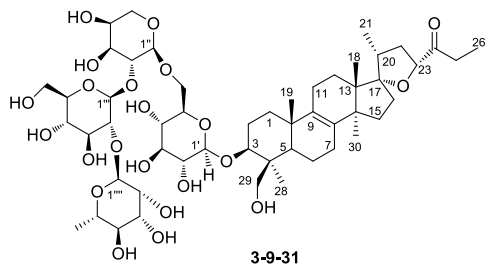
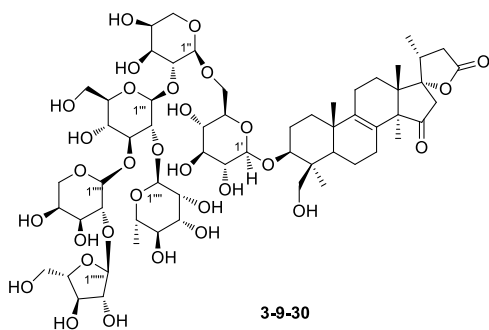
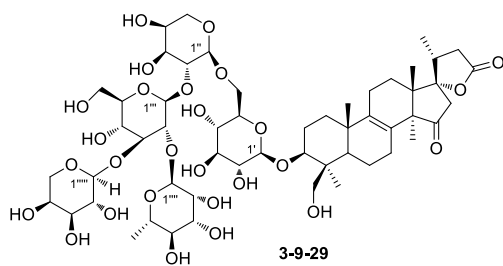
Table 3-9-7: Cos, MFs, and TSs of lanostane-type saponins 3-9-26~3-9-39.

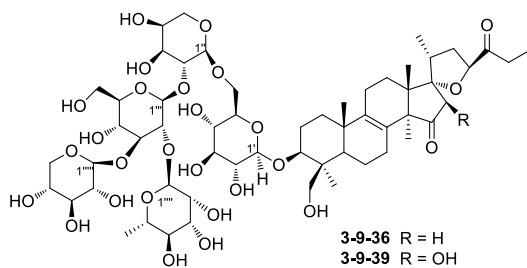
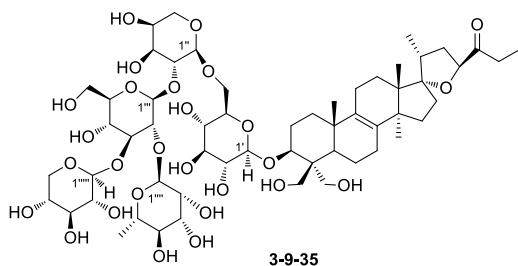
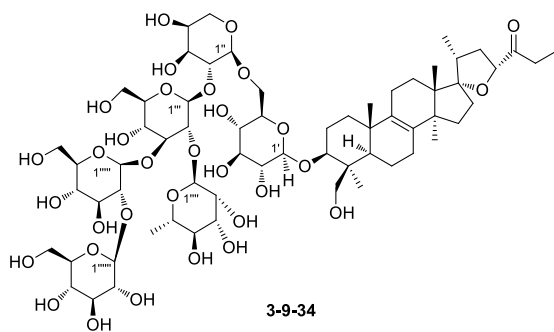
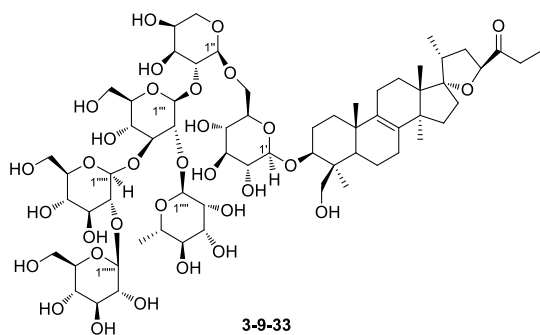
No.	Compounds	MFs	Test solvents	References
3-9-26	lucilanoside C	C ₄₈ H ₇₆ O ₂₃	C ₅ D ₅ N	[249]
3-9-27	lucilanoside B	C ₆₁ H ₉₈ O ₃₃	C ₅ D ₅ N	[256]
3-9-28	lucilanoside A	C ₆₁ H ₉₈ O ₃₂	C ₅ D ₅ N- CD ₃ OD (11:1)	[256]
3-9-29	lucilanoside D	C ₅₄ H ₈₄ O ₂₇	C ₅ D ₅ N	[249]
3-9-30	lucilanoside E	C ₅₉ H ₉₂ O ₃₁	C ₅ D ₅ N	[249]
3-9-31	23- <i>epi</i> -15-deoxoeucosterol-3- <i>O</i> -{ <i>O</i> - α -L-rhamnopyranosyl(1 $\rightarrow$ 2)- <i>O</i> - β -D-glucopyranosyl-(1 $\rightarrow$ 2)- <i>O</i> - α -L-arabinopyranosyl-(1 $\rightarrow$ 6)- β -D-glucopyranoside}	C ₅₂ H ₈₄ O ₂₂	C ₅ D ₅ N	[252]
3-9-32	(23S)-3 β -[(<i>O</i> - β -D-apiofuranosyl-(1 $\rightarrow$ 2)- <i>O</i> -[β -D-glucopyranosyl-(1 $\rightarrow$ 3)]- <i>O</i> - β -D-glucopyranosyl-(1 $\rightarrow$ 2)- α -L-arabinopyranosyl-(1 $\rightarrow$ 6)- β -D-glucopyranosyl]oxy]-17 α ,23-epoxy-28,29-dihydroxy-27-norlanost-8-en-24-one	C ₅₇ H ₉₂ O ₂₈	C ₅ D ₅ N	[250]
3-9-33	15-deoxoeucosterol-3- <i>O</i> -{ <i>O</i> - α -L-rhamnopyranosyl-(1 $\rightarrow$ 2)- <i>O</i> -[β -D-glucopyranosyl-(1 $\rightarrow$ 2)- <i>O</i> - β -D-glucopyranosyl-(1 $\rightarrow$ 3)]- <i>O</i> - β -D-glucopyranosyl-(1 $\rightarrow$ 2)- <i>O</i> -arabinopyranosyl-(1 $\rightarrow$ 6)- β -D-glucopyranoside}	C ₆₄ H ₁₀₄ O ₃₂	C ₅ D ₅ N	[251]
3-9-34	23- <i>epi</i> -15-deoxoeucosterol-3- <i>O</i> -{ <i>O</i> - α -L-rhamnopyranosyl-(1 $\rightarrow$ 2)- <i>O</i> -[β -D-glucopyranosyl-(1 $\rightarrow$ 2)- <i>O</i> - β -D-glucopyranosyl-(1 $\rightarrow$ 3)]- <i>O</i> - β -D-glucopyranosyl-(1 $\rightarrow$ 2)- <i>O</i> -arabinopyranosyl-(1 $\rightarrow$ 6)- β -D-glucopyranoside}	C ₆₄ H ₁₀₄ O ₃₂	C ₅ D ₅ N	[251]
3-9-35	3- <i>O</i> -{ <i>O</i> - α -L-rhamnopyranosyl-(1 $\rightarrow$ 2)- <i>O</i> -[β -D-xylopyranosyl-(1 $\rightarrow$ 3)]- <i>O</i> - β -D-glucopyranosyl-(1 $\rightarrow$ 2)- <i>O</i> - α -L-arabinopyranosyl-(1 $\rightarrow$ 6)- β -D-glucopyranoside} of 15-deoxo-30-hydroxyeucosterol	C ₅₇ H ₉₂ O ₂₇	C ₅ D ₅ N	[252]

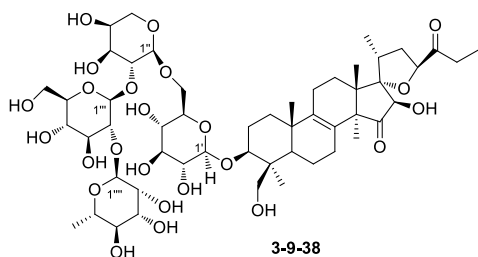
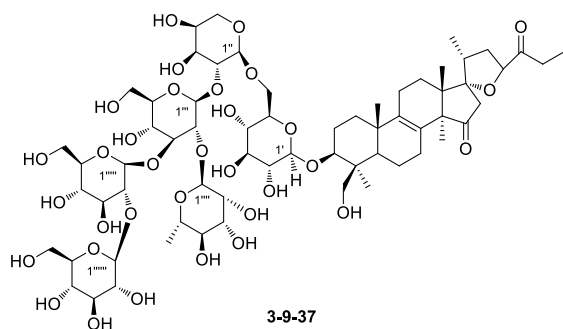
Table 3-9-7 (continued)

No.	Compounds	MFs	Test solvents	Refer-ences
3-9-36	3- <i>O</i> -{ <i>O</i> - α -L-rhamnopyranosyl-(1 $\rightarrow$ 2)- <i>O</i> -[β -D-xylopyranosyl-(1 $\rightarrow$ 3)]- <i>O</i> - β -D-glucopyranosyl-(1 $\rightarrow$ 2)- <i>O</i> - α -L-arabinopyranosyl-(1 $\rightarrow$ 6)- β -D-glucopyranoside} of eucosterol	C ₅₇ H ₉₀ O ₂₇	C ₅ D ₅ N	[252]
3-9-37	(23 <i>S</i>)-17 α ,23-epoxy-29-hydroxy-3 β -[({ <i>O</i> - α -L-rhamnopyranosyl-(1 $\rightarrow$ 2)- <i>O</i> -[<i>O</i> - β -D-glucopyranosyl-(1 $\rightarrow$ 2)- β -D-glucopyranosyl-(1 $\rightarrow$ 3)]- <i>O</i> - β -D-glucopyranosyl-(1 $\rightarrow$ 2)- α -L-arabinopyranosyl-(1 $\rightarrow$ 6)- β -D-glucopyranosyl]oxy]-27-nor-lanost-8-ene-15,24-dione	C ₆₄ H ₁₀₂ O ₃₃	C ₅ D ₅ N	[250]
3-9-38	16 β -hydroxyeucosterol-3- <i>O</i> -{ <i>O</i> - α -L-rhamnopyranosyl-(1 $\rightarrow$ 2)- <i>O</i> - β -D-glucopyranosyl-(1 $\rightarrow$ 2)- <i>O</i> - α -L-arabinopyranosyl-(1 $\rightarrow$ 6)- β -D-glucopyranoside}	C ₅₂ H ₈₂ O ₂₄	C ₅ D ₅ N	[252]
3-9-39	3- <i>O</i> -{ <i>O</i> - α -L-rhamnopyranosyl-(1 $\rightarrow$ 2)- <i>O</i> -[β -D-xylopyranosyl-(1 $\rightarrow$ 3)]- <i>O</i> - β -D-glucopyranosyl-(1 $\rightarrow$ 2)- <i>O</i> - α -L-arabinopyranosyl-(1 $\rightarrow$ 6)- β -D-glucopyranoside} of 16 β -hydroxyeucosterol	C ₅₇ H ₉₀ O ₂₈	C ₅ D ₅ N	[252]







**Table 3-9-8:** ^1H NMR spectroscopic data of lanostane-type saponins **3-9-26~3-9-30**.

H	3-9-26	3-9-27	3-9-28	3-9-29	3-9-30
1	—	—	ax 1.14 ddd (13.2, 11.2, 3.4) eq 1.67 m	ax 1.12 ddd (13.0, 13.0, 3.1) eq 1.63 br d(13.0)	—
2	—	—	ax 1.98 m eq 2.27 m	ax 1.99 q-like(12.9) eq 2.28 br dd (12.9, 3.1)	—
3	4.50 dd(11.9, 4.9)	—	3.57 dd(11.7, 4.4)	3.59 dd(12.1, 4.7)	3.59 dd(11.5, 4.7)
5	—	—	1.24 br d(14.2)	1.23 br d(12.8)	—
6	—	—	α 1.81 m β 1.48 m	α 1.87 br dd (12.3, 7.6) β 1.47 m	—
7	—	—	α 2.03 m β 1.90 m	α 2.79 dd (16.5, 6.0) β 2.51 m	—
11	—	—	α 2.13 m β 1.95 m	α 2.11 β 1.95 m	—
12	—	—	α 2.22 m β 1.46 m	α 2.27 β 1.57 br dd (13.1, 10.2)	—

Table 3-9-8 (continued)

H	3-9-26	3-9-27	3-9-28	3-9-29	3-9-30
15	—	—	α 1.32 m β 1.67 m		
16	—	—	α 1.98 m β 2.08 m	α 3.03 d(19.3) β 2.81 d(19.3)	3.02 d(19.3) 2.81 d(19.3)
18	0.87 s	0.88 s	0.88 s	0.93 s	0.93 s
19	1.02 s	1.03 s	0.92 s	0.91 s	0.90 s
20	—	—	2.36 dq(6.4, 6.8)	2.46 m	—
21	1.00 d(6.7)	1.01 d(6.9)	1.04 d(6.8)	1.05 d(6.8)	1.05 d(6.7)
22	2.75 dd(16.5, 6.3)	—	2.07 d(16.6)	2.88 dd(16.8, 6.6)	2.88 dd(16.8, 6.7)
	2.04 br d(16.5)		2.81 dd(16.6, 6.4)	2.16 br d(16.8)	2.16 br d(16.8)
28	4.93 d(11.4) 4.37 d(11.4)	—	1.54 s	1.55 s	1.55 s
29	4.61 d(11.4) 3.95 d(11.4)	—	4.39 d(10.3) 3.63 d(10.3)	4.40 d(11.2) 3.62	4.40 d(11.2) 3.63 d(11.2)
30	1.13 s	1.14 s	1.20 s	1.38 s	1.37 s
1'	5.14 d(7.5)	4.98 d(7.5)	4.94 d(7.8)	4.97 d(7.5)	4.98 d(7.8)
2'	—	—	3.94 dd(9.0, 7.8)	3.98 t-like(8.5)	3.99 t-like(8.3)
3'	—	—	4.15 t-like(9.0)	4.17 dd(9.0, 9.0)	4.19 t-like(8.8)
4'	—	—	4.15 t-like(9.0)	4.16	4.18 t-like(8.8)
5'	—	—	4.01 ddd (9.0, 4.4, 3.4)	4.02	4.03
6'	—	—	4.53 dd(12.6, 3.4) 4.27 dd(12.6, 4.4)	4.56 dd(10.3, 3.6) 4.27	4.56 dd(12.0, 3.0) 4.30 dd(12.0, 5.0)
1''	5.19 br s	5.27 d(3.2)	5.26 d(3.4)	5.31 d(3.6)	5.28 d(3.7)
2''	—	—	4.67 dd(5.9, 3.4)	4.69 dd(5.7, 3.6)	4.67 dd(5.5, 3.7)
3''	—	—	4.64 dd(5.9, 3.2)	4.67 br d(5.7)	4.64 dd(5.5, 3.3)
4''	—	—	4.50 ddd (6.8, 3.4, 3.2)	4.03 dd(7.1, 3.4)	4.48 m
5''	—	—	4.35 dd(11.7, 6.8) 3.92 dd(11.7, 3.4)	4.37 dd(11.2, 7.1) 3.91 dd(11.2, 3.4)	4.36 dd(11.2, 7.2) 3.87 dd(11.2, 3.3)
1'''	5.12 d(7.0)	5.13 d(7.5)	5.16 d(7.8)	5.21 d(7.7)	5.21 d(6.9)
2'''	—	—	4.25 dd(9.0, 7.8)	4.13 t-like(8.2)	4.12 t-like(8.0)
3'''	—	—	4.13 t-like(9.0)	4.05 dd(8.9, 8.9)	4.10 t-like(8.3)
4'''	—	—	4.14 t-like(9.0)	4.03	4.03 t-like(8.3)
5'''	—	—	3.63 ddd (8.8, 4.9, 2.9)	3.61 m	3.62
6'''	—	—	4.23 dd(11.0, 2.9) 4.14 dd(11.0, 2.9)	4.23 4.17	4.23 dd(11.6, 1.7) 4.16 dd(11.6, 4.9)
1''''	6.42 d(1.9)	6.43 br s	6.38 br s	6.23 br s	5.97 br s
2''''	—	—	4.69 dd(2.5, 1.0)	4.83 br d(3.3)	4.90 br d(3.2)

Table 3-9-8 (continued)

H	3-9-26	3-9-27	3-9-28	3-9-29	3-9-30
3 ^{''''}	—	—	4.53 dd(9.3, 2.5)	4.63 dd(9.3, 3.3)	4.59 dd(9.4, 3.2)
4 ^{''''}	—	—	4.24 dd(9.3, 9.3)	4.28 dd(9.3, 9.3)	4.29 dd(9.4, 9.4)
5 ^{''''}	—	—	4.89 dd(9.3, 5.9)	4.87	4.78 dq(9.4, 6.2)
6 ^{''''}		1.83 d(6.1)	1.80 d(5.9)	1.74 d(6.1)	1.75 d(6.2)
1 ^{'''''}		5.07 d(7.6)	5.07 d(7.8)	4.85 d(7.3)	5.18 d(5.8)
2 ^{'''''}		—	4.05 dd(9.0, 7.8)	4.14 dd(9.4, 7.3)	4.55 dd(7.5, 5.8)
3 ^{'''''}		—	4.20 dd(9.3, 9.0)	4.03 dd(9.4, 9.4)	4.19 br d(7.5)
4 ^{'''''}		—	4.03 dd(9.3, 9.3)	4.23	4.22
5 ^{'''''}		—	3.87 ddd (9.3, 6.4, 3.2)	4.24 3.75 br d(11.4)	4.35 dd(11.8, 5.1) 3.68 br d(11.8)
6 ^{'''''}		—	4.43 dd(11.2, 6.4) 4.20 dd(11.2, 6.4)		
1 ^{''''''}		5.35 d(7.7)	5.32 d(7.8)		6.05 br s
2 ^{''''''}		—	4.24 dd(9.0, 7.8)		5.03 br d(3.3)
3 ^{''''''}		—	4.13 dd(9.3, 9.0)		4.73 dd(5.3, 3.3)
4 ^{''''''}		—	4.24 dd(9.3, 9.3)		4.90
5 ^{''''''}		—	3.83 ddd (9.3, 3.4, 2.4)		4.22 br d(11.9) 4.08 br d(11.9)
6 ^{''''''}		—	4.37 dd(11.7, 2.4) 4.28 dd(11.7, 3.4)		

Table 3-9-9: ¹H NMR spectroscopic data of lanostane-type saponins 3-9-31~3-9-35.

H	3-9-31	3-9-32	3-9-33	3-9-34	3-9-35
18	0.89 s	0.93 s	0.92 s	0.89 s	0.92 s
19	0.96 s	1.08 s	0.95 s	0.96 s	1.04 s
21	0.84 d(6.8)	1.02 d(6.4)	1.03 d(6.5)	0.84 d(6.7)	1.02 d(6.6)
23	—	—	4.64 dd(9.4, 7.2)	4.33 (ov)	—
25	2.82 dq(18.4, 7.3) 2.67 dq(18.4, 7.3)		2.56 q(7.2)(2H)	2.82 dq(18.4, 7.3) 2.68 dq(18.4, 7.3)	2.52 q(7.3)(2H)
26	1.11 t(7.3)	1.04 t(7.3)	1.07 t(7.2)	1.11 t(7.3)	1.03 t(7.3)
28	1.57 s	—	1.56 s	1.57 s	—
30	1.37 s	1.47 s	1.53 s	1.38 s	1.46 s
1 [']	4.96 d(7.8)	5.12 d(7.6)	4.96 d(7.9)	4.95 d(7.9)	5.06 d(6.9)
1 ^{''}	5.33 d(2.9)	5.06 br s	5.28 br s	5.27 br s	5.31 d(2.5)
1 ^{'''}	5.16 d(7.5)	5.15 d(7.9)	5.14 d(7.6)	5.13 d(7.7)	5.12 d(7.3)
1 ^{''''}	6.36 br s	6.24 d(4.0)	6.47 br s	6.47 br s	6.35 br s
6 ^{''''}	1.74 d(6.1)		1.82 d(6.1)	1.81 d(6.2)	1.74 d(6.1)
1 ^{'''''}		5.05 d(7.5)	4.99 d(7.6)	4.99 d(7.7)	5.14 d(7.2)
1 ^{''''''}			5.22 d(7.8)	5.21 d(7.8)	

Table 3-9-10: ^1H NMR spectroscopic data of lanostane-type saponins **3-9-36~3-9-39**.

H	3-9-36	3-9-37	3-9-38	3-9-39
16	3.04 ABq(19.0) 2.38 ABq(19.0)	3.07 d(19.0) 2.38 d(19.0)	—	—
18	0.93 s	0.95 s	1.12 s	1.12 s
19	0.94 s	0.94 s	0.92 s	0.92 s
21	1.04 d(6.6)	1.06 d(6.8)	1.15 d(6.6)	1.15 d(6.6)
22	—	1.87 m(2H)	—	—
25	2.45 q(7.3)(2H)	2.45 m(2H)	2.41 q(7.3)(2H)	2.41 q(7.3)(2H)
26	1.02 t(7.3)	1.01 t(7.3)	0.97 t(7.3)	0.97 t(7.3)
28	1.50 s	1.56 s	1.54 s	1.51 s
30	1.68 s	1.72 s	1.77 s	1.77 s
1'	4.91 d(7.8)	4.97 d(7.8)	4.96 d(7.8)	4.91 d(7.8)
1''	5.34 d(2.1)	5.34 br s	5.33 d(2.9)	5.34 d(2.6)
1'''	5.15 d(7.5)	5.14 d(7.7)	5.17 d(7.4)	5.15 d(7.5)
1''''	6.35 br s	6.44 br s	6.36 br s	6.35 br s
6''''	1.74 d(6.1)	1.83 d(6.2)	1.75 d(6.2)	1.74 d(6.1)
1'''''	5.19 d(7.2)	5.08 d(7.7)		5.19 d(7.3)
1''''''		5.35 d(7.7)		

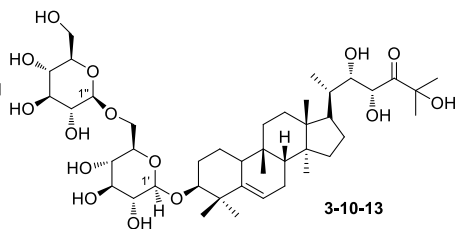
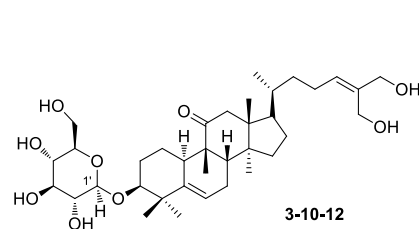
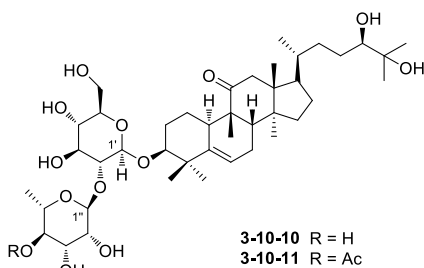
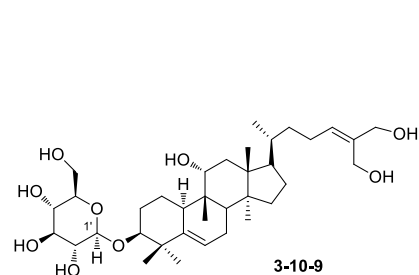
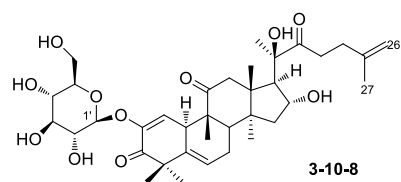
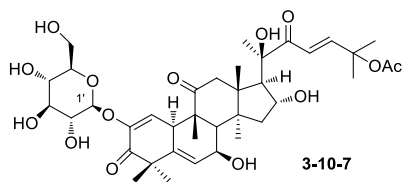
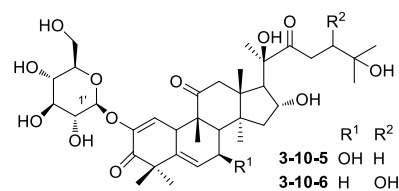
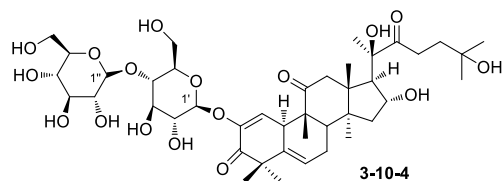
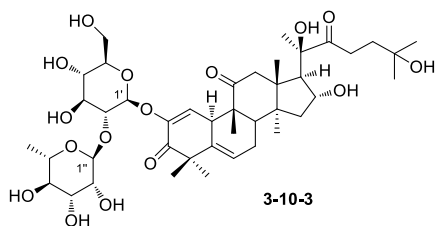
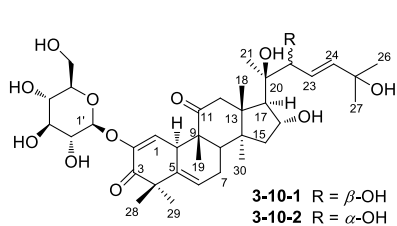
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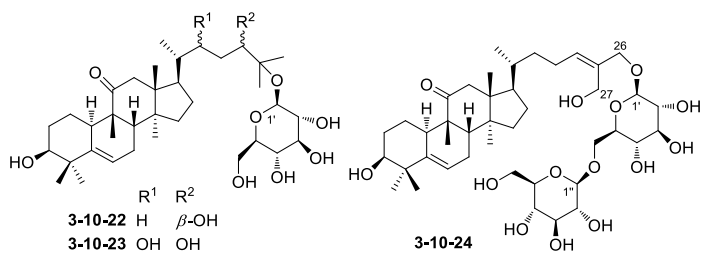
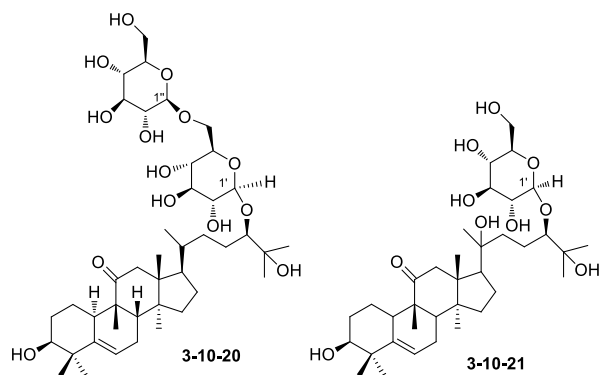
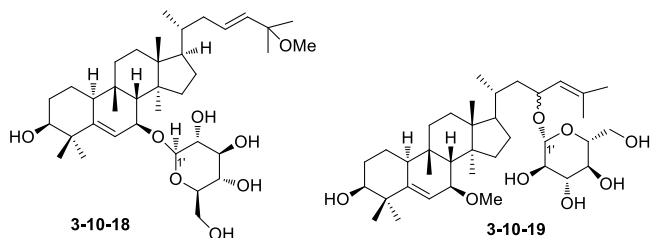
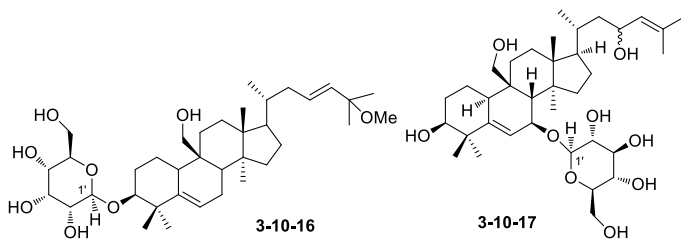
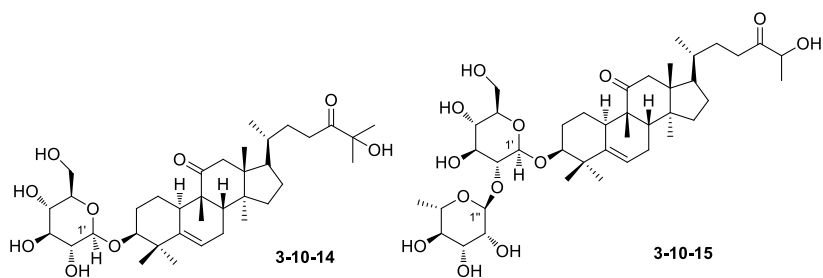
- [249] Ori K, Koroda M, Mimaki Y et al. *Phytochemistry*. 2003;64:1351.
- [250] Ori K, Kuroda M, Mimaki Y et al. *Chem Pharm Bull*. 2003;51(1):92.
- [251] Mimaki Y, Kubo S, Kinoshita Y et al. *Phytochemistry*. 1993;34(3):791.
- [252] Mimaki Y, Nishino H, Ori K et al. *Chem Pharm Bull*. 1994;42(2):327.
- [253] Yoshikawa K, Inoue M, Matsumoto Y et al. *J Nat Prod*. 2005;68(1):69.
- [254] Shin J, Lee HS, Woo L et al. *J Nat Prod*. 2001;64(6):767.
- [255] Yoshikawa K, Matsumoto K, Mine C et al. *Chem Pharm Bull*. 2000;48(10):1418.
- [256] Kuroda M, Mimaki Y, Ori K et al. *Tetrahedron*. 2002;58:6735.

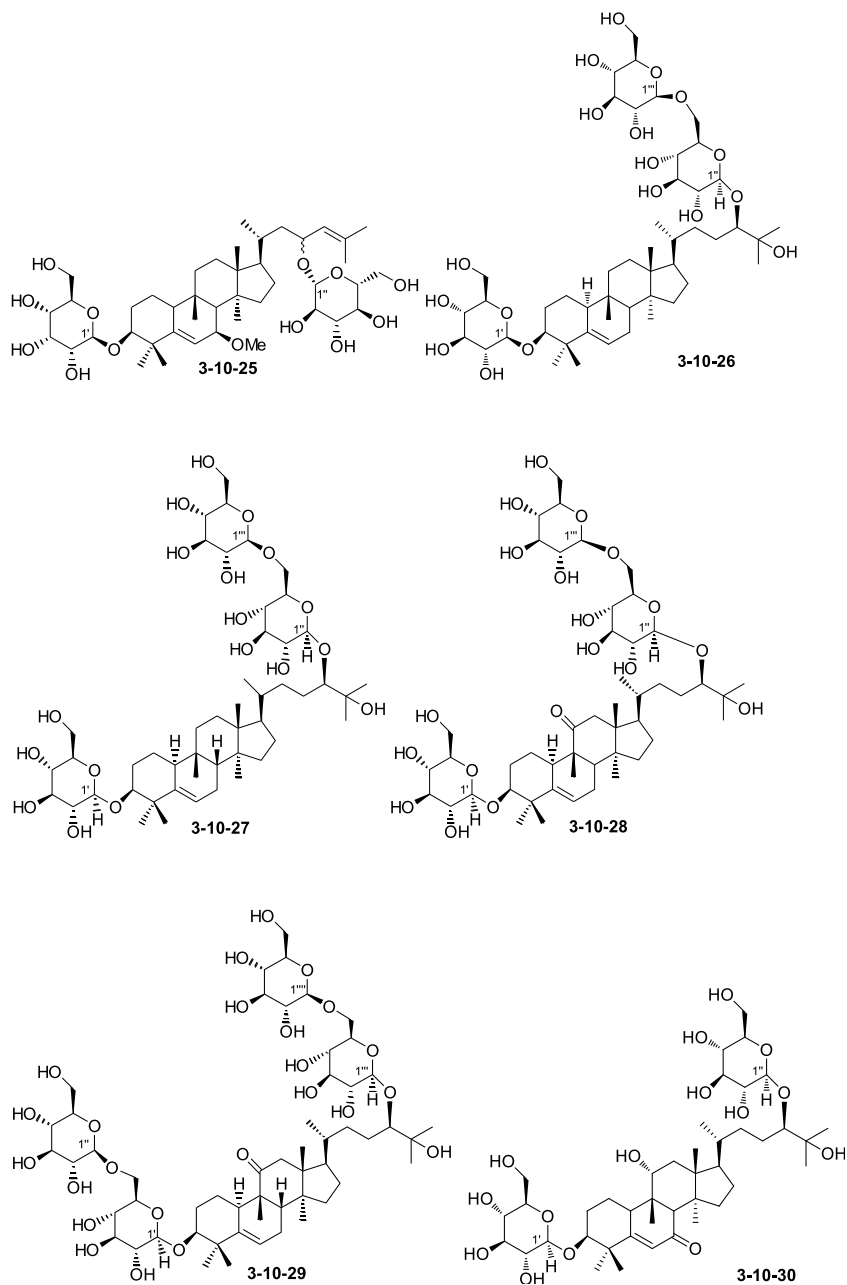
3.10 Cucurbitane-type Saponins

Table 3-10-1: Cos, MFs, and TSs of cucurbitane-type saponins 3-10-1~3-10-37.

No.	Compounds	MFs	Test solvents	References
3-10-1	khekadaengoside D	C ₃₆ H ₅₄ O ₁₂	C ₅ D ₅ N	[257]
3-10-2	khekadaengoside E	C ₃₆ H ₅₄ O ₁₂	C ₅ D ₅ N	[257]
3-10-3	khekadaengoside A	C ₄₂ H ₆₄ O ₁₆	C ₅ D ₅ N	[257]
3-10-4	khekadaengoside B	C ₄₂ H ₆₄ O ₁₇	C ₅ D ₅ N	[257]
3-10-5	khekadaengoside F	C ₃₆ H ₅₄ O ₁₃	C ₅ D ₅ N	[257]
3-10-6	cucurbitacin J 2- <i>O</i> - β -glucopyranoside	C ₃₆ H ₅₄ O ₁₃	C ₅ D ₅ N	[257]
3-10-7	colocynthiside A	C ₃₈ H ₅₄ O ₁₄	CD ₃ OD	[258]
3-10-8	khekadaengoside C	C ₃₆ H ₅₂ O ₁₁	C ₅ D ₅ N	[257]
3-10-9	jinfushanoside A	C ₃₆ H ₆₀ O ₉	C ₅ D ₅ N	[259]
3-10-10	bryonioside B	C ₄₂ H ₇₀ O ₁₃	C ₅ D ₅ N	[260]
3-10-11	bryonioside C	C ₄₄ H ₇₂ O ₁₄	C ₅ D ₅ N	[260]
3-10-12	jinfushanoside B	C ₃₆ H ₅₈ O ₉	C ₅ D ₅ N	[259]
3-10-13	goyaglycoside-h	C ₄₂ H ₇₀ O ₁₅	C ₅ D ₅ N	[261]
3-10-14	bryonioside F	C ₃₆ H ₅₈ O ₉	C ₅ D ₅ N	[260]
3-10-15	bryonioside G	C ₄₂ H ₆₈ O ₁₃	C ₅ D ₅ N	[260]
3-10-16	25-methoxycucurbita-5(6),23(<i>E</i>)-dien-19-ol-3- <i>O</i> - β -D-allopyranoside	C ₃₇ H ₆₂ O ₈	C ₅ D ₅ N	[262]
3-10-17	kuguaglycoside D	C ₃₆ H ₆₀ O ₉	C ₅ D ₅ N	[263]
3-10-18	kuguaglycoside B	C ₃₇ H ₆₂ O ₈	C ₅ D ₅ N	[263]
3-10-19	kuguaglycoside A	C ₃₇ H ₆₂ O ₈	C ₅ D ₅ N	[263]
3-10-20	11-oxomogroside II A ₁	C ₄₂ H ₇₀ O ₁₄	C ₅ D ₅ N	[264]
3-10-21	20-hydroxy-11-oxomogroside IA ₁	C ₃₆ H ₆₂ O ₁₀	C ₅ D ₅ N	[265]
3-10-22	bryonioside A	C ₃₆ H ₆₀ O ₉	C ₅ D ₅ N	[260]
3-10-23	bryonioside E	C ₃₆ H ₆₀ O ₁₀	C ₅ D ₅ N	[260]
3-10-24	jinfushanoside D	C ₄₂ H ₆₈ O ₁₄	C ₅ D ₅ N	[259]
3-10-25	kuguaglycoside F	C ₄₃ H ₇₂ O ₁₃	C ₅ D ₅ N	[263]
3-10-26	11-dehydroxymogroside III	C ₄₈ H ₈₂ O ₁₈	C ₅ D ₅ N	[266]
3-10-27	11-deoxymogroside III	C ₄₈ H ₈₂ O ₁₈	C ₅ D ₅ N	[264]
3-10-28	11-oxomogroside III	C ₄₈ H ₈₀ O ₁₉	C ₅ D ₅ N	[266]
3-10-29	11-oxomogroside IV A	C ₅₄ H ₉₀ O ₂₄	C ₅ D ₅ N	[264]
3-10-30	7-oxomogroside II E	C ₄₂ H ₇₀ O ₁₅	C ₅ D ₅ N	[264]
3-10-31	mogroside II B	C ₄₂ H ₇₂ O ₁₄	C ₅ D ₅ N	[264]
3-10-32	khekadaengoside M	C ₄₈ H ₈₂ O ₁₈	C ₅ D ₅ N	[257]
3-10-33	khekadaengoside N	C ₄₈ H ₈₀ O ₁₈	C ₅ D ₅ N	[257]
3-10-34	jinfushanoside C	C ₄₂ H ₆₈ O ₁₄	C ₅ D ₅ N	[259]
3-10-35	kuguaglycoside G	C ₄₂ H ₇₀ O ₁₃	C ₅ D ₅ N	[263]
3-10-36	kuguaglycoside H	C ₄₈ H ₈₀ O ₁₈	C ₅ D ₅ N	[263]
3-10-37	kuguaglycoside E	C ₄₂ H ₇₀ O ₁₄	C ₅ D ₅ N	[263]







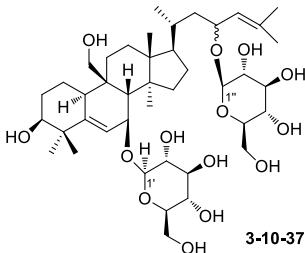
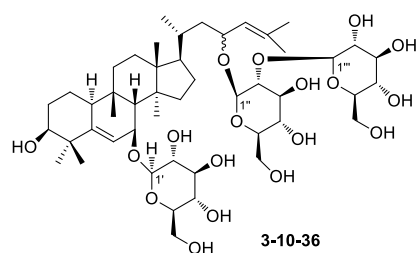
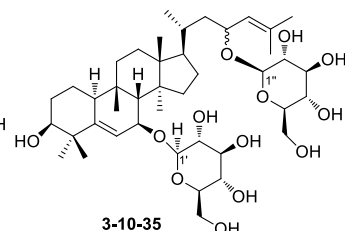
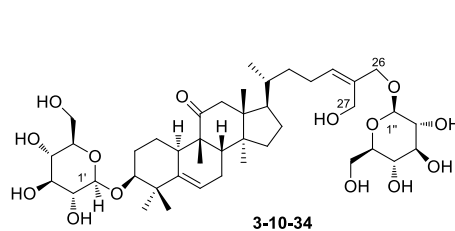
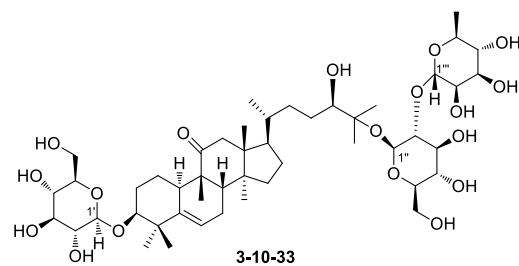
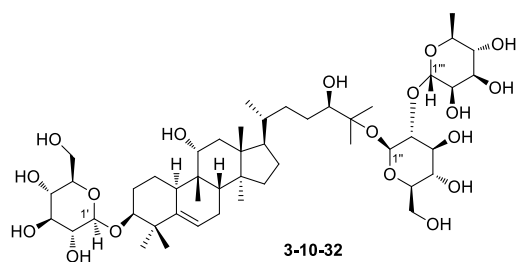
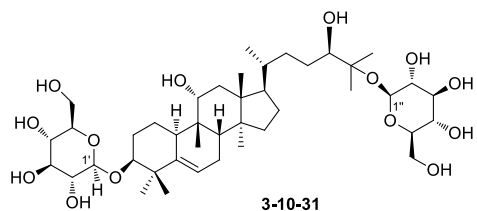


Table 3-10-2: ^1H NMR spectroscopic data of cucurbitane-type saponins **3-10-1~3-10-5**.

H	3-10-1	3-10-2	3-10-3	3-10-4	3-10-5
1	6.44 d(2.4)	6.45 d(2.4)	6.38 d(2.4)	6.35 d(2.2)	6.57 d(2.7)
6	5.63 br s	5.64 br s	5.63 br s	5.63 br s	6.18 br s
7	2.14 m, 1.96 m	2.14 m, 1.98 m	2.12 m, 1.86 m	2.14 m, 1.86 m	4.46 d(3.4)
8	1.96 m	1.98 m	1.92 m	1.92 m	2.56 br s
10	3.66 br s	3.69 br s	3.68 br s	3.67 br s	3.81 br s
12	3.17 d(14.4)	3.23 d(14.7)	3.40 d(15.0)	3.34 d(14.7)	3.35 d(14.9)
	2.85 d(14.4)	2.89 d(14.7)	2.94 d(15.0)	2.90 d(14.7)	2.97 d(14.7)
15	1.96 m	1.98 m	1.86 m	1.86 m	2.19 m
	1.84 d(12.7)	1.82 d(12.7)	1.69 d(12.9)	1.69 d(12.9)	1.90 d(12.9)
16	5.25 t(7.5)	5.31 t(7.3)	4.96 t(7.8)	4.92 t(7.6)	4.94 t(7.8)
17	2.83 d(6.4)	2.85 d(6.6)	2.96 d(6.8)	2.90 d(7.1)	2.97 d(7.3)
18	1.40 s	1.39 s	1.38 s	1.38 s	1.44 s
19	1.54 s	1.55 s	1.54 s	1.51 s	1.54 s
21	1.56 s	1.60 s	1.62 s	1.63 s	1.64 s
22	4.61 d(5.1)	5.15 d(5.6)			
23	6.52 dd(15.6, 5.4)	6.50 dd(15.6, 5.6)	3.47 ddd (15.6, 10.3, 5.1)	3.46 ddd (16.1, 10.5, 5.1)	3.47 ddd (15.6, 10.3, 5.1)
			3.01 ddd (15.6, 10.3, 5.4)	3.26 ddd (16.1, 10.3, 5.1)	3.27 ddd (15.6, 10.3, 5.4)
24	6.38 d(15.6)	6.57 d(15.6)	2.18 m	2.18 m	2.19 m
26	1.50 s	1.50 s	1.36 s	1.35 s	1.37 s
27	1.52 s	1.52 s	1.36 s	1.35 s	1.37 s
28	1.25 s	1.24 s	1.18 s	1.19 s	1.54 s
29	1.27 s	1.24 s	1.36 s	1.24 s	1.34 s
30	1.00 s	1.00 s	0.96 s	0.94 s	1.26 s
1'	5.51 d(7.8)	5.50 d(7.8)	5.51 d(7.8)	5.34 d(7.6)	5.50 d(7.6)
2'	4.22 dd(9.0, 7.6)	4.21 dd(8.5, 8.1)	4.40	—	4.21 dd(9.0, 8.0)
3'	4.30 dd(9.0, 8.8)	4.30 dd(9.0, 8.8)	4.25	—	4.30 dd(8.8, 8.8)
4'	4.47 dd(9.3, 9.3)	4.46 dd(9.3, 9.0)	4.25	—	4.47 dd(9.3, 9.0)
5'	4.06 m	4.05 m	3.92 m	3.84 m	4.07 m
6'	4.70 dd(12.0, 2.0)	4.69 dd(12.0, 2.2)	4.57	—	4.73 dd(12.0, 2.4)
	4.56 dd(12.0, 3.7)	4.55 dd(12.0, 3.4)	4.55		4.57 dd(12.0, 3.4)
1''			6.30 br s	5.91 d(3.7)	
2''			4.74 br d(2.0)	—	
3''			4.40	—	
4''			4.27	—	
5''			4.65 m	—	
6''			1.78 d(6.1)	—	

Table 3-10-3: ^1H NMR spectroscopic data of cucurbitane-type saponins **3-10-6~3-10-10**.

H	3-10-6	3-10-7	3-10-8	3-10-9	3-10-10
1	6.45 d(2.4)	6.11 d(2.7)	6.45 d(2.4)	2.86 dd(3.6, 9.6) 1.97 m	1.57, 1.89
2				2.42 br d(12.0) 2.16 m	1.84, 2.30
3				3.66 br s	3.63 br s
6	5.63 br s	5.96 br s	5.64 br s	5.52 br d(4.4)	5.95 br d (5.8)
7	2.13 m, 1.88 m	α 4.12 br d(ca. 3)	2.14 m, 1.88 m	1.74 br d(4.8)(2H)	1.87, 2.73
8	1.92 m	2.14 br s	1.92 m	1.63 br d(5.9)	1.90
10	3.68 br s	3.68 br s	3.71 br s	1.14 m	2.46
11				4.18 m	
12	3.29 d(14.9)	2.64 d(15.3)	3.39 d(14.2)	2.10 m(2H)	α 2.94 d (14.3)
	2.87 d(14.6)	3.31 d(15.3)	2.93 d(14.4)		β 2.50 d (14.3)
15	1.92 m	α 2.10 m	1.88 m	1.13 m	1.15
	1.69 d(12.7)	β 1.56 d(11.0)	1.67 d(12.2)	1.05 m	1.28
16	5.04 t(7.6)	4.61 br dd(ca. 7, 8)	4.93 t(7.6)	2.16 m, 1.83 m	1.76, 1.83
17	3.02 d(7.1)	2.53 d(7.3)	2.91 d(7.1)	1.58 m	1.72
18	1.40 s	0.93 s	1.41 s	0.83 s	0.74 s
19	1.52 s	1.11 s	1.54 s	1.29 s	1.40 s
20				1.47 m	1.49
21	1.63 s	1.41 s	1.62 s	0.91 d(4.9)	0.93 d(6.4)
22		4.61 d(5.1)		2.86 dd(3.6, 9.6) 1.56 m	1.60 1.78
23	3.64 dd(15.9, 9.5) 3.36 dd(15.9, 1.5)	6.84 d(15.9)	3.32 m 3.09 m	2.34 m 2.16 m	1.33 2.03
24	4.55 dd(9.5, 1.5)	6.98 d(15.9)	2.55 t(8.1)	5.91 t(5.6, 5.7)	3.47 d(7.9)
26	1.48 s	1.57 s	4.82 s, 4.76 s	4.74 s(2H)	1.53 s
27	1.50 s	1.54 s	1.68 s	4.72 s(2H)	1.53 s
28	1.19 s	1.36 s	1.20 s	0.88 s	1.08 s
29	1.27 s	1.29 s	1.27 s	1.17 s	1.51 s
30	1.00 s	1.32 s	1.02 s	1.56 s	0.99 s
OAc		2.00 s(25-OAc)			
1'	5.47 d(7.6)	4.66 d(7.6)	5.46 d(7.3)	4.88 d(6.2)	4.88 d(7.3)
2'	4.21 dd(9.0, 7.8)	3.39 m	4.22 dd(8.8, 7.8)	3.95 m	4.25
3'	4.28 dd(8.8, 8.8)	3.42 m	4.29 dd(8.8, 8.5)	4.27 d(7.2)	4.27
4'	4.46 dd(9.0, 9.0)	3.53 m	4.47 dd(9.3, 9.0)	4.18 m	4.13
5'	4.04 m	3.35 m	4.05 m	3.96 m	3.84
6'	4.69 dd(12.0, 2.4) 4.56 dd(12.0, 3.4)	3.86 dd(12.2, 3.7) 4.05 dd(12.2, 2.4)	4.70 dd(12.2, 1.2) 4.58 dd(11.1, 3.4)	4.51 dd(8.0, 1.6) 4.35 dd(4.0, 8.0)	4.32 4.46
1''					6.67 br s
2''					4.62
3''					4.75
4''					4.28
5''					4.62
6''					1.70 d(6.1)

Table 3-10-4: ^1H NMR spectroscopic data of cucurbitane-type saponins **3-10-11~3-10-15**.

H	3-10-11	3-10-12	3-10-13	3-10-14	3-10-15
1	1.55, 1.83	2.23 m, 1.68 m	—	1.52, 1.92	1.56, 1.90
2	1.83, 2.40	1.80 m, 2.24 m	—	1.80, 2.39	1.83, 2.31
3	3.62 br s	3.54 s	3.73 br s	3.65 br s	3.62 br s
6	5.76 br d(5.9)	5.53 br s	5.45 dd-like	5.53 br d(6.0)	5.97 br d(5.6)
7	1.95, 2.46	1.81 m, 2.24 m	—	1.76, 2.17	1.89, 2.74
8	1.94	1.78 m	1.65 br s	1.80	1.89
10	2.49	2.44 m	—	2.46	2.46
12	α 2.93 d(14.2) β 2.52 d(14.2)	3.00 d(14.1) 2.37 d(14.1)	—	α 2.92 d(14.4) β 2.46 d(14.4)	α 2.92 d(14.6) β 2.48 d(14.6)
15	1.24, 1.33	1.40 m, 1.27 m	—	1.17, 1.27	1.17, 1.30
16	1.84(2H)	1.93 m, 1.27 m	—	1.35, 1.96	1.32, 1.96
17	1.73	1.68 m	—	1.68	1.70
18	0.79 s	0.67 s	1.06 s	0.70 s	0.70 s
19	1.32 s	1.08 s	0.88 s	1.16 s	1.40 s
20	1.50	1.37 m	—	1.40	1.39
21	0.94 d(6.4)	0.87 d(5.1)	1.50 d(6.3)	0.86 d(6.4)	0.85 d(6.1)
22	1.72, 1.83	1.16 m, 1.47 m	4.81 dd-like	1.40, 1.96	1.41, 1.96
23	1.36, 2.04	2.25 m, 2.11 m	5.53 d-like	2.92, 2.98	2.97(2H)
24	3.78 d(7.6)	5.71 t(7.3, 6.9)			
26	1.55 s	4.40 s(2H)	1.72 s	1.58 s	1.57 s
27	1.56 s	4.40 s(2H)	1.63 s	1.58 s	1.58 s
28	1.13 s	0.97 s	0.91 s	1.12 s	1.08 s
29	1.54 s	1.06 s	1.48 s	1.56 s	1.55 s
30	1.01 s	1.41 s	0.80 s	0.96 s	0.97 s
1'	4.88 dt(7.5, 3.5)	4.57 d(6.2)	4.80 d(7.6)	4.88 d(7.8)	4.91 d(7.5)
2'	4.25	3.52 m	—	3.96	4.27
3'	4.26	3.73 d(8.7)	—	4.19	4.30
4'	4.15	3.66 m	—	4.22	4.16
5'	3.86	3.54 m	—	3.96	3.86
6'	4.36, 4.49	4.15 d(9.0) 3.95 dd(5.4, 11.3)	—	4.40, 4.55	4.34, 4.49
1''	6.74 br s		5.17 d(7.6)		6.74 d(7.6)
2''	4.77		—		4.63
3''	4.69		—		4.78
4''	5.91 t(10.0)		—		4.30
5''	4.72		—		4.64
6''	1.50 d(6.1)		—		1.72 d(6.1)
OAc	2.27 s(4''-OAc)				

Table 3-10-5: ^1H NMR spectroscopic data of cucurbitane-type saponins **3-10-16~3-10-20**.

H	3-10-16	3-10-17	3-10-18	3-10-19	3-10-20
1	1.55, 1.93	1.89~1.91 m 1.65~1.68 m	1.66~1.69 m 1.59~1.60 m	1.68~1.71 m 1.59~1.61 m	1.64, 2.07
2	1.31	1.95~1.98 m 1.88~1.91 m	2.01~2.03 m 1.95~1.97 m	2.00~2.03 m 1.96~1.99 m	1.86, 1.95
3	3.57 br s	3.74 br s	3.79 br s	3.59 br s	3.72 br s
6	5.62	6.06 d(4.4)	6.03 d(4.6)	5.99 d(4.8)	5.69 d(5.5)
7	2.44	4.51 br d(5.2)	4.58 br d(4.6)	3.45 br d(5.1)	1.86, 2.33
8	2.79	3.00 br s	2.50 br s	2.14 br s	1.87
10	2.44	2.55~2.57 m	2.41~2.43 m	2.38~2.40 m	2.54
11	1.84, 2.25	2.29~2.33 m 1.59~1.62 m	1.76~1.79 m 1.52~1.54 m	1.74~1.77 m 1.50~1.53 m	
12	1.31, 1.55	1.72~1.75 m 1.53~1.55 m	1.65~1.68 m 1.49~1.52 m	1.62~1.64 m 1.46~1.48 m	2.53, 2.96
15	1.31	1.34~1.37 m	1.32~1.34 m	1.30~1.34 m	1.17, 1.29
16	1.31	1.92~1.94 m 1.40~1.42 m	1.88~1.90 m 1.46~1.48 m	1.84~1.87 m 1.47~1.49 m	1.46, 2.11
17	3.57	1.60 (ov)	1.51 (ov)	1.51 (ov)	1.74
18	1.11 s	1.22 s	0.87 s	0.87 s	0.77 s
19	3.57, 3.80	4.30~4.31 m 3.53~3.55 m	1.41 s	1.18 s	1.27 s
20	1.55	2.14~2.16 m	1.48 (ov)	2.11~2.13 m	1.43
21	0.99 d(5.0)	1.18 d(6.2)	0.96 d(5.2)	1.20 d(6.3)	0.87 d(6.5)
22	1.90, 2.25	2.03~2.05 m 1.24~1.26 m	2.41~2.43 m 1.95~1.96 m	2.03~2.05 m 1.23~1.25 m	1.74, 1.87
23	5.72	4.82~4.84 m	5.62~5.64 m	4.95~4.97 m	1.55, 1.72
24	5.55	5.63 d(8.2)	5.55 d(15.8)	5.63 d(8.7)	3.77 br d(9.6)
26	1.31	1.73 s	1.31 s	1.68 s	1.46 s
27	1.31	1.74 s	1.31 s	1.77 s	1.34 s
28	0.91	1.38 s	1.41 s	1.45 s	1.16 s
29	1.07	1.12 s	1.10 s	1.14 s	1.43 s
30	1.45	0.82 s	0.71 s	0.76 s	0.99 s
OMe	3.20 s(25-OMe)		3.20 s(25-OMe)	3.35 s(7-OMe)	
1'	5.25 d(8.0)	5.07 d(7.8)	5.11 d(7.7)	4.97 d(7.8)	4.90 d(8.2)
2'	3.82	4.06 t-like(8.0)	4.09~4.11 m	4.02~4.04 m	4.04
3'	4.60	4.31~4.33 m	4.34~4.36 m	4.22~4.24 m	4.17
4'	4.10 d(8.5)	4.28~4.30 m	4.29~4.31 m	4.20~4.22 m	3.97
5'	4.39	4.00~4.02 m	4.04~4.06 m	3.88~3.90 m	4.16
6'	4.33, 4.43	4.59 br d(10.2) 4.40 dd(5.3, 11.8)	4.65 br d(10.6) 4.46 dd(5.1, 11.6)	4.47 d(9.7) 4.33~4.35 m	3.96, 4.97
1''					4.85 d(7.9)
2''					4.06
3''					4.24
4''					4.26
5''					3.90
6''					4.38, 4.50

Table 3-10-6: ^1H NMR spectroscopic data of cucurbitane-type saponins 3-10-21~3-10-25.

H	3-10-21	3-10-22	3-10-23	3-10-24	3-10-25
1	α 1.61, β 2.08	1.64, 2.07	1.65, 2.09	2.09 m, 1.66 m	—
2	α 1.88, β 1.70	1.86, 1.96	1.87, 1.99	1.96 m, 1.12 m	—
3	3.72 brs(7.2)	3.73 br s	3.73 br s	3.74 br s	3.64 br s
6	5.52 d(5.2)	5.71 d(5.7)	5.58 br d(5.4)	5.72 br d(4.2)	5.91 d(4.9)
7	α 2.25, β 1.82	1.87, 2.34	1.81, 2.30	1.87 m, 1.67 m	3.38 d(5.0)
8	1.97	1.89	1.86	1.87 m	2.14 (ov)
10	2.55	2.55	2.56	2.57 m	2.30~2.31 m
12	α 3.07, β 2.51	α 2.99 d(14.2) β 2.55 d(14.2)	α 3.04 d(14.0) β 2.61 d(14.0)	3.00 d(11.3) 1.67 d(11.3)	—
15	α 1.30, β 1.37	1.18, 1.33	1.15, 1.31	1.21 m, 1.32 m	—
16	α 2.31, β 1.92	1.37, 2.03	1.52, 2.32	1.96 m, 1.23 m	—
17	2.29	1.75	2.02	1.67 m	1.58 (ov)
18	1.23 s	0.75 s	0.78 s	0.74 s	0.91 s
19	1.26 s	1.28 s	1.27 s	1.27 s	1.09 s
20		1.45	2.06	1.37 m	2.18 (ov)
21	1.45 s	0.94 d(6.4)	1.22 d(6.1)	0.86 d(5.1)	1.19 d(6.1)
22	1.99 d(8.7) 2.55 d(8.6)	1.20, 1.95	4.63 br d(10.1)	1.52 m, 1.12 m	—
23	1.87, 2.08	1.55, 1.71	1.85, 1.97	2.30 m, 2.10 m	4.97~4.99 m
24	3.93 d(8.0)	4.03 dd(3.7, 4.2)	4.73 br d(10.1)	5.84 t(5.7, 5.5)	5.63 d(8.7)
26	1.46 s	1.56 s	1.61 s	4.90 m, 4.68 m	1.61 s
27	1.35 s	1.56 s	1.65 s	4.67 s(2H)	1.76 s
28	1.15 s	1.44 s	1.43 s	1.03 s	1.55 s
29	1.43 s	1.16 s	1.16 s	1.18 s	1.07 s
30	1.10 s	1.05 s	1.03 s	1.46 s	0.69 s
OMe					3.27 s(7-OMe)
1'	4.99 d(7.9)	5.25 d(7.8)	5.22 d(8.0)	4.98 d(4.7)	5.32 d(7.9)
2'	4.01 dd(7.9, 8.0)	4.06	4.03	4.08 m	—
3'	4.20 dd(7.9, 8.0)	4.25	4.17	4.26 m	—
4'	4.18 dd(7.9, 8.0)	4.25	4.18	4.27 m	—
5'	3.95 m	3.98	3.85	4.10 m	—
6'	4.51 dd(5.5, 9.8) 4.31 d(9.8)	4.37 4.53	4.32 4.49	4.90 m(2H)	—
1''				5.11 d(6.2)	4.99 d(7.8)
2''				4.08 m	—
3''				4.19 m	—
4''				4.26 m	—
5''				3.95 br s	—
6''				4.54 dd(1.6, 9.4) (2H)	—

Table 3-10-7: ^1H NMR spectroscopic data of cucurbitane-type saponins **3-10-26~3-10-30**.

H	3-10-26	3-10-27	3-10-28	3-10-29	3-10-30
1	α 1.58, β 1.95	1.49, 1.83	α 1.60, β 1.96	1.63, 1.94	2.10, 3.02
2	α 1.91, β 1.72	1.92, 2.47	α 1.91, β 1.71	1.92, 2.47	2.09, 2.43
3	3.68 br s(5.8)	3.68 br s	3.61 br s(5.8)	3.69 br s	3.79 br s
6	5.48 d(5.5)	5.48 br d(5.8)	5.53 d(5.5)	5.51 d(5.8)	6.29 s
7	α 2.02, β 1.66	1.70, 2.24	α 2.20, β 1.75	1.76, 2.17	
8	1.68	1.65	1.79	1.79	2.54 s
10	2.25	2.26	2.46	2.41	3.21
11	1.69 m	1.36, 1.59			4.13 dd(6.2, 10.6)
12	1.39	1.42, 1.56	α 2.89, β 2.49	2.49, 2.91	2.10(2H)
15	1.20	1.10, 1.17	α 1.13, β 1.28	1.15, 1.26	1.17, 1.69
16	α 1.92, β 1.80	1.44, 2.02	α 1.92, β 1.82	1.45, 2.09	1.46, 2.02
17	1.56	1.55	1.63	1.73	1.65
18	0.86 s	0.85 s	0.75 s	0.74 s	0.92 s
19	0.87 s	0.87 s	1.16 s	1.18 s	1.27 s
20	1.47	1.52	1.45	1.43	1.50
21	0.94 d(5.5)	0.94 d(6.2)	0.86 d(6.7)	0.86 d(6.5)	0.96 d(6.5)
22	1.75	1.75, 1.90	1.69	1.74, 1.88	1.82, 1.89
23	2.55	1.72, 1.77	2.36	1.53, 1.73	1.69, 1.81
24	3.77 d(9.8)	3.78 br d(10.0)	3.75 d(9.1)	3.76 br d(10.0)	3.86 br d(8.6)
26	1.45 s	1.45 s	1.44 s	1.45 s	1.46 s
27	1.34 s	1.34 s	1.33 s	1.33 s	1.40 s
28	1.11 s	1.11 s	1.12 s	1.08 s	1.23 s
29	1.53 s	1.53 s	1.54 s	1.51 s	1.57 s
30	0.76 s	0.75 s	0.93 s	0.92 s	0.88 s
1'	4.89 d(7.9)	4.88 d(7.9)	4.88 d(7.3)	4.81 d(7.5)	4.88 d(7.9)
2'	4.02 (ov)	3.96	4.02 (ov)	3.91	3.97
3'	4.16 (ov)	4.20	4.17 (ov)	4.13	4.20
4'	4.20 (ov)	4.18	4.23 (ov)	4.01	4.19
5'	4.18 (ov)	3.95	4.16 (ov)	4.07	3.93
6'	4.54, 4.34	4.38, 4.56	4.30, 4.47	4.31, 4.81	4.36, 4.52
1''	4.87 d(8.0)	4.91 d(7.9)	4.94 d(7.9)	5.14 d(7.9)	4.99 d(7.9)
2''	4.04 (ov)	4.04	4.03 (ov)	4.04	4.03
3''	4.18 (ov)	4.17	4.15 (ov)	4.24	4.20
4''	4.20 (ov)	3.97	4.16 (ov)	4.24	4.19
5''	3.96 (ov)	4.16	3.92 (ov)	3.96	4.00
6''	3.97, 4.88	3.95, 4.96	3.98, 4.86	4.37, 4.53	4.32, 4.54
1'''	4.83 d(8.0)	4.85 d(7.6)	4.84 d(8.2)	4.89 d(7.5)	
2'''	4.06 (ov)	4.06	4.01 (ov)	4.04	
3'''	4.22 (ov)	4.25	4.18 (ov)	4.15	
4'''	4.23 (ov)	4.24	4.20 (ov)	3.96	
5'''	4.16 (ov)	3.91	4.15 (ov)	4.16	
6'''	4.36, 4.56	4.36, 4.49	4.33, 4.52	3.96, 4.97	
1''''				4.85 d(7.5)	
2''''				4.06	
3''''				4.25	
4''''				4.25	
5''''				3.91	
6''''				4.37, 4.50	

Table 3-10-8: ^1H NMR spectroscopic data of cucurbitane-type saponins **3-10-31**–**3-10-34**.

H	3-10-31	3-10-32	3-10-33	3-10-34
1	2.00, 2.92	–	–	2.48 d(11.3), 1.92 m
2	2.03, 2.42	–	–	2.41 d(8.7), 1.93 m
3	3.67 br s	3.65 br s	3.65 br s	3.65 s
6	5.50 br d(5.7)	5.47 br d(4.6)	4.49 br d(4.6)	5.55 br d(3.6)
7	1.69, 2.34	–	–	1.81 m, 2.13 m
8	1.66 br d(7.7)	–	–	1.81 br d(6.6)
10	2.79 br d(11.2)	–	–	2.48 m
11	4.15	–	–	–
12	2.09, 2.12	–	–	2.93 d(11.3), 2.48 d(11.3)
15	1.17, 1.07	–	–	1.27 br d(8.3)
16	1.55, 1.99	–	–	1.95 m, 1.25 m
17	1.67	–	–	1.64 m
18	0.91 s	0.89 s	0.72 s	0.72 s
19	1.32 s	1.29 s	1.51 s	1.16 s
20	1.53	–	–	1.34 m
21	1.01 d(6.3)	1.00 d(6.8)	0.91 d(6.1)	0.85 d(5.0)
22	1.66, 1.72	–	–	1.49 m, 2.13 m
23	1.56, 1.72	–	–	2.27 m, 2.13 m
24	4.03 br d(8.3)	–	–	5.82 t(5.7, 5.7)
26	1.53 s	1.56 s	1.57 s	4.91 d(9.6), 4.65 d(9.6)
27	1.53 s	1.57 s	1.58 s	4.68 s(2H)
28	1.15 s	1.22 s	1.12 s	0.97 s
29	1.55 s	1.53 s	1.51 s	1.33 s
30	0.92 s	0.87 s	0.94 s	1.57 s
1'	4.89 d(8.0)	4.85 d(7.8)	4.83 d(7.8)	4.84 d(6.2)
2'	3.94	3.92	3.92	3.94 m
3'	4.18	4.20	4.20	4.22 m
4'	4.17	4.08 dd(9.3, 8.8)	4.09 dd(9.5, 8.5)	4.20 m
5'	3.93	3.83	3.83	3.94 m
6'	4.33, 4.49	4.43 dd(12.0, 2.2)	4.44 dd(12.0, 2.2)	4.53 m
		4.33 dd(12.0, 4.9)	4.34	4.35 dd(9.3, 4.2)
1''	5.21 d(7.7)	5.10 d(7.1)	5.10 d(7.3)	5.01 d(6.2)
2''	4.02	4.20	4.20	4.08 br t(6.2, 7.0)
3''	4.23	4.20	4.20	4.22 m
4''	4.20	4.20	4.20	4.20 m
5''	3.93	3.83	3.83	3.94 m
6''	4.36, 4.50	4.48 dd(12.0, 2.7)	4.50 dd(12.0, 2.7)	4.35 m, 4.53 m
		4.20	4.20	–
1'''		6.43 d(1.0)	6.43 br s	–
2'''		4.76 d(1.7)	4.76 d(1.2)	–
3'''		4.61 dd(9.0, 3.4)	4.61 dd(9.0, 3.4)	–
4'''		4.28	4.29	–
5'''		4.82 m	4.85 m	–
6'''		1.71 d(6.3)	1.71 d(6.1)	–

Table 3-10-9: ^1H NMR spectroscopic data of cucurbitane-type saponins **3-10-35**~**3-10-37**.

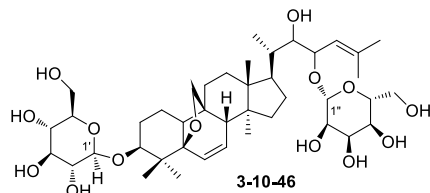
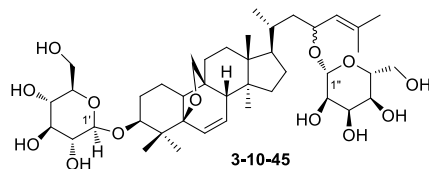
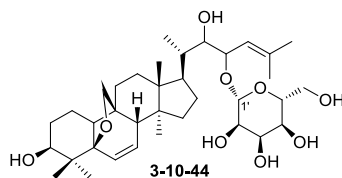
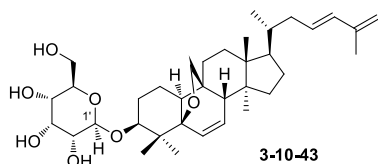
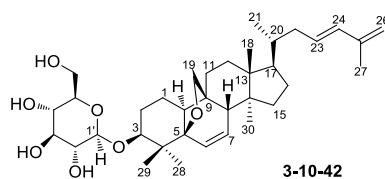
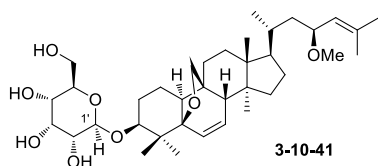
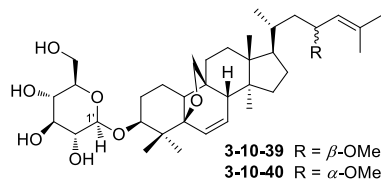
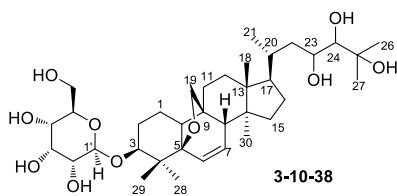
H	3-10-35	3-10-36	3-10-37
3	3.78 br s	3.79 br s	3.76 br s
6	6.01 d(5.0)	6.01 d(5.0)	6.01 d(5.1)
7	4.52 d(5.2)	4.58 d(5.1)	4.49 d(5.3)
8	2.46 br s	2.47 br s	3.07 br s
10	2.41 (ov)	2.41~2.42 m	2.56~2.57 m
17	1.54 (ov)	1.53 (ov)	1.58 (ov)
18	0.94 s	0.99 s	1.11 s
19	1.36 s	1.34 s	α 4.31~4.33 m β 3.53~3.55 m
20	2.17 (ov)	2.16 (ov)	2.19 (ov)
21	1.17 d(6.1)	1.16 d(6.4)	1.18 (ov)
23	4.92~4.94 m	4.85~4.87 m	4.91~4.93 m
24	5.62 d(8.4)	5.63 d(8.1)	5.62 d(8.6)
26	1.67 s	1.64 s	1.67 s
27	1.76 s	1.71 s	1.74 s
28	1.41 s	1.43 s	1.36 s
29	1.10 s	1.10 s	1.18 s
30	0.70 s	0.68 s	0.77 s
1'	5.02 d(7.7)	5.11 d(7.7)	5.08 d(7.7)
1''	4.96 d(7.8)	4.95 d(7.5)	4.97 d(7.8)
1'''		5.50 d(7.7)	

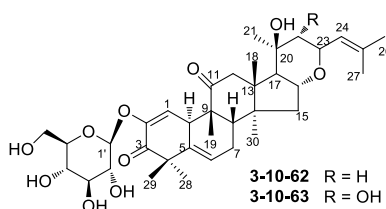
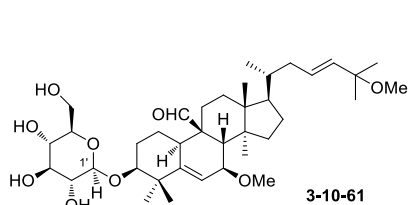
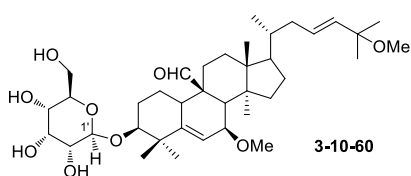
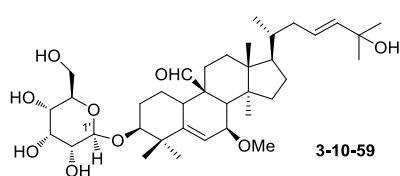
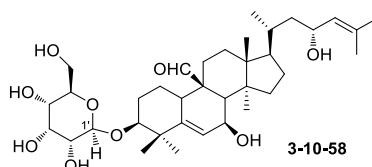
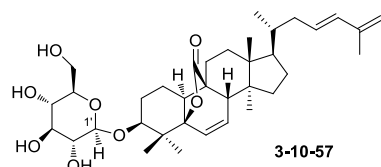
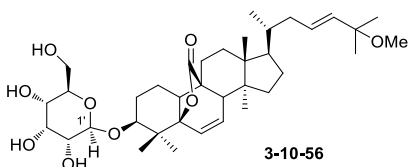
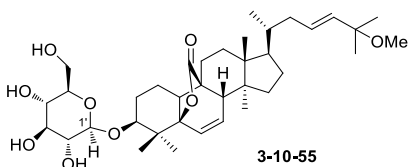
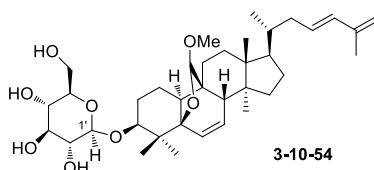
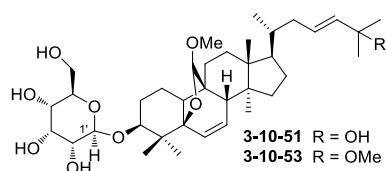
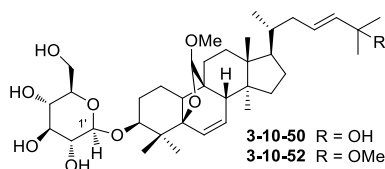
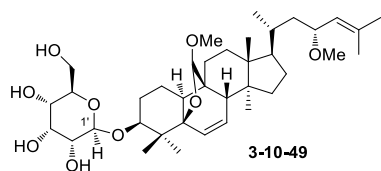
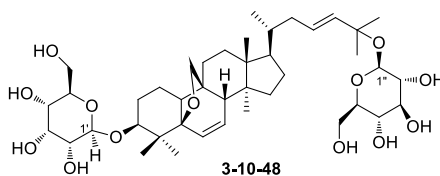
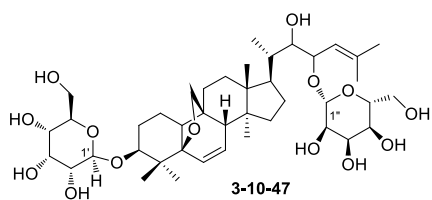
Table 3-10-10: Cos, MFs, and TSs of cucurbitane-type saponins **3-10-38**~**3-10-67**.

No.	Compounds	MFs	Test solvents	References
3-10-38	karaviloside XI	$\text{C}_{36}\text{H}_{60}\text{O}_{10}$	$\text{C}_5\text{D}_5\text{N}$	[267]
3-10-39	karaviloside VII	$\text{C}_{37}\text{H}_{60}\text{O}_8$	$\text{C}_5\text{D}_5\text{N}$	[267]
3-10-40	charantoside V	$\text{C}_{37}\text{H}_{60}\text{O}_8$	$\text{C}_5\text{D}_5\text{N}$	[268]
3-10-41	charantoside VI	$\text{C}_{37}\text{H}_{60}\text{O}_8$	$\text{C}_5\text{D}_5\text{N}$	[268]
3-10-42	charantoside III	$\text{C}_{36}\text{H}_{56}\text{O}_7$	$\text{C}_5\text{D}_5\text{N}$	[268]
3-10-43	charantoside IV	$\text{C}_{36}\text{H}_{56}\text{O}_7$	$\text{C}_5\text{D}_5\text{N}$	[268]
3-10-44	karaviloside VIII	$\text{C}_{36}\text{H}_{58}\text{O}_9$	$\text{C}_5\text{D}_5\text{N}$	[267]
3-10-45	goyaglycoside-f	$\text{C}_{42}\text{H}_{68}\text{O}_{13}$	$\text{C}_5\text{D}_5\text{N}$	[261]
3-10-46	karaviloside IX	$\text{C}_{42}\text{H}_{68}\text{O}_{14}$	$\text{C}_5\text{D}_5\text{N}$	[267]
3-10-47	karaviloside X	$\text{C}_{42}\text{H}_{68}\text{O}_{14}$	$\text{C}_5\text{D}_5\text{N}$	[267]
3-10-48	goyaglycoside-e	$\text{C}_{42}\text{H}_{68}\text{O}_{13}$	$\text{C}_5\text{D}_5\text{N}$	[261]
3-10-49	charantoside II	$\text{C}_{38}\text{H}_{62}\text{O}_9$	$\text{C}_5\text{D}_5\text{N}$	[268]
3-10-50	goyaglycoside-a	$\text{C}_{37}\text{H}_{60}\text{O}_9$	$\text{C}_5\text{D}_5\text{N}$	[261]
3-10-51	goyaglycoside-b	$\text{C}_{37}\text{H}_{60}\text{O}_9$	$\text{C}_5\text{D}_5\text{N}$	[261]
3-10-52	goyaglycoside-c	$\text{C}_{38}\text{H}_{62}\text{O}_9$	$\text{C}_5\text{D}_5\text{N}$	[261]

Table 3-10-10 (continued)

No.	Compounds	MFs	Test solvents	References
3-10-53	goyaglycoside-d	C ₃₈ H ₆₂ O ₉	C ₅ D ₅ N	[261]
3-10-54	charantoside I	C ₃₇ H ₅₈ O ₈	C ₅ D ₅ N	[268]
3-10-55	karaviloside VI	C ₃₇ H ₅₈ O ₉	C ₅ D ₅ N	[267]
3-10-56	charantoside C	C ₃₇ H ₅₈ O ₉	CDCl ₃	[269]
3-10-57	charantoside VII	C ₃₆ H ₅₄ O ₈	C ₅ D ₅ N	[268]
3-10-58	charantoside B	C ₃₆ H ₅₈ O ₉	C ₅ D ₅ N	[269]
3-10-59	charantoside A	C ₃₇ H ₆₀ O ₉	C ₅ D ₅ N	[269]
3-10-60	7β,25-dimethoxycucurbita-5(6),23(E)-dien-19-al 3-O-β-D-allopyranoside	C ₃₈ H ₆₂ O ₉	C ₅ D ₅ N	[262]
3-10-61	charantoside VIII	C ₃₈ H ₆₂ O ₉	C ₅ D ₅ N	[268]
3-10-62	kekadaengoside G	C ₃₆ H ₅₂ O ₁₀	C ₅ D ₅ N	[257]
3-10-63	kekadaengoside I	C ₃₆ H ₅₂ O ₁₁	C ₅ D ₅ N	[257]
3-10-64	kekadaengoside J	C ₄₂ H ₆₄ O ₁₆	C ₅ D ₅ N	[257]
3-10-65	kekadaengoside H	C ₃₆ H ₅₂ O ₁₀	C ₅ D ₅ N	[257]
3-10-66	Aoibaclyin	C ₃₆ H ₅₂ O ₁₀	CDCl ₃	[270]
3-10-67	colocynthoside B	C ₄₂ H ₆₂ O ₁₅	C ₅ D ₅ N	[258]





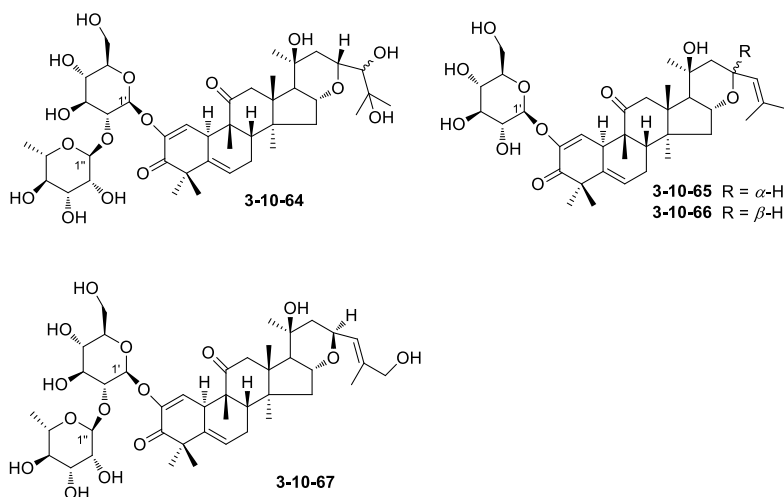


Table 3-10-11: ^1H NMR spectroscopic data of cucurbitane-type saponins **3-10-38**, **3-10-39**, and **3-10-44~3-10-46**.

H	3-10-38	3-10-39	3-10-44	3-10-45	3-10-46
3	3.65 br s	3.69 br s	3.51 br s	3.69 br s	3.65 br s
6	6.18 d(9.5)	6.21 d-like	6.14 d(9.9)	6.19 d(9.2)	6.19 d(9.6)
7	5.55 dd(3.9, 9.5)	5.57 dd(4.0, 9.8)	5.62 dd(3.6, 9.9)	5.61 dd-like	5.54 m
8	—	—	—	2.31 br s	—
18	0.79 s	0.80 s	0.77 s	0.79 s	0.74 s
19	3.58 d(7.9)	3.59 d(8.0)	3.55 d(8.3)	3.61 ABq(8.2)	3.58 d(7.9)
	3.76 d(7.9)	3.73 d(8.0)	3.74 d(8.3)	3.67 ABq(8.2)	3.73 d(7.9)
20	—	—	—	—	—
21	1.12 d(6.4)	1.06 d(6.4)	1.16 d(6.9)	1.12 d(6.3)	1.14 d(6.9)
22	—	—	4.02 dd(2.2, 7.9)	—	4.01 dd-like
23	4.53 ddd-like	3.96 m	4.64 t-like	—	4.68 t-like
24	3.52 d-like	5.23 d-like	5.51 m	5.56 d-like	5.54 m
26	1.61 s	1.71 s	1.64 s	1.68 s	1.63 s
27	1.63 s	1.75 s	1.85 s	1.71 s	1.83 s
28	1.46 s	1.52 s	1.35 s	1.49 s	1.48 s
29	0.89 s	0.93 s	0.89 s	0.92 s	0.91 s
30	0.88 s	0.90 s	0.87 s	0.89 s	0.88 s
OMe	—	3.30 s(23-OMe)	—	—	—
1'	5.37 d(7.9)	4.90 d(7.6)	5.53 d(7.9)	4.87 d(7.6)	4.84 d(7.6)
1''	—	—	—	5.34 d(7.9)	5.54 d(7.9)

Table 3-10-12: ^1H NMR spectroscopic data of cucurbitane-type saponins **3-10-40~3-10-43** and **3-10-49**.

H	3-10-40	3-10-41	3-10-42	3-10-43	3-10-49
1 α	1.35	1.35	1.34	1.34	1.44
1 β	1.77	1.77	1.77	1.78	1.90
2 α	1.78	1.78	1.78	1.80	1.74
2 β	2.37	2.34	2.33	2.33	2.13 dq(13.1, 3.7)
3	3.70 br s	3.65 br s	3.71 br s	3.66 br s	3.70 br s
6	6.20 dd(2.0, 9.6)	6.19 d(9.6)	6.21 dd(2.0, 9.6)	6.20 dd(2.1, 9.6)	6.15 dd(2.4, 9.6)
7	5.56 dd(3.8, 9.6)	5.56 dd(3.8, 9.6)	5.58 dd(3.8, 9.6)	5.58 dd(3.5, 9.6)	5.61 dd(3.8, 9.6)
8	2.31	2.31 br s	2.32	2.34	3.13 br s
10	2.29	2.29	2.28	2.31	2.47 dd(5.8, 12.7)
11 α	1.62	1.64	1.63	1.62	1.76
11 β	1.34	1.34	1.33	1.33	1.67
12 α	1.61	1.61	1.56	1.54	1.66
12 β	1.52	1.51	1.45	1.46	1.61
15 α	1.26	1.27	1.28	1.30	α 1.30(2H)
15 β	1.19	1.20	1.21	1.22	
16 α	1.95	1.98	1.94	1.95	1.96
16 β	1.43	1.35	1.32	1.32	1.43
17	1.45	1.53	1.47	1.47	1.48
18	0.79 s	0.78 s	0.78 s	0.78 s	0.95 s
19 α	3.59 d(7.9)	3.58 d(8.3)	3.61 d(8.0)	3.61 d(8.3)	4.88 s
19 β	3.73 d(7.9)	3.75 d(8.3)	3.74 d(8.0)	3.77 d(8.3)	
20	1.92	1.55	1.49	1.51	1.94
21	1.05 d(6.5)	1.04 d(5.5)	0.93 d(5.8)	0.94 d(6.2)	1.08 d(6.2)
22	1.05, 1.85	1.57, 1.72	1.84, 2.31	1.84, 2.30	1.07, 1.86
23	4.13 dt(9.9, 3.1)	4.11 dt(8.9, 5.1)	5.77 ddd (6.2, 6.8, 14.8)	5.78 ddd (6.2, 8.1, 15.1)	4.13 dt(9.0, 3.1)
24	5.22 dt(8.6, 1.4)	5.16 br d(8.9)	6.31 d(14.8)	6.31 d(15.1)	5.22 d(9.0)
26	1.75 d(1.1)	1.75 s	4.98 s, 5.03 s	4.98 s, 5.04 s	1.74 br s
27	1.71 d(1.0)	1.73 s	1.92 s	1.92 s	1.71 br s
28	0.93 s	0.89 s	0.93 s	0.90 s	0.82 s
29	1.53 s	1.47 s	1.54 s	1.48 s	1.44 s
30	0.89 s	0.86 s	0.87 s	0.87 s	0.93 s
OMe	3.30 s(23-OMe)	3.30 s(23-OMe)			3.48 s(C-19) 3.28 s(C-23)
1'	4.91 d(7.9)	5.38 d(7.9)	4.92 d(7.9)	5.40 d(7.9)	5.46 d(7.6)
2'	3.99 t(7.9)	3.92 dd(2.7, 7.9)	4.00 t(7.9)	3.94 dd(2.4, 7.9)	3.88 dd(2.0, 7.6)
3'	4.23 t(9.0)	4.68 t(2.7)	4.22 t(8.9)	4.69 t(2.4)	4.71 t(2.0)
4'	4.19 t(9.0)	4.17 br dd(2.4, 9.2)	4.20 t(8.9)	4.18 br d(9.6)	4.18 dd(2.0, 9.7)
5'	3.97 ddd (3.1, 5.5, 8.2)	4.45	3.98	4.46	4.45
6'	4.40 dd(5.5, 11.7) 4.57 dd(2.4, 11.7)	4.37 dd(5.1, 11.7) 4.52 dd(2.4, 11.7)	4.41 dd(5.5, 11.7) 4.57 br d(11.7)	4.38 dd(5.1, 11.7) 4.53 br d(11.7)	4.37 dd(4.8, 11.3) 4.52 dd(2.0, 11.3)

Table 3-10-13: ^1H NMR spectroscopic data of cucurbitane-type saponins **3-10-47**, **3-10-48**, and **3-10-50~3-10-52**.

H	3-10-47	3-10-48	3-10-50	3-10-51	3-10-52
3	3.62 br s	3.64 br s	3.73 br s	3.70 br s	3.73 br s
6	6.18 d(9.8)	6.18 d(9.9)	6.16 dd(2.0, 9.6)	6.15 dd(2.0, 9.6)	6.17 dd(1.7, 9.6)
7	5.77 dd(3.6, 9.8)	5.56 dd(3.3, 9.9)	5.62 dd(3.6, 9.6)	5.61 dd(3.3, 9.6)	5.65 m
8	—	2.31 br s	3.12 dd-like	3.13 dd-like	3.13 dd-like
18	0.75 s	0.77 s	0.90 s	0.90 s	0.92 s
19	3.59 d(8.3)	3.65 ABq(7.9)	4.84 s	4.88 s	4.85 s
	3.76 d(8.3)	3.71 ABq(7.9)			
21	1.15 d(7.0)	0.98 d(5.6)	0.97 d(5.3)	0.98 d(5.3)	
22	4.01 dd-like	—	—	—	—
23	4.63 t-like	5.79 ddd-like	5.92 m	5.92 m	5.65 m
24	5.52 d(10.2)	6.01 d(15.8)	5.92 m	5.92 m	5.55 d(15.8)
26	1.63 s	1.54 s	1.54 s	1.54 s	1.33 s
27	1.85 s	1.60 s	1.54 s	1.54 s	1.33 s
28	1.45 s	1.45 s	1.47 s	1.44 s	1.48 s
29	0.89 s	0.90 s	0.86 s	0.83 s	0.86 s
30	0.89 s	0.89 s	0.89 s	0.89 s	0.92 s
OMe			3.44 s(19-OMe)	3.50 s(19-OMe)	3.44 s(19-OMe) 3.22 s(25-OMe)
1'	5.34 d(7.9)	5.35 d(8.5)	4.95 d(7.6)	5.44 d(7.6)	4.95 d(7.6)
1''	5.56 d(7.9)	4.98 d(7.6)			

Table 3-10-14: ^1H NMR spectroscopic data of cucurbitane-type saponins **3-10-53~3-10-57**.

H	3-10-53	3-10-54	3-10-55	3-10-56	3-10-57
1	—	α 1.44, β 1.90	—	1.54 (ov)	α 1.47, β 1.70
2	—	α 1.78 β 2.18 dq(13.5, 3.5)	—	1.75 m	α 1.77 β 2.46 dd(13.0, 3.5)
3	3.69 br s	3.75 br s	3.67 br s	3.48 br s	3.68 br s
6	6.15 dd(1.8, 9.8)	6.18 dd(2.4, 9.6)	5.65 m	6.20 d(9.6)	6.33 dd(2.0, 9.7)
7	5.62 dd(3.7, 9.7)	5.63 dd(3.5, 9.6)	6.33 dd(2.1, 9.5)	5.69 dd(3.6, 9.6)	5.63 dd(3.1, 9.7)
8	3.14 dd-like	β 3.13 br s	—	2.04 br s	β 2.57 t(2.0)
10	—	α 2.47 dd(5.9, 12.7)	—	2.62 dd(6.6, 13.2)	α 2.67 dd (5.5, 12.4)
11	—	α 1.74, β 1.63	—	1.70 (ov)	α 1.71 β 2.41 dt(5.5, 15.2)
12	—	α 1.61, β 1.52	—	1.30 (ov) 1.69 (ov)	α 1.51, β 1.58
15	—	$\alpha\beta$ 1.31(2H)	—	1.35 m	α 1.28, β 1.20
16	—	α 1.94, β 1.31	—	1.05 (ov)	α 1.91, β 1.30

Table 3-10-14 (continued)

H	3-10-53	3-10-54	3-10-55	3-10-56	3-10-57
17	—	α 1.51	—	1.49 m	α 1.49
18	0.93 s	0.90 s	0.89 s	0.92 s	0.87 s
19	4.89 s	4.86 s			
20	—	1.50	—	1.55 m	1.48
21	0.99 d(5.4)	0.95 d(5.8)	0.95 d-like	0.91 d(6.6)	0.92 d(5.8)
22	—	1.84	—	1.79 (ov)	1.81
		2.30 br dd(5.8, 13.4)		2.18 dd(3.6, 13.8)	2.28 br dd(6.2, 13.4)
23	5.66 ddd (5.6, 8.6, 15.8)	5.77 ddd (5.8, 8.2, 15.1)	5.65 m	5.51 m	5.76 ddd (6.2, 8.6, 15.1)
24	5.55 d(15.8)	6.31 d(15.1)	5.57 d(15.9)	5.40 d(16.2)	6.30 d(15.1)
26	1.33 s	4.98 s	1.33 s	1.24 s	4.98 br s
		5.03 s			5.03 br s
27	1.33 s	1.92 s	1.33 s	1.24 s	1.91 s
28	1.44 s	0.86 s	1.58 s	0.92 s	0.94 s
29	0.83 s	1.50 s	0.94 s	1.24 s	1.60 s
30	0.93 s	0.90 s	0.83 s	0.83 s	0.82 s
OMe	3.50 s(19-OMe) 3.22 s(25-OMe)	3.45 s(19-OMe)	3.22 s(25-OMe)	3.15 s(25-OMe)	
1'	5.43 d(7.7)	4.99 d(7.9)	4.83 d(7.9)	4.72 d(7.8)	4.86 d(7.9)
2'	—	4.00 t(7.9)	—	3.42 dd(3.0, 7.8)	3.97 dd(7.9, 8.9)
3'	—	4.26 t(8.9)	—	4.23 t(3.0)	4.20 t(8.9)
4'	—	4.22 t(8.9)	—	3.57 dd(3.0, 9.6)	4.13 t(8.9)
5'	—	3.99	—	3.67 m	3.95
6'	—	4.42 dd(4.4, 11.3)	—	3.75 dd(5.4, 10.8)	4.38 dd(5.5, 12.1)
		4.59 br d(11.3)		3.89 dd(4.2, 10.8)	4.56 dd(2.4, 12.1)

Table 3-10-15: ^1H NMR spectroscopic data of cucurbitane-type saponins 3-10-58~3-10-62.

H	3-10-58	3-10-59	3-10-60	3-10-61	3-10-62
1	1.41 d(5.4), 2.38 (ov)	1.41 d(5.4), 2.36 (ov)	1.54, 1.91	α 1.57, β 1.82	6.44 d(2.4)
2	1.88 m	2.10 dd(3.6, 13.8)	1.89, 2.46	α 1.92 β 2.44 dq(13.2, 2.6)	
3	3.50 br s	3.54 br s	3.68 br s	3.74 br s	
6	5.83 d(4.2)	5.92 d(4.2)	6.05 d(5.0)	6.07 d(4.9)	5.62 br s
7	3.98 d(4.2)	3.53 d(4.2)	3.47 d(5.5)	3.48 br d(5.4)	2.10 m
					1.85 m
8	1.90 br s	1.55 br s	2.18 s	β 2.19 s	1.96 m
10	2.56 dd(4.8, 12.6)	1.56 (ov)	2.56	α 2.57	3.65 br s

Table 3-10-15 (continued)

H	3-10-58	3-10-59	3-10-60	3-10-61	3-10-62
11	1.55 (ov)	1.56 (ov)	1.91, 2.58	α 1.44, β 2.59	
12	1.22 d(2.4), 1.67 (ov)	1.68 m	1.56	α 1.58, β 1.52	3.25 d(14.9)
					2.77 d(14.9)
15	1.35 m	1.39 m	1.33	α 1.34, β 1.14	1.85 m
					1.67 dd(14.2, 3.2)
16	2.05 (ov)	2.05 (ov)	—	α 1.94, β 1.33	4.84 td(10.3, 3.5)
17	1.49 m	1.52 m	1.49	α 1.55	2.12 d(9.5)
18	0.90 s	0.96 s	0.93 s	0.94 s	1.24 s
19	9.80 s	9.72 s	10.24 s	10.21 s	1.64 s
20	1.71 m	2.60 m	1.53	1.53	
21	0.96 d(6.6)	0.95 d(6.6)	0.98 d(5.0)	0.98 d(5.4)	1.49 s
22	1.61 m	1.73 (ov)	1.84	1.85	1.96 m, 1.63
		2.15 dd(3.6, 13.8)	2.24 dd(5.3, 13.0)	2.24 br d(5.4, 13.5)	
23	4.39 dt (2.4, 8.4)	5.58 (ov)	5.65 ddd (5.3, 8.5, 15.8)	5.65	4.95 m
24	5.13 d(8.4)	5.58 (ov)	5.56 d(15.8)	5.57 d(15.7)	5.42 d(9.3)
26	1.66 s	1.26 s	1.34 s	1.72 s	1.60 s
27	1.63 s	1.26 s	1.34 s	1.34 s	1.39 s
28	1.05 s	1.09 s	1.10 s	1.14 s	1.24 s
29	1.27 s	1.32 s	1.59 s	1.34 s	1.39 s
30	0.78 s	0.82 s	0.76 s	0.78 s	1.01 s
OMe		3.26 s(7-OMe)	3.20 s(7-OMe) 3.23 s(25-OMe)	3.20 s(7-OMe) 3.23 s(25-OMe)	
1'	4.61 d(7.8)	4.66 d(7.8)	5.32 d(8.0)	4.86 d(8.3)	5.44 d(7.8)
2'	3.22 dd(3.0, 7.8)	3.29 dd(3.0, 7.8)	3.84 br d(6.5)	3.87 t(8.3)	4.20 dd(8.3, 8.3)
3'	4.10 t(3.0)	4.03 t(3.0)	4.66 br s	4.20 t(8.9)	4.28 dd(8.8, 8.8)
4'	3.42 dd(3.0, 9.6)	3.46 dd(3.0, 9.6)	4.15 br d(7.5)	4.15 t(8.9)	4.46 dd(9.0, 9.0)
5'	3.60 m	3.64 m	4.46 m	3.94	4.04 m
6'	3.61 m	3.63 m	4.51 br d(11.5)	4.36 dd(5.1, 11.7)	4.68 br d(12.0)
	3.78 d(8.4)	3.80 d(8.4)	4.35 dd(5.0, 11.5)	4.54 dd(2.4, 11.7)	4.56 dd(12.0, 3.2)

Table 3-10-16: ^1H NMR spectroscopic data of cucurbitane-type saponins 3-10-63~3-10-67.

H	3-10-63	3-10-64	3-10-65	3-10-66	3-10-67
1	6.48 d(2.5)	6.37 d(2.4)	6.44 d(2.2)	6.27 d(2.4)	6.41 d(2.4)
6	5.59 br s	5.63 br s	5.62 br s	5.77 br s	5.64 dd(2.4, 2.4)
7	1.78 m, 2.10 m	1.85 m, 2.07 m	1.85 m, 2.06 m	2.01 m 2.34 br d(11.6)	α 1.91 m, β 2.07 m
8	1.95 m	1.95 m	1.95 m	2.03 m	1.97 br d(ca. 8)

Table 3-10-16 (continued)

H	3-10-63	3-10-64	3-10-65	3-10-66	3-10-67
10	3.65 br s	3.63 br s	3.65 br s	3.43 br s	3.65 br s
12	3.32 d(14.7)	3.34 d(14.9)	3.26 d(14.9)	2.57 d(15.0)	2.82 d(15.0)
	2.80 d(14.7)	2.80 d(14.7)	2.16 d(14.9)	3.04 d(15.0)	3.35 d(15.0)
15	1.90 m	1.92 m	1.88 m	1.53 dd ^①	α 1.97 m
	1.74 dd(13.4, 3.2)	1.60 dd(12.7, 3.1)	1.63 dd(14.2, 2.9)	1.83 (ov)	β 1.65 dd(3.1, 13.2)
16	4.96 td(10.3, 3.2)	4.57 m	5.07 td(9.5, 2.5)	4.38 dt ^①	5.10 ddd (3.1, 9.5, 10.1)
17	2.99 d(9.8)	2.20 d(9.5)	2.16 d(9.3)	1.90 d(9.8)	2.19 d(9.5)
18	1.30 s	1.21 s	1.25 s	0.90 s	1.25 s
19	1.68 s	1.39 s	1.66 s	0.93 s	0.98 s
21	1.78 s	1.48 s	1.48 s	1.30 s	1.51 s
22	3.53 br s	2.44 d(13.9)	1.73 d(13.7)	1.40 m	1.80 m, 2.02 m
		2.00 m	1.95 m		
23	5.22 d(8.3)	4.98 m	4.89 dd(7.6, 7.3)	4.52 m	5.02 br dd(ca. 7, 8)
24	6.02 d(8.0)	4.40 m	6.53 d(8.3)	5.12 d(8.2)	6.97 dd(1.2, 8.2)
26	1.62 s	1.58 s	1.65 s	1.67 s	4.29 br s(2H)
27	1.37 s	1.54 s	1.40 s	1.69 s	1.86 s
28	1.20 s	1.38 s	1.24 s	1.27 s	1.40 s
29	1.45 s	1.39 s	1.41 s	1.21 s	1.36 s
30	1.03 s	0.95 s	0.99 s	1.27 s	1.43 s
1'	5.47 d(7.6)	5.50 d(7.8)	5.45 d(7.6)	4.68 d(7.9)	5.52 d(7.9)
2'	4.22 dd(8.8, 7.8)	4.34 dd(9.3, 9.0)	4.21 dd(8.5, 8.1)	3.31 dd ^①	4.26 dd(7.9, 8.9)
3'	4.29 dd(9.0, 8.8)	4.42	4.28 dd(9.0, 8.8)	3.60 (ov)	4.44 m
4'	4.48 dd(9.3, 9.0)	4.26	4.46 dd(9.3, 9.0)	3.56 (ov)	4.33 dd(9.2, 9.5)
5'	4.05 m	3.93 m	4.04 m	3.40 (ov)	3.94 m
6'	4.70 dd(12.2, 2.4)	4.57	4.68 dd(12.2, 2.2)	3.92 br d(10.4)	4.42 dd(4.6, 11.9)
	4.57 dd(12.2, 3.4)	4.44	4.55 dd(12.0, 3.2)	4.07 br d(11.0)	4.56 dd(2.5, 11.9)
1''		6.29 br s			6.29 d(1.5)
2''		4.76 br d(2.0)			4.74 dd(1.5, 3.4)
3''		4.42			4.47 dd(3.4, 9.2)
4''		4.26			4.28 m
5''		4.63 m			4.70 m
6''		1.79 d(6.1)			1.80 d(6.1)

^① Unresolved.

Bibliography

- [257] Kanchanapoom T, Kasai R, Yamasaki K. *Phytochemistry*. 2002;59:215.
 [258] Yoshikawa M, Morikawa T, Kobayashi H et al. *Chem Pharm Bull*. 2007;55(3):428.
 [259] Chen JC, Niu XM, Li ZR et al. *Planta Med*. 2005;71:983.
 [260] Ukiya M, Ashihisa T, Yasukawa K et al. *J Nat Prod*. 2002;65(2):179.
 [261] Murakami T, Emoto A, Matsuda H et al. *Chem Pharm Bull*. 2001;49(1):54.
 [262] Liu Y, Ali Z, Khan IA. *Planta Med*. 2008;74:1291.

- [263] Chen JC, Lu L, Zhang XM et al. *Helv Chim Acta*. 2008;91:920.
- [264] Akihisa T, Hayakawa Y, Tokuda H et al. *J Nat Prod*. 2007;70(5):783.
- [265] Li DP, Ikeda T, Matsuoka N et al. *Chem Pharm Bull*. 2006;54(10):1425.
- [266] Li DP, Ikeda T, Nohara T et al. *Chem Pharm Bull*. 2007;55(7):1082.
- [267] Matsuda H, Nakamura S, Murakami T et al. *Heterocycles*. 2007;71(2):331.
- [268] Akihisa T, Higo N, Tokuda H et al. *J Nat Prod*. 2007;70(8):1233.
- [269] Nhiem NX, Kiem PV, Minh CV et al. *Chem Pharm Bull*. 2010;58(5):720.
- [270] Sekine T, Kurihara H, Waku M et al. *Chem Pharm Bull*. 2002;50(5):645.

3.11 Steroidal Saponins

Table 3-11-1: Cos, MFs, and TSs of steroidal saponins 3-11-1~3-11-55.

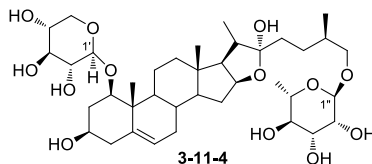
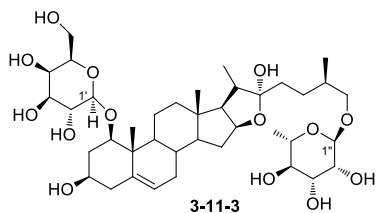
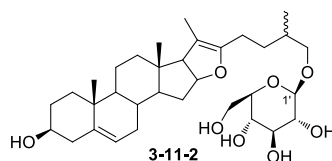
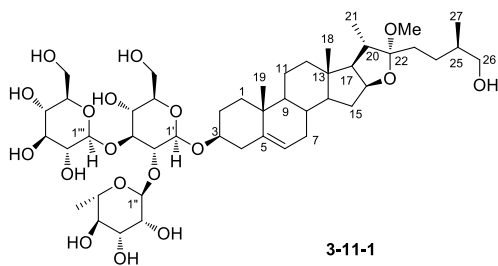
No.	Compounds	MFs	Test solvents	References
3-11-1	icogenin 1	C ₄₆ H ₇₆ O ₁₈	C ₅ D ₅ N	[271]
3-11-2	26- <i>O</i> - β -D-glucopyranosyl-furost-5(6),20(22)-dien-3 β ,26-diol	C ₃₃ H ₅₂ O ₈	CD ₃ OD	[272]
3-11-3	tropeoside A1	C ₃₉ H ₆₄ O ₁₄	CD ₃ OD	[273]
3-11-4	tropeoside B1	C ₃₈ H ₆₂ O ₁₃	CD ₃ OD	[273]
3-11-5	namonin E	C ₅₁ H ₈₀ O ₂₂	C ₅ D ₅ N	[274]
3-11-6	26-[(β -D-glucopyranosyl)oxy]-3 β -hydroxy-22 α -methoxyfurosta-5,25(27)-diene-1 β -yl- <i>O</i> - β -D-apipfuranosyl-(1 $\rightarrow$ 3)- α -L-rhamnopyranosyl-(1 $\rightarrow$ 2)- <i>O</i> -[β -D-xylopyranosyl-(1 $\rightarrow$ 3)]- α -L-arabinopyranoside	C ₅₅ H ₈₈ O ₂₆	C ₅ D ₅ N	[275]
3-11-7	atropurosides F	C ₃₉ H ₆₂ O ₁₆	C ₅ D ₅ N	[276]
3-11-8	atropurosides G	C ₃₉ H ₆₂ O ₁₅	C ₅ D ₅ N	[276]
3-11-9	neoprotodioscin	C ₅₁ H ₈₆ O ₂₂	C ₅ D ₅ N	[277]
3-11-10	borivilianoside A	C ₅₆ H ₉₄ O ₂₇	C ₅ D ₅ N	[278]
3-11-11	(25S)-3 β ,5 β ,22 α -furostane-3,22,26-triol-3- <i>O</i> - β -D-xylopyranosyl-(1 $\rightarrow$ 2)-[β -D-xylopyranosyl-(1 $\rightarrow$ 4)]- β -D-glucopyranosyl-26- <i>O</i> - β -D-glucopyranoside	C ₄₉ H ₈₂ O ₂₂	C ₅ D ₅ N	[279]
3-11-12	(25S)-3 β ,5 β ,22 α -furostane-3,22,26-triol-3- <i>O</i> - α -L-rhamnopyranosyl-(1 $\rightarrow$ 2)- β -D-glucopyranosyl-(1 $\rightarrow$ 2)- β -D-glucopyranosyl-26- <i>O</i> - β -D-glucopyranoside	C ₅₁ H ₈₆ O ₂₃	C ₅ D ₅ N	[280]
3-11-13	elephanoside B	C ₅₁ H ₈₆ O ₂₄	C ₅ D ₅ N	[281]
3-11-14	shatavarin I	C ₅₁ H ₈₆ O ₂₃	C ₅ D ₅ N	[282]
3-11-15	26- <i>O</i> - β -D-glucopyranosyl-22 α -methoxy-(25 <i>R</i>)-furostan-3 β ,26-diol-3- <i>O</i> -[β -D-glucopyranosyl-(1 $\rightarrow$ 2)- β -D-glucopyranoside]	C ₄₆ H ₇₈ O ₁₉	C ₅ D ₅ N	[283]
3-11-16	borivilianoside B	C ₅₇ H ₉₆ O ₂₇	C ₅ D ₅ N	[278]
3-11-17	borivilianoside C	C ₅₇ H ₉₆ O ₂₈	C ₅ D ₅ N	[278]
3-11-18	(25S)-3 β ,5 β ,22 α -22-methoxyfurostane-3,26-diol-3- <i>O</i> - β -D-xylopyranosyl-(1 $\rightarrow$ 2)-[β -D-xylopyranosyl-(1 $\rightarrow$ 4)]- β -D-glucopyranosyl-26- <i>O</i> - β -D-glucopyranoside	C ₅₀ H ₈₄ O ₂₂	C ₅ D ₅ N	[279]
3-11-19	(25S)-3 β ,5 β ,22 α -22-methoxyfurostane-3,26-diol-3- <i>O</i> - β -D-xylopyranosyl-(1 $\rightarrow$ 2)- β -D-glucopyranosyl-26- <i>O</i> - β -D-glucopyranoside	C ₄₅ H ₇₆ O ₁₈	C ₅ D ₅ N	[279]
3-11-20	pentandrosides F	C ₅₇ H ₉₆ O ₃₀	CD ₃ OD	[284]
3-11-21	trigoneosides Xa	C ₄₅ H ₇₆ O ₁₉	C ₅ D ₅ N	[285]
3-11-22	trigoneosides Xb	C ₄₅ H ₇₆ O ₁₉	C ₅ D ₅ N	[285]
3-11-23	trigoneosides Xlb	C ₄₄ H ₇₄ O ₁₉	C ₅ D ₅ N	[285]

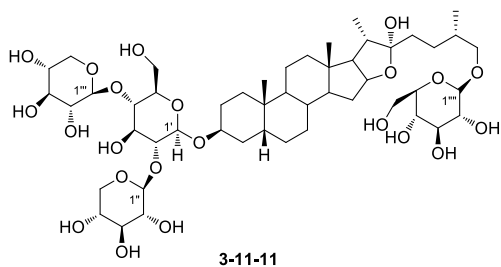
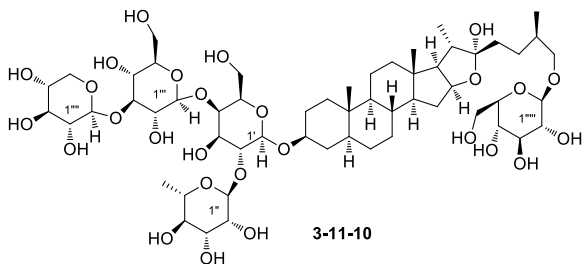
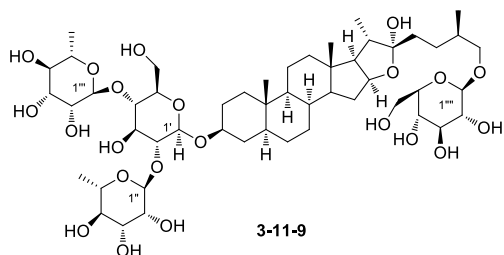
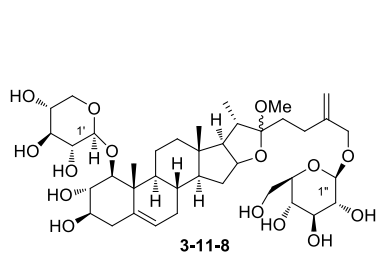
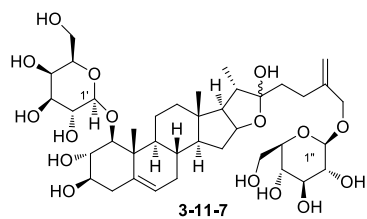
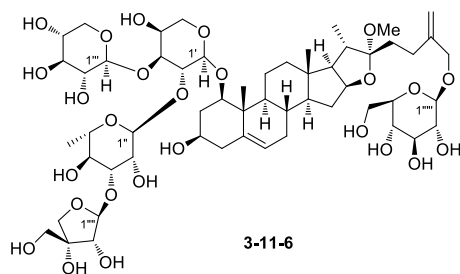
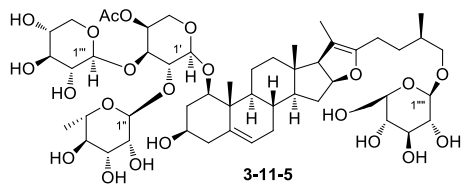
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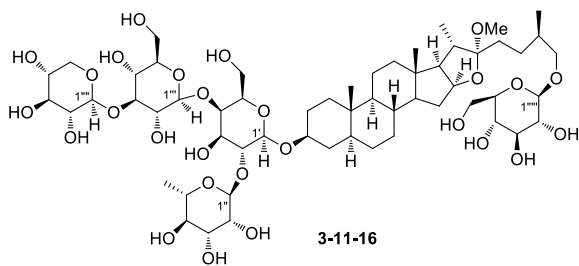
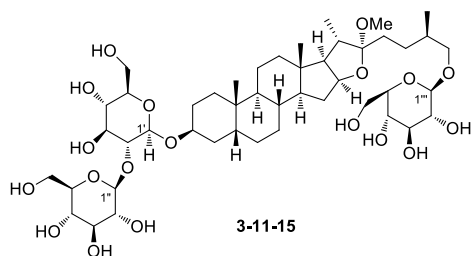
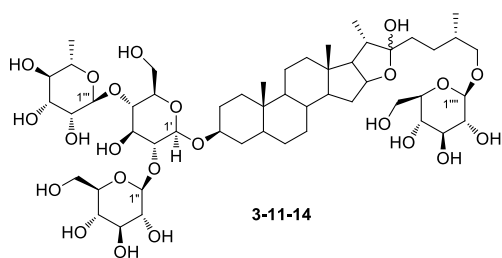
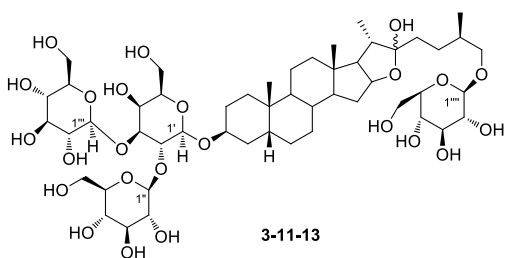
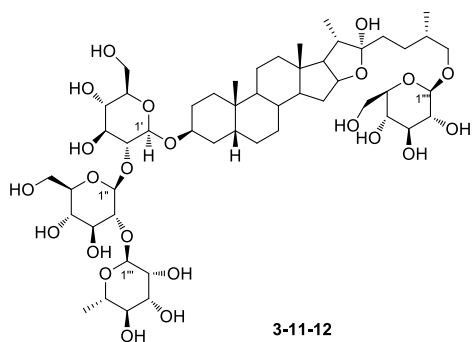
No.	Compounds	MFs	Test solvents	References
3-11-24	26- <i>O</i> - β -D-glucopyranosyl-(25 <i>S</i>)-5 α -furostan-22-methoxy-2 α ,3 β ,26-triol-3- <i>O</i> - β -D-glucopyranosyl(1 $\rightarrow$ 2)- β -D-glucopyranosyl(1 $\rightarrow$ 4)- β -D-galactopyranoside	C ₅₂ H ₈₈ O ₂₅	C ₅ D ₅ N	[286]
3-11-25	elephanoside E	C ₄₅ H ₇₆ O ₂₀	C ₅ D ₅ N	[281]
3-11-26	elephanoside F	C ₅₁ H ₈₆ O ₂₅	C ₅ D ₅ N	[281]
3-11-27	trigoneoside XIIa	C ₄₅ H ₇₄ O ₁₈	C ₅ D ₅ N	[285]
3-11-28	trigoneoside XIIb	C ₄₅ H ₇₄ O ₁₈	C ₅ D ₅ N	[285]
3-11-29	parisyunnanoside A	C ₅₀ H ₈₂ O ₂₃	C ₅ D ₅ N	[287]
3-11-30	26- <i>O</i> - β -D-glucopyranosyl(25 <i>R</i>)-furost-5-ene-3 β ,22 α ,26-triol-3- <i>O</i> - α -L-rhamnopyranosyl-(1 $\rightarrow$ 4)- β -D-glucopyranosyl-(1 $\rightarrow$ 4)-[α -L-rhamnopyranosyl-(1 $\rightarrow$ 2)]- β -D-glucopyranoside	C ₅₇ H ₉₂ O ₂₆	C ₅ D ₅ N	[288]
3-11-31	smilaciniside C	C ₄₅ H ₇₄ O ₁₈	C ₅ D ₅ N	[289]
3-11-32	(25 <i>S</i>)-26- <i>O</i> -(β -D-glucopyranosyl)-furost-5-ene-3 β ,22 α ,26-triol-3- <i>O</i> - β -D-glucopyranosyl-(1 $\rightarrow$ 2)- β -D-glucopyranosyl-(1 $\rightarrow$ 4)- β -D-glucopyranoside	C ₅₁ H ₈₄ O ₂₄	C ₅ D ₅ N	[290]
3-11-33	26- <i>O</i> - β -D-glucopyranosyl-22-methoxy-3 β ,26-dihydroxy-(25 <i>R</i>)-furost-5-ene-3- <i>O</i> - α -L-rhamnopyranosyl-(1 $\rightarrow$ 4)- α -L-rhamnopyranosyl-(1 $\rightarrow$ 4)-[α -L-rhamnopyranosyl-(1 $\rightarrow$ 2)]- β -D-glucopyranoside	C ₅₈ H ₉₆ O ₂₆	C ₅ D ₅ N	[291]
3-11-34	(25 <i>R</i>)-26-[(α -L-rhamnopyranosyl)oxy]-22 α -methoxyfurost-5-ene-3 β -yl- <i>O</i> - β -D-glucopyranosyl-(1 $\rightarrow$ 3)- <i>O</i> -[6-acetyl- β -D-glucopyranosyl-(1 $\rightarrow$ 3)]- <i>O</i> - β -D-glucopyranoside	C ₅₄ H ₈₈ O ₂₄	CD ₃ OD	[292]
3-11-35	borivilianoside D	C ₅₆ H ₉₂ O ₂₇	C ₅ D ₅ N	[278]
3-11-36	tuberoside A	C ₄₅ H ₇₄ O ₁₈	C ₅ D ₅ N	[293]
3-11-37	tuberoside B	C ₅₁ H ₈₄ O ₂₂	C ₅ D ₅ N	[293]
3-11-38	26- <i>O</i> - β -D-glucopyranosyl-22 α -hydroxy-5 β -furost-25(27)-ene-1 β ,3 β ,6 β ,26-tetraol-3- <i>O</i> - β -D-galactopyranoside	C ₃₉ H ₆₄ O ₁₆	C ₅ D ₅ N	[294]
3-11-39	ceparoside C	C ₅₁ H ₈₂ O ₂₂	C ₅ D ₅ N	[295]
3-11-40	ceparoside D	C ₅₁ H ₈₂ O ₂₂	C ₅ D ₅ N	[295]
3-11-41	parisyunnanoside B	C ₅₀ H ₈₀ O ₂₁	C ₅ D ₅ N	[287]
3-11-42	smilaxchinoside A	C ₅₁ H ₈₂ O ₂₂	C ₅ D ₅ N	[296]
3-11-43	smilaxchinoside B	C ₅₇ H ₉₂ O ₂₆	C ₅ D ₅ N	[296]
3-11-44	smilaxchinoside C	C ₄₅ H ₇₂ O ₁₈	C ₅ D ₅ N	[296]
3-11-45	26-[(β -D-glucopyranosyl)oxy]-22 α -methoxyfurosta-5,25(27)-diene-3 β -yl- <i>O</i> - β -D-glucopyranosyl-(1 $\rightarrow$ 6)- <i>O</i> -[α -L-rhamnopyranosyl-(1 $\rightarrow$ 2)]- β -D-glucopyranoside	C ₅₂ H ₈₄ O ₂₃	C ₅ D ₅ N	[275]

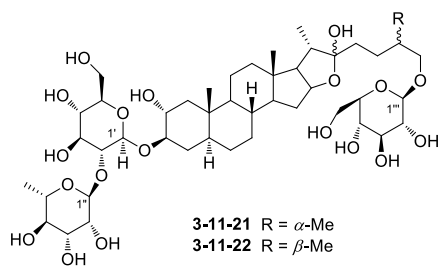
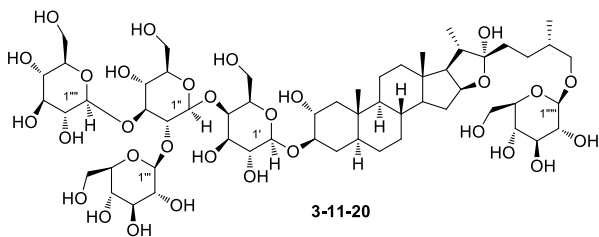
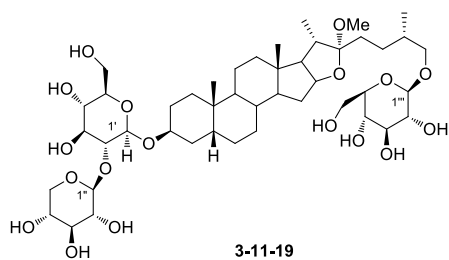
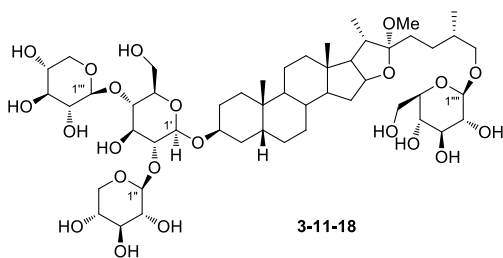
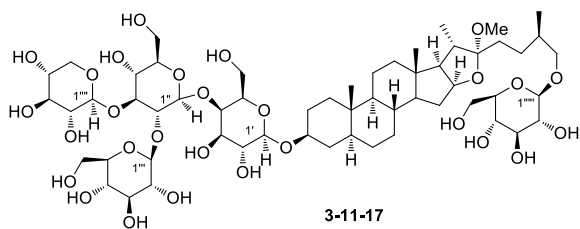
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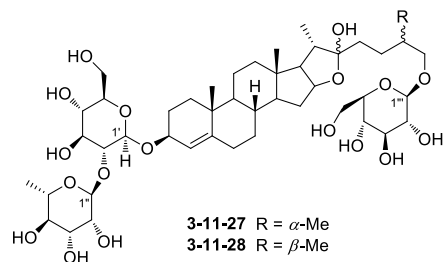
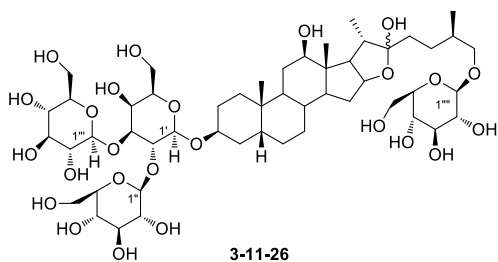
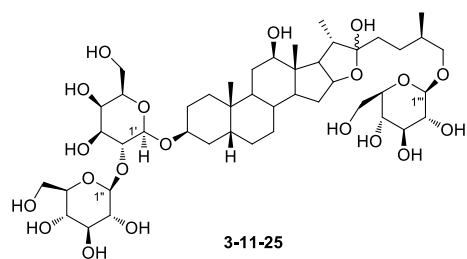
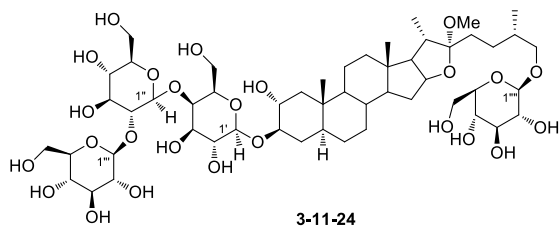
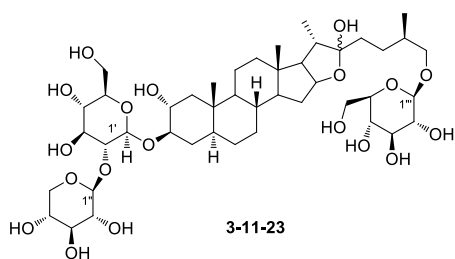
No.	Compounds	MFs	Test solvents	References
3-11-46	26- <i>O</i> - β -D-glucopyranosyl-(25 <i>R</i>)-5 α -furostan-12-one-3 β ,22 α ,26-triol-3- <i>O</i> - β -D-glucopyranosyl(1 $\rightarrow$ 2)- β -D-glucopyranosyl(1 $\rightarrow$ 4)- β -D-galactopyranoside	C ₅₁ H ₈₄ O ₂₅	C ₅ D ₅ N	[286]
3-11-47	elephanoside C	C ₅₁ H ₈₄ O ₂₅	C ₅ D ₅ N	[281]
3-11-48	elephanoside D	C ₄₅ H ₇₄ O ₂₀	C ₅ D ₅ N	[281]
3-11-49	26- <i>O</i> - β -D-glucopyranosyl-3- <i>O</i> -[{ β -D-xylopyranosyl(1 $\rightarrow$ 3)}{ β -D-galactopyranosyl(1 $\rightarrow$ 2)}]- β -D-glucopyranosyl(1 $\rightarrow$ 4)- β -D-glucopyranosyl]-5 α -furostan-12-one-3 β ,22,26-triol	C ₅₆ H ₉₂ O ₂₉	C ₅ D ₅ N	[297]
3-11-50	26- <i>O</i> - β -D-glucopyranosyl-3- <i>O</i> -[{ β -D-xylopyranosyl(1 $\rightarrow$ 3)}{ β -D-galactopyranosyl(1 $\rightarrow$ 2)}]- β -D-glucopyranosyl(1 $\rightarrow$ 4)- β -D-glucopyranosyl]-5 α -furost-20(22)-en-12-one-3 β ,26-diol	C ₅₆ H ₉₀ O ₂₈	C ₅ D ₅ N	[297]
3-11-51	smilaxchinoside D	C ₄₅ H ₇₂ O ₁₈	C ₅ D ₅ N	[296]
3-11-52	3- <i>O</i> -[α -L-rhamnopyranosyl-(1 $\rightarrow$ 2)]- [β -D-glucopyranosyl(1 $\rightarrow$ 3)]- β -D-glucopyranosyl-26- <i>O</i> - β -D-glucopyranosyl cholest-5-ene-16,22-dione	C ₅₁ H ₈₂ O ₂₃	C ₅ D ₅ N	[298]
3-11-53	dioscoreside A	C ₅₁ H ₈₂ O ₂₄	C ₅ D ₅ N	[299]
3-11-54	dioscoreside B	C ₅₁ H ₈₂ O ₂₄	C ₅ D ₅ N	[299]
3-11-55	namonin F	C ₄₄ H ₆₈ O ₁₉	C ₅ D ₅ N	[274]

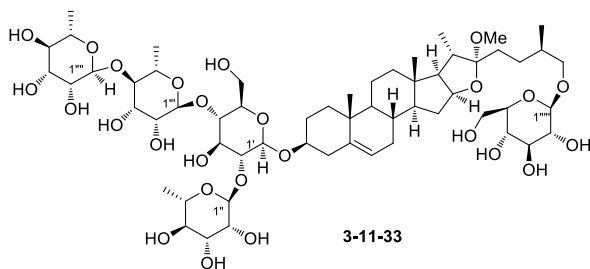
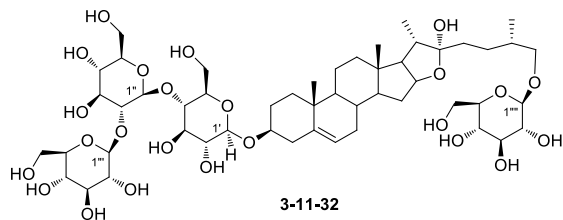
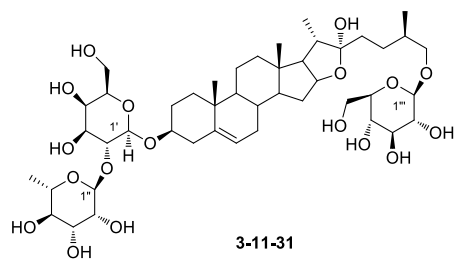
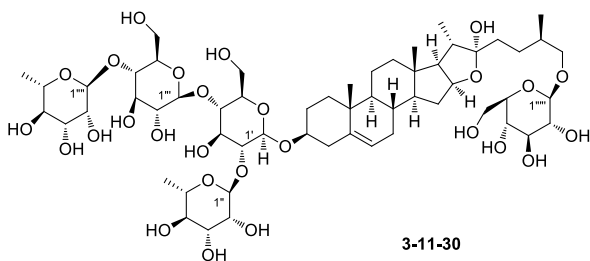
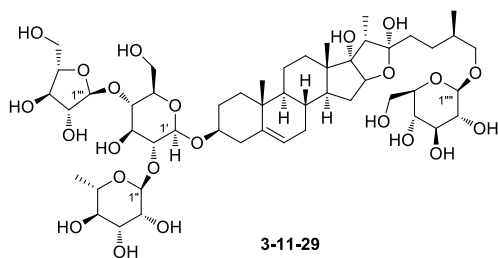


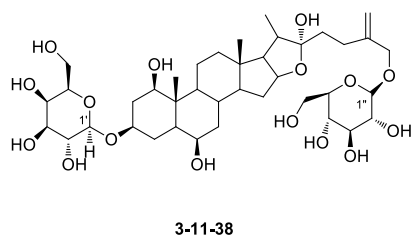
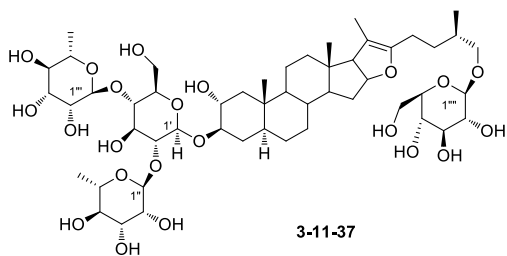
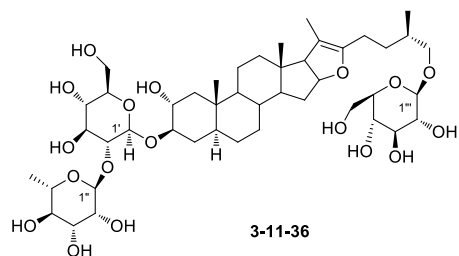
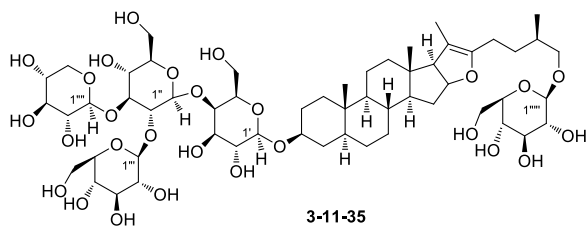
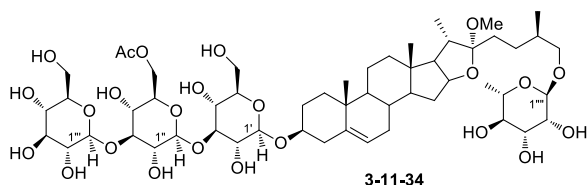


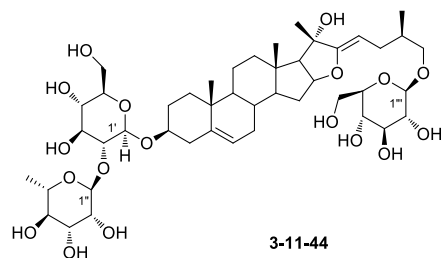
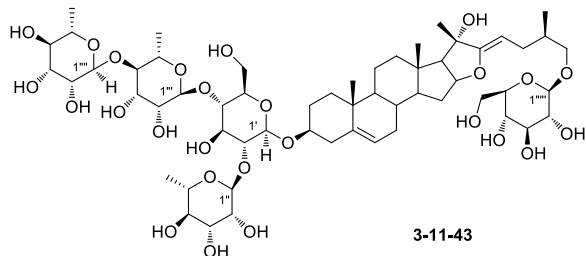
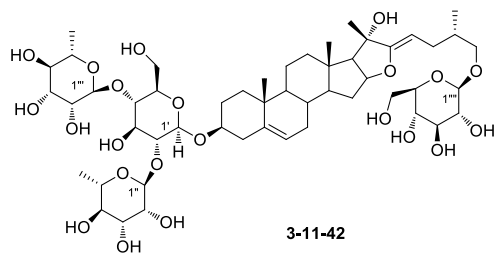
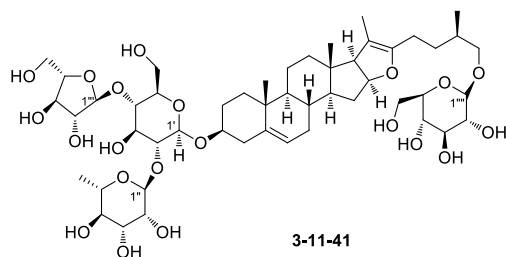
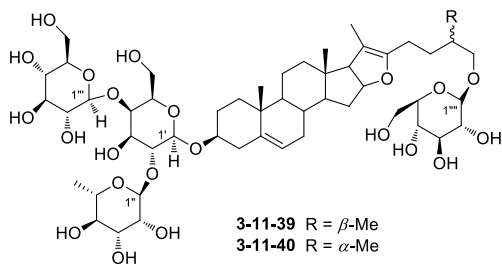


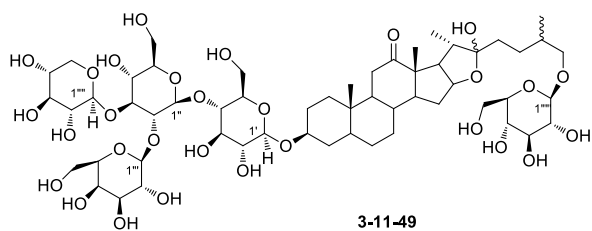
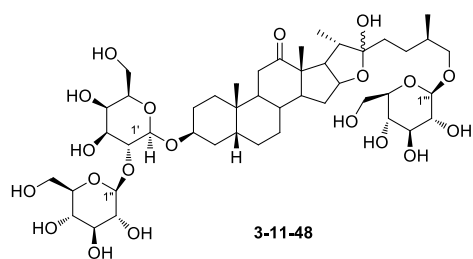
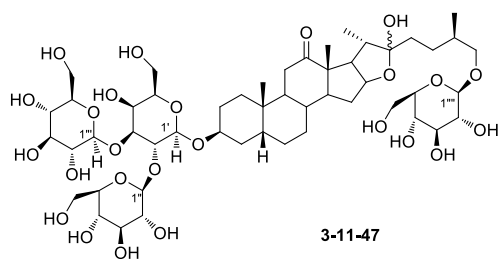
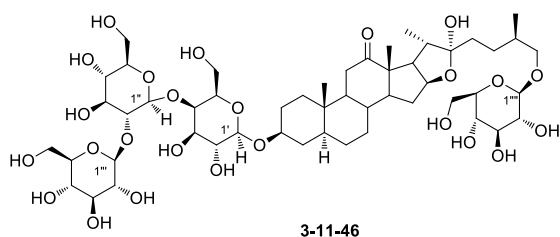
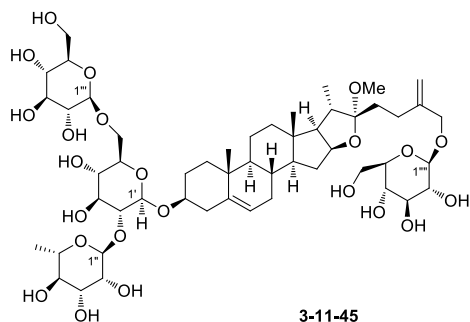


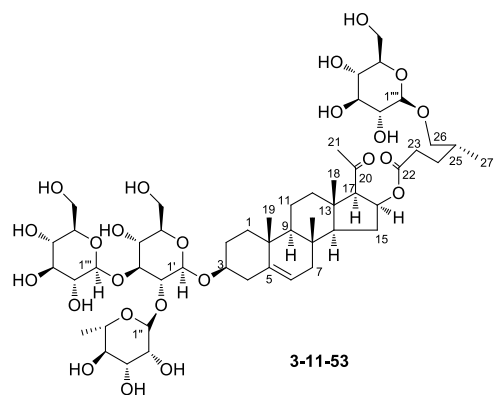
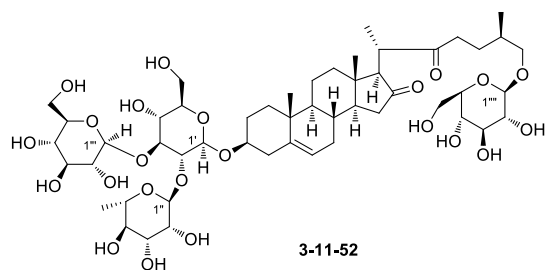
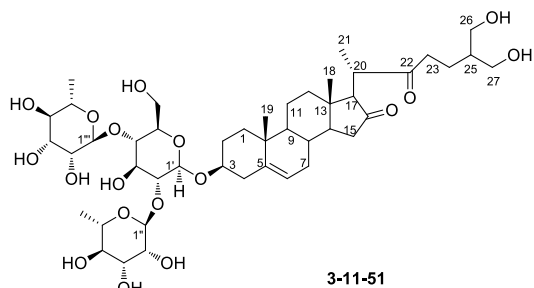
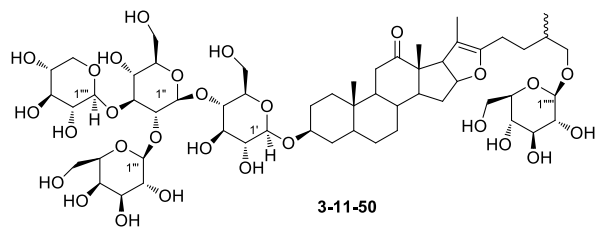


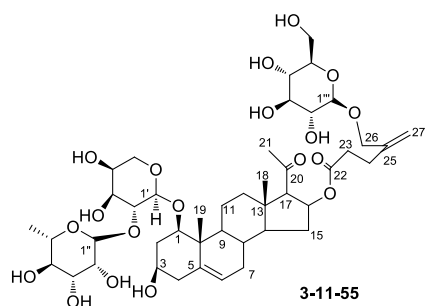
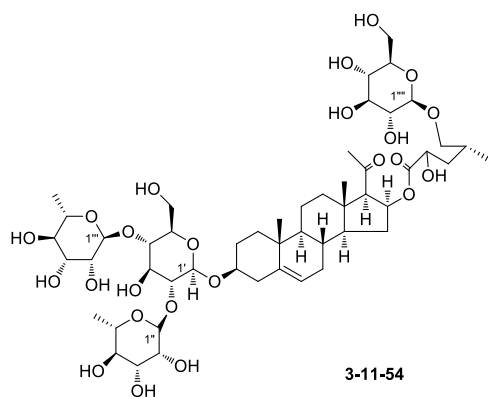










**Table 3-11-2:** ^1H NMR spectroscopic data of steroidal saponins **3-11-1**~**3-11-5**.

H	3-11-1	3-11-2	3-11-3	3-11-4	3-11-5
1	0.96 m 1.70 m	1.07 td(13.5, 3.5) 1.86 dt(13.5, 3.5)	3.36 dd(7.2, 3.5)	3.36 dd(7.2, 3.5)	3.75 dd(11.0, 3.6)
2	ax 1.85 m eq 2.06 m	1.48 m 1.79 m	2.08 (ov) 1.70 (ov)	2.09 (ov) 1.70 (ov)	—
3	4.00	3.38 m	3.31 (ov)	3.30 (ov)	3.83 m
4	2.70 m	2.21 m 2.24 m	2.24 dd(11.5, 7.3) 2.20 dd(11.5, 3.5)	2.27 dd(11.5, 7.3) 2.21 dd(11.5, 3.5)	—
6	5.33 br d	5.34 m	5.55 dd(5.5, 2.5)	5.56 dd(5.5, 2.5)	5.59 d(5.2)
7	1.46 m 1.85 m	1.59 m 2.01 m	1.98 (ov) 1.96 (ov)	1.98 (ov) 1.98 (ov)	—
8	1.55 m	1.59 m	1.52 m	1.50 m	—
9	1.15 m	0.97 td(11.4, 5.0)	1.31 (ov)	1.29 (ov)	—
11	1.41 m	1.54 m 1.57 m	2.56 dd(10.5, 2.5) 1.41 m	2.55 dd(10.5, 2.5) 1.43 m	—
12	1.70	1.28 td(12.6, 5.0) 1.82 dt(12.6, 3.5)	1.70 (ov) 1.19 (ov)	1.70 (ov) 1.20 (ov)	—
14	0.89 m	1.04 m	1.17 (ov)	1.16 (ov)	—
15	1.47 m 2.02 m	1.40 td(13.2, 5.7) 2.15 m	1.98 (ov) 1.31 (ov)	1.98 (ov) 1.31 (ov)	—

Table 3-11-2 (continued)

H	3-11-1	3-11-2	3-11-3	3-11-4	3-11-5
16	4.51	4.71 m	4.60 q(5.5)	4.60 q(5.5)	4.78 m
17	1.79 m	2.49 d(10.3)	1.72 (ov)	1.72 (ov)	—
18	0.80 s	0.71 s	0.80 s	0.80 s	0.80 s
19	1.02 s	1.03 s	1.09 s	1.09 s	1.37 s
20	1.91 m		2.07 (ov)	2.08 (ov)	
21	1.11 d(5.8)	1.60 s	0.99 d(6.6)	0.99 d(6.6)	1.68 s
23	1.60 m	2.09 m	1.72 (ov)	1.72 (ov)	—
		2.12 m	1.63 (ov)	1.63 (ov)	
24	1.55 m	1.24 m	1.40 (ov)	1.40 (ov)	—
		1.63 m	1.31 (ov)	1.31 (ov)	
25	1.55 br s	1.76 m	1.71 (ov)	1.71 (ov)	—
26	ax 4.56 m	3.38 m	3.87 dd(8.5, 6.9)	3.85 dd(8.5, 6.9)	3.93 m
	eq 3.48 m	3.70 dd(9.5, 6.6)	3.30 (ov)	3.30 (ov)	3.62 m
27	0.65 br s	0.94 d(7.0)	0.97 d(6.6)	0.97 d(6.6)	1.02 d(6.5)
OMe	3.56 s				
	(22-OMe)				
1'	4.87	4.22 d(7.7)	4.30 d(7.8)	4.27 d(7.5)	4.86 d(7.0)
2'	4.00	3.17 dd(8.8, 7.7)	3.70 dd(7.8, 6.8)	3.68 dd(7.5, 6.8)	4.21 m
3'	4.15	3.33 br t(8.8)	3.68 dd(6.8, 2.5)	3.88 dd(6.8, 7.0)	4.32 m
4'	4.02	3.27 dd(9.5, 8.8)	3.87 dd(3.2, 2.5)	3.65 ddd (2.0, 7.0, 8.5)	5.44 dt(6.3, 9.0)
5'	3.80	3.23 m	3.44 (ov)	3.50 dd(2.0, 11.5) 3.95 dd(8.5, 11.5)	4.28 m 3.67 m
6'	4.38 m	3.66 dd(11.7, 5.5)	3.47 (ov)		
	4.20 m	3.85 dd(11.7, 2.0)	3.65 (ov)		
OAc					2.05(4'-OAc)
1''	6.27 br s		5.30 bs	5.30 bs	6.31 br s
2''	4.83 br s		3.89 bs	3.90 bs	4.78 m
3''	4.53 d(9.3)		3.72 d(6.5)	3.72 d(6.5)	4.54 dd(9.0, 3.5)
4''	4.28 t(8.8)		3.40 dd(6.5, 6.0)	3.39 dd(6.5, 6.0)	4.28 m
5''	4.88 d(4.3)		4.10 dq(6.6, 6.0)	4.10 dq(6.6, 6.0)	4.70 m
6''	1.70 d(5.3)		1.25 d(6.6)	1.25 d(6.6)	1.74 d(6.3)
1'''	5.04 d(7.0)				4.97 d(7.2)
2'''	3.94				3.97 m
3'''	4.14 br s				4.09 t(8.6)
4'''	4.04				4.14 m
5'''	3.94				4.30 m, 3.63 m
6'''	4.53 m, 4.38 m				
1''''					4.83 d(8.0)
2''''					4.03 m
3''''					4.24 m
4''''					4.22 m
5''''					3.94 m
6''''					4.57 dd(10.8, 4.5) 4.40 dd(10.8, 2.0)

Table 3-11-3: ^1H NMR spectroscopic data of steroidal saponins **3-11-6~3-11-10**.

H	3-11-6	3-11-7	3-11-8	3-11-9	3-11-10
1	3.79 dd(12.0, 3.9)	3.56 d(9.2)	3.57 d(9.3)	α 0.96 m β 1.74 m	0.73 (ov) 1.45~1.50 m
2	—	4.28 t(9.2)	4.28 t(9.3)	α 1.82 m β 2.07 m	1.17 (ov) (ov)
3	3.87 m	3.92 m	3.92 m	3.92 m	3.82 (ov)
4	—	α 2.66 dd(6.3, 12.6) β 2.78 br d(12.6)	α 2.63 dd(5.7, 12.5) β 2.78 t(12.5)	α 1.40 m β 1.87 m	1.25 (ov) (ov)
5				0.93 br dd	0.81~0.86 m
6	5.58 br d(5.5)	5.62 br d(5.1)	5.65 d(5.8)	α, β 1.15 m	1.11 (ov), 1.13 (ov)
7	—	1.85 m	1.85 m	α 1.48 m, β 1.87 m	1.23 (ov), 1.40 (ov)
8	—	—	—	1.56 br s	1.26~1.33 m
9	—	1.58 m	1.54 m	0.88 m	0.39~0.43 m
11	—	α 3.10 br d(9.8) β 1.58 m	α 3.07 br d(10.4) β 1.54 m	α, β 1.48 m	1.31 (ov) (ov)
12	—	—	—	α 1.08 m, β 1.83 m	0.97 (ov), 1.63 (ov)
14	—	—	—	1.11 m	0.90 (ov)
15	—	α 2.00 m, β 1.50 m	α 1.98 m, β 1.49 m	α 1.48 m, β 2.05 m	1.24 (ov), 1.92 (ov)
16	4.41 m	4.91 m	4.45 m	4.94 m	4.86 (ov)
17	—	2.00 m	1.77 dd(6.2, 8.2)	1.92 s	1.85~1.89 m
18	0.82 s	0.93 s	0.85 s	0.90 s	0.77 s
19	1.43 s	1.24 s	1.23 s	1.04 s	0.75 s
20	—	2.19 m	2.20 m	2.26 m	2.12~2.18 m
21	1.11 d(6.9)	1.19 d(6.8)	1.10 d(6.7)	1.34 d(6.9)	1.23 d(6.5)
23	—	2.19 m, 2.19 m		α 2.05 m, β 1.94 m	1.99 (ov)
24	—	2.67 m	2.38 m	α 2.05 m, β 1.69 m	1.57 (ov), 1.95 (ov)
25				1.94 m	1.80~1.85 m
26	4.60 d(12.7)	4.33 t(9.7)	4.35 br d(12.9)	α 3.64 dd(5.7, 9.4)	3.55 (ov)
	4.35 d(12.7)	4.56 br d(9.7)	4.61 br d(12.9)	β 3.95 dd(5.7, 9.4)	3.82 (ov)
27	5.33 br s 5.04 br s	5.32 br s 5.02 br s	5.34 br s 5.04 br s	1.01 d(6.5)	0.90 d(6.0)
OMe	3.24 s(22-OMe)				
1'	4.69 d(7.3)	5.34 d(7.9)	5.26 d(7.9)	4.96 d(7.5)	4.72 d(7.5)

Table 3-11-3 (continued)

H	3-11-6	3-11-7	3-11-8	3-11-9	3-11-10
2'	4.62 dd(8.7, 7.3)	—	4.50 t(7.9)	4.19 m	4.30 (ov)
3'	4.08 dd(8.7, 3.1)	—	—	4.20 m	4.04 (ov)
4'	4.40 br d(3.1)	4.61 br s	—	4.33 m	4.40 (ov)
5'	4.24 (ov)	4.04 m	3.74 br d(12.0)	3.71 m	3.82 (ov)
	3.69 br d(11.3)		4.31 br d(12.0)		
6'		—		α 4.07 m, β 4.15 m	4.12 (ov) 4.52~4.56 m
1''	6.35 d(1.5)	4.87 d(7.8)	4.91 d(7.7)	6.31 d(0.9)	5.96 br s
2''	4.95 dd(3.1, 1.5)	4.01 m	—	4.78 m	4.63~4.67 m
3''	4.66 dd(9.4, 3.1)	3.92 m	—	4.56 dd(2.8, 9.0)	4.26~4.30 m
4''	4.38 dd(9.4, 8.5)	—	—	4.29 m	4.22 (ov)
5''	4.83 dq(8.5, 6.0)	3.92 m	—	4.92 m	4.72~4.78 m
6''	1.68 d(6.0)	—	—	1.74 d(6.2)	1.62 d(6.0)
1'''	4.99 d(7.5)			5.79 d(1.0)	4.83 d(7.5)
2'''	3.90 dd(8.6, 7.5)			4.66 m	4.02 (ov)
3'''	4.11 dd(8.6, 8.1)			4.50 m	3.95 (ov)
4'''	4.12 (ov)			4.25 m	4.02 (ov)
5'''	4.26 (ov)			4.88 m	3.70 (ov)
	3.68 dd(12.5, 11.0)				
6'''				1.62 d(6.2)	3.91 (ov) 4.40 (ov)
1''''	6.23 d(2.5)			4.79 d(7.5)	5.04 d(7.8)
2''''	4.82 d(2.5)			3.99 m	3.83 (ov)
3''''	—			4.19 m	4.02 (ov)
4''''	4.64 d(9.2)			4.20 m	4.03 (ov)
	4.28 d(9.2)				
5''''	4.15 br s			3.95 m	3.54 (ov) 4.14 (ov)
6''''				α 4.38 m, β 4.53 m	
1'''''	4.91 d(7.8)				4.70 d(7.5)
2'''''	4.06 dd(7.8, 7.7)				3.90 (ov)
3'''''	4.24 dd(8.7, 7.7)				4.14 (ov)
4'''''	4.23 dd(8.7, 8.7)				4.03 (ov)
5'''''	3.95 ddd (8.7, 5.5, 2.5)				3.83 (ov)
6'''''	4.55 dd(11.9, 2.5)				4.17 (ov)
	4.39 dd(11.9, 5.5)				4.36 (ov)

Table 3-11-4: ^1H NMR spectroscopic data of steroidal saponins **3-11-11~3-11-15**.

H	3-11-11	3-11-12	3-11-13	3-11-14	3-11-15
1	1.42 (ov), 1.74 (ov)	1.20 (ov)	—	1.75~1.83 m	1.84, 1.84
2	1.44 (ov)	1.10 (ov)	1.43 m	1.14 m	1.94
	1.78 (ov)	1.84 (ov)	1.87 m	1.78 m	1.51
3	4.24 m	4.29 m	4.29 m	4.24 m	4.29
4	1.65 (ov)	1.20 (ov)	—	1.43 m, 1.78 m	1.84, 1.49
5	2.14 m	2.36 (ov)	2.20 m	2.16 m	2.16
6	1.70 (ov)	1.80 (ov)	—	1.47 m	1.86
	1.78 br d(12.4)			1.82 m	1.22
7	1.06 (ov)	1.10 (ov)	0.90 m	1.20 m	1.28
	1.44 (ov)		1.14 m	1.90 m	0.99
8	1.36 m	1.33 m	1.43 m	1.46 m	1.51
9	1.15 (ov)	1.20 (ov)	1.22 m	1.24 m	1.31
11	1.10 (ov), 1.22 (ov)		1.18 m, 1.27 m	1.20 m, 1.30 m	1.34, 1.22
12	1.00 (ov)	1.20 (ov)	1.26 m	1.08 m	1.70
	1.64 (ov)	1.65 (ov)	1.69 m	1.71 m	1.08
14	0.95 (ov)	0.98 (ov)	1.09 m	1.04 m	1.06
15	1.32 (ov)	(ov)	—	1.40 ddd	1.98
	1.90 m			(6.1, 6.1, 12.8)	1.36
				2.00 m	
16	4.90 m	4.94 m	4.99 m	4.97 dt(7.1, 7.1)	4.51
17	1.91 m	1.92 (ov)	2.04 m	1.95 m	1.79
18	0.78 s	0.79 s	0.86 s	0.86 s	0.83
19	0.87 s	0.90 s	0.95 s	0.94 s	0.99
20	2.16 m	2.16 m	2.21 m	2.22 dq(6.8, 6.8)	2.24
21	1.24 d(6.7)	1.26 (ov)	1.33 d(6.7)	1.31 d(6.8)	1.17
23	1.94 (ov), 2.06 (ov)	1.96 (ov), 2.07 (ov)	2.03 m, 2.03 m	1.95 m, 2.06 m	1.93, 1.85
24	1.61 (ov), 1.95 (ov)	1.63 (ov), 1.97 (ov)	1.62 m, 2.03 m	1.66 m, 2.06 m	1.72, 1.46
25	1.84 m	1.86 m	1.87 m	1.91 m	1.88
26	3.43 m, 3.98 (ov)	3.42 (ov), 4.00 (ov)	3.60 dd(4.5, 9.5)	3.46 m, 4.08 m	4.07, 3.54
			3.92 m		
27	0.95 d(6.4)	0.98 d(6.5)	0.97 d(6.6)	1.01 d(6.8)	1.05
22-OMe					3.58 s
1'	4.80 d(7.6)	4.90 d(7.5)	4.84 d(7.6)	4.85 d(7.8)	4.93 d(7.9)
2'	4.02 t(7.8)	4.39 (ov)	4.79 m	4.28 dd(8.0, 9.0)	4.19
3'	4.17 (ov)	4.52	4.37 m	4.26 dd(9.0, 9.0)	4.28
4'	4.10 (ov)	4.04 (ov)	4.78 br s	4.48 dd(9.1, 9.1)	4.13
5'	3.74 m	3.85 (ov)	—	3.59 ddd	3.84
				(2.3, 3.1, 9.2)	
6'	4.30 (ov)	4.20 (ov)	—	4.08 dd(3.1, 12.0)	4.29
	4.36 (ov)	4.40 (ov)		4.22 br d(12.0)	4.46
1''	5.17 d(7.4)	5.60 d(7.5)	5.57 d(7.7)	5.46 d(7.8)	5.35 d(7.4)
2''	3.92 t(8.6)	4.00 dd(9.3, 9.8)	—	4.08 dd(8.0, 9.2)	4.03
3''	4.10 (ov)	4.08 (ov)	—	4.26 dd(9.2, 9.2)	4.21
4''	4.18 m	3.84 (ov)	4.15 t(10.0)	4.34 dd(9.2, 9.2)	4.26

Table 3-11-4 (continued)

H	3-11-11	3-11-12	3-11-13	3-11-14	3-11-15
5''	3.64 t(10.5), 4.35 (ov)	3.84 (ov)	4.24 m	3.97 ddd (3.2, 4.5, 9.2)	3.93
6''		4.19 (ov), 4.52 (ov)	—	4.49 dd(4.5, 11.8) 4.58 dd(3.2, 11.8)	4.45, 4.49
1'''	4.92 d(7.6)	6.06 s	5.40 d(7.6)	5.92 br s	4.81 d(7.4)
2'''	3.85 t(8.3)	4.57 br s	—	4.67 dd(1.5, 3.3)	3.99
3'''	4.10 (ov)	4.57 dd(7.6, 11.2)	—	4.53 dd(3.3, 9.3)	4.17
4'''	4.06 (ov)	4.26 dd(9.9, 9.1)	4.20 t(10.0)	4.32 dd(9.3, 9.3)	4.15
5'''	3.56 (ov), 4.10 (ov)	4.89 (ov)	—	4.99 dq(6.3, 9.3)	3.91
6'''		1.72 d(4.5)	—	1.67 d(6.3)	4.51, 4.34
1''''	4.70 d(7.8)	4.70 d(7.6)	4.81 d(7.6)	4.81 d(7.8)	
2''''	3.92 t(8.6)	3.92 (ov)	—	4.03 dd(7.8, 9.0)	
3''''	4.15 (ov)	4.18 dd(8.1, 8.3)	—	4.25 m	
4''''	4.04 (ov)	3.97 dd(8.6, 8.3)	—	4.25 m	
5''''	3.84 m	3.85	3.81 m	3.95 ddd (2.7, 5.1, 9.3)	
6''''	4.38 (ov) 4.20 (ov)	4.19 (ov) 4.38 (ov)	—	4.40 dd(5.1, 11.8) 4.56 br d(2.7, 11.8)	

Table 3-11-5: ¹H NMR spectroscopic data of steroidal saponins 3-11-16~3-11-20.

H	3-11-16	3-11-17	3-11-18	3-11-19	3-11-20
1	0.73 (ov) 1.45~1.50 m	0.68 (ov) 1.40 (ov)	1.40 (ov) 1.82 (ov)	1.43 (ov) 1.76 (ov)	—
2	1.17 (ov)	1.58 (ov) 1.98~2.02 m	1.10 (ov) 1.66 (ov)	1.46 (ov) 1.74 (ov)	3.52 m 3.89 m
3	3.82 (ov)	3.83 (ov)	4.30 (ov)	4.20 m	—
4	1.25 (ov)	1.30~1.34 m 1.72~1.76 m	1.62 (ov) 1.76 (ov)	1.76 (ov) 1.84 (ov)	—
5	0.82~0.85 m	0.78~0.84 m	2.08 m	2.14 m	—
6	1.11 (ov) 1.13 (ov)	1.00 (ov) 1.06 (ov)	1.65 (ov) 1.80 br d(13.5)	1.72 (ov) 1.82 (ov)	—
7	1.23 (ov) 1.40 (ov)	1.26 (ov) 1.38 (ov)	1.10 (ov)	1.10 (ov) 1.46 (ov)	—
8	1.26~1.33 m	1.22~1.26 m	1.29 m	1.36 m	—
9	0.39~0.43 m	0.36~0.42 m	1.10 (ov)	1.16 (ov)	—
11	1.31 (ov)	1.06 (ov), 1.28 (ov)	1.18 (ov)	1.10 (ov) 1.22 (ov)	—
12	0.97 (ov) 1.63 (ov)	0.92 (ov) 1.56 (ov)	1.14 (ov) 1.60 (ov)	1.00 (ov) 1.62 (ov)	—
14	0.90 (ov)	0.88 (ov)	0.90 (ov)	0.96 (ov)	—

Table 3-11-5 (continued)

H	3-11-16	3-11-17	3-11-18	3-11-19	3-11-20
15	1.24 (ov) 1.92 (ov)	1.26 (ov) 1.88~1.92 m	1.26 (ov) 1.90 m	1.30 (ov) 1.92 m	—
16	4.40 (ov)	4.37 (ov)	4.44 m	4.46 m	4.39 ddd(9.0, 7.0, 4.5)
17	1.66 (ov)	1.64~1.68 m	1.72 (ov)	1.74 m	—
18	0.76 s	0.70 s	0.70 s	0.74 s	0.84 s
19	0.75 s	0.69 s	0.84 s	0.88 s	0.93 s
20	2.11~2.17 m	2.14~2.18 m	2.16 m	2.18 m	—
21	1.10 d(6.5)	1.09 d(6.5)	1.10 d(6.4)	1.10 d(6.7)	1.03 d(6.5)
23	1.98 (ov) 1.66 (ov)	1.95 (ov)	0.90 (ov) 1.60 (ov)	1.00 (ov) 1.60 (ov)	—
24	1.54 (ov) 1.92 (ov)	(ov) (ov)	1.34 (ov) 1.60 (ov)	1.36 (ov) 1.62 (ov)	—
25	1.80~1.85 m	1.78~1.84 m	1.83 m	1.82 (ov)	—
26	3.55 (ov) 3.82 (ov)	3.54 (ov) 3.89 (ov)	3.47 m 4.22 (ov)	3.50 m 4.00 (ov)	3.42 dd(7.0, 11.5) 3.77 dd(6.0, 11.5)
27	0.90 d(6.0)	0.92 d(6.4)	0.98 d(6.4)	0.98 d(6.4)	0.98 d(6.5)
22-OMe	3.24 s	3.26 s	3.28 s	3.24 s	
1'	4.72 d(7.5)	4.82 d(7.4)	4.78 d(7.6)	4.80 d(7.8)	4.42 d(7.8)
2'	4.22 (ov)	4.30 (ov)	3.95 (ov)	3.98 t(7.3)	3.70 dd(7.8, 8.5)
3'	4.04 (ov)	4.08 (ov)	4.12 (ov)	4.22 (ov)	3.85 dd(2.9, 8.5)
4'	4.38 (ov)	4.49 (ov)	4.00 (ov)	4.04 (ov)	4.07 dd(2.9, 1.2)
5'	3.83 (ov)	3.70~3.74 m	3.75 m	3.82 (ov)	3.58 m
6'	4.12 (ov) 4.52~4.56 m	4.14 (ov) 4.48 (ov)	4.28 (ov) (ov)	4.30 (ov) 4.34 (ov)	3.90 dd(2.0, 12.0) 3.70 dd(5.0, 12.0)
1''	5.96 br s	5.02 d(7.5)	5.06 d(6.9)	5.10 d(7.6)	4.66 d(7.5)
2''	4.63~4.67 m	4.19 (ov)	3.85 t(8.5)	3.92 t(9.0)	3.74 dd(7.5, 9.0)
3''	4.26~4.30 m	3.98 (ov)	4.04 (ov)	4.08 (ov)	3.81 dd(9.0, 9.0)
4''	4.22 (ov)	4.30 (ov)	4.10 m	4.15 (ov)	3.77 dd(9.0, 9.0)
5''	4.72~4.78 m	3.96 (ov)	3.58 t(10.9) 4.28 (ov)	3.62 t(10.9) 4.33 (ov)	3.77 m
6''	1.64 d(6.2)	4.26 (ov), 4.37 (ov)			3.96 dd(2.5, 12.0) 3.63 dd(4.5, 12.0)
1'''	4.81 d(7.5)	5.44 d(7.7)	4.82 d(7.9)	4.72 d(7.9)	4.94 d(7.5)
2'''	4.03 (ov)	3.92 (ov)	3.78 t(8.3)	3.92 t(9.0)	3.20 dd(7.5, 9.0)
3'''	3.93 (ov)	4.08 (ov)	4.08 (ov)	4.18 (ov)	3.38 dd(9.0, 9.0)
4'''	4.02 (ov)	4.00 (ov)	3.98 m	4.04 (ov)	3.40 dd(9.0, 9.0)
5'''	3.70 (ov)	3.83 (ov)	3.54 t(10.2) 4.08 (ov)	3.88 (ov)	3.38 m
6'''	3.91 (ov) 4.40 (ov)	4.29 (ov) 4.50 (ov)		4.19 (ov) 4.40 (ov)	3.93 dd(2.5, 12.0) 3.65 dd(4.5, 12.0)
1''''	5.07 d(8.0)	5.05 d(7.7)	4.70 d(7.6)		4.72 d(7.5)
2''''	3.83 (ov)	3.82 (ov)	3.82 t(8.3)		3.31 dd(7.5, 9.0)
3''''	4.02 (ov)	4.00 (ov)	4.11 (ov)		3.39 dd(9.0, 9.0)
4''''	4.03 (ov)	4.26 (ov)	3.92 (ov)		3.30 dd(9.0, 9.0)

Table 3-11-5 (continued)

H	3-11-16	3-11-17	3-11-18	3-11-19	3-11-20
5 ^{'''}	3.54 (ov)	3.58 t(10.3)	3.83 m		3.39 m
	4.14 (ov)	4.11 (ov)			
6 ^{'''}			4.10 (ov)		3.93 dd(2.5, 12.0)
			4.32 (ov)		3.67 dd(4.5, 12.0)
1 ^{''''}	4.70 d(7.6)	4.72 d(7.5)			4.27 d(7.5)
2 ^{''''}	3.90 (ov)	3.90 (ov)			3.22 dd(7.5, 9.0)
3 ^{''''}	4.16 (ov)	4.16 (ov)			3.30 dd(9.0, 9.0)
4 ^{''''}	4.02 (ov)	4.02 (ov)			3.37 dd(9.0, 9.0)
5 ^{''''}	3.84 (ov)	3.84 (ov)			3.29 m
6 ^{''''}	4.18 (ov)	4.18 (ov)			3.90 dd(2.5, 12.0)
	4.40 (ov)	4.37 (ov)			3.70 dd(4.5, 12.0)

Table 3-11-6: ¹H NMR spectroscopic data of steroidal saponins 3-11-21~3-11-23, 3-11-27, and 3-11-28.

H	3-11-21	3-11-22	3-11-23	3-11-27	3-11-28
2	4.08 m	4.06 m	3.95 m	—	—
3	3.86 m	3.86 m	3.84 m	4.48 dd-like	4.49 ddd-like
4	—	—	—	5.81 br s	5.81 br s
16	4.90 m	4.91 ddd-like	4.92 ddd-like	4.91 ddd-like	4.92 ddd-like
18	0.86 s	0.86 s	0.87 s	0.91 s	0.92 s
19	0.88 s	0.88 s	0.75 s	1.07 s	1.07 s
21	1.28 d(6.6)	1.30 d(7.0)	1.31 d(7.0)	1.29 d(6.7)	1.32 d(6.7)
26	3.47 dd-like	3.61 dd(6.4, 9.2)	3.62 m	3.48 dd-like	3.63 dd(6.1, 9.4)
	4.06 m	3.96 m	3.93 m	4.05 dd-like	3.92 m
27	1.01 d(6.2)	0.98 d(6.7)	0.99 d(6.7)	1.01 d(7.2)	0.99 d(6.7)
1'	5.01 d(7.0)	5.01 d(7.6)	5.01 d(7.6)	4.99 d(7.6)	4.99 d(7.6)
1''	6.27 br s	6.27 d(1.2)	5.10 d(7.3)	6.25 br s	6.23 br s
6''	1.67 d(5.6)	1.68 d(6.4)	—	1.67 d(5.8)	1.68 d(6.1)
1'''	4.76 d(8.2)	4.77 d(7.6)	4.79 d(7.6)	4.77 d(7.6)	4.78 d(7.9)

Table 3-11-7: ¹H NMR spectroscopic data of steroidal saponins 3-11-24~3-11-26, 3-11-29, and 3-11-30.

H	3-11-24	3-11-25	3-11-26	3-11-29	3-11-30
1	1.16 m, 2.18 m	—	—	0.94 m, 1.74 m	0.94 m, 1.72 m
2	4.17 m	1.42 m, 1.88 m	—	1.84 m, 2.08 m	1.85 m, 2.07 m
3	3.85 m	4.29 m	4.28 m	3.84 m	3.84 m
4	1.48 m, 1.89 m	—	—	2.71 m, 2.74 m	2.72 m
5	0.99 m	2.15 m	2.21 m	—	—
6	1.02 m, 1.12 m	—	—	5.27 d(4.8)	5.26 br d(3.6)

Table 3-11-7 (continued)

H	3-11-24	3-11-25	3-11-26	3-11-29	3-11-30
7	0.77 m, 1.47 m	0.89 m, 1.19 m	0.89 m, 1.17 m	1.88, 1.92 m	1.49 m, 1.84 m
8	1.36 m	1.48 m	1.51 m	1.62 m	1.55 m
9	0.57 m	1.43 m	1.19 m	0.96 m	0.89 m
11	1.21 m, 1.44 m	1.49 m, 1.78 m	—	1.52 m, 1.59 m	1.43 m
12	1.02 m, 1.65 m	3.55 t(5.6)	3.54 dd(4.5, 10.5)	1.57 m, 2.15 m	1.06 m, 1.72 m
14	1.00 m	1.07 m	1.17 m	2.02 m	1.07 m
15	1.42 m	1.56 m	1.58 m	1.50 m	1.43 m
	2.00 m	2.06 m	2.12 m	2.17 m	2.00 ddd (6.0, 7.0, 13.0)
16	4.55 m	5.06 m	5.06 m	4.75 m	4.96 m
17	1.89 m	2.35 dd(6.4, 8.2)	2.34 t(7.5)		1.91 m
18	0.85 s	1.13 s	1.13 s	0.99 s	0.88 s
19	0.76 s	0.97 s	0.96 s	1.08 s	1.04 s
20	2.20 m	2.48 m	2.48 m	2.49 q(7.2)	2.22 dq(6.5, 7.3)
21	1.14 d(7.2)	1.62 d(6.6)	1.61 d(6.8)	1.37 d(7.2)	1.32 d(6.5)
23	1.95 m, 2.04 m	2.07 m(2H)	2.07 m(2H)	2.05 m	1.99 m
24	1.69 m, 2.04 m	1.69 m, 2.03 m	1.70 m, 2.02 m	1.68 m, 2.06 m	1.67 m, 2.04 m
25	1.90 m	1.87 m	1.90 m	1.93 m	1.92 m
26	3.46 dd(7.1, 8.9)	3.60 dd(6.0, 9.6)	3.61 dd(6.0, 9.5)	3.62 dd(6.0, 9.0)	3.61 dd(6.0, 10.0)
	4.06 m	3.90 br t(9.6)	3.91 m	3.94 m	3.93 m
27	1.03 d(6.8)	0.96 d(5.8)	0.97 d(6.3)	1.00 d(6.0)	0.97 d(6.6)
1'	4.93 d(7.3)	4.90 d(7.6)	4.84 d(7.5)	4.93 d(7.2)	4.92 d(7.8)
2'	4.56 m	4.66 t(8.4)	—	4.19 m	4.19 m
3'	4.07 m	4.33 m	—	4.27 m	4.12 m
4'	4.55 m	4.56 br s	4.79 br s	4.33 m	4.15 m
5'	4.06 m	—	—	3.75 m	3.80 m
6'	4.21 m, 4.72 m	—	—	4.20 m, 4.29 m	4.06 m, 4.17 m
1''	5.15 d(7.8)	5.28 d(7.8)	5.55 d(7.7)	6.27 br s	6.19 s
2''	4.12 m	—	—	4.77 m	4.72 br s
3''	3.86 m	—	—	4.59 dd(3.0, 9.0)	4.57 m
4''	3.92 m	4.30 t(8.4)	4.15 t(9.0)	4.34 m	4.33 t(9.0)
5''	3.92 m	—	—	4.94 (ov)	4.92 m
6''	4.35 m, 4.58 m	—	—	1.76 d(6.0)	1.75 d(6.0)
1'''	5.28 d(7.2)	4.80 d(7.6)	5.37 d(7.8)	5.91 d(1.2)	5.06 d(7.8)
2'''	4.07 m	—	—	4.84 (ov)	3.98 br t(7.8)
3'''	4.22 m	4.19 t(8.8)	—	4.83 (ov)	4.13 m
4'''	3.96 m	4.20 t(8.8)	—	4.85 (ov)	4.45 m
5'''	3.93 m	3.83 m	—	4.16, 4.26 m	3.73 m
6'''	4.08 m, 4.58 m	—	—		4.42 m, 4.50 m
1''''	4.83 d(7.7)		4.80 d(8.0)	4.81 d(7.8)	5.87 s
2''''	4.06 m		—	4.02 m	4.65 br s
3''''	4.22 m		—	4.24 (ov)	4.50 m
4''''	4.22 m		—	4.22 (ov)	4.33 t(9.0)
5''''	3.87 m		—	3.93 m	4.98 m

Table 3-11-7 (continued)

H	3-11-24	3-11-25	3-11-26	3-11-29	3-11-30
6''''	4.38 m, 4.55 m	—	—	4.38 4.54 br d(10.8)	1.70 d(6.0)
1''''	—	—	—	—	4.80 d(7.8)
2''''	—	—	—	—	4.06 m
3''''	—	—	—	—	4.23 m
4''''	—	—	—	—	3.96 m
5''''	—	—	—	—	3.94 m
6''''	—	—	—	—	4.38 dd(6.0, 12.6) 4.57 m

Table 3-11-8: ¹H NMR spectroscopic data of steroidal saponins 3-11-31, 3-11-36~3-11-38, and 3-11-45.

H	3-11-31	3-11-36	3-11-37	3-11-38	3-11-45
1	—	—	—	4.60 d(7.2)	—
2	—	4.12 m	4.12 m	—	—
3	3.92 m	3.94 m	3.92 m	3.98 m	3.96 m
6	5.31 br s	—	—	—	5.31 br d(4.9)
16	4.62 m	4.89 m	4.87 m	4.56 m	4.44 m
17	—	2.54 d(9.6)	2.51 d(9.9)	—	—
18	0.88 s	0.76 s	0.78 s	0.92 s	0.79 s
19	1.05 s	0.96 s	0.96 s	1.05 s	1.03 s
21	1.33 d(6.2)	1.70 s	1.70 s	1.60 d(6.9)	1.17 d(6.9)
26	3.60 dd(6.0, 11.2) (2H)	3.52 m 4.10 m	3.52 dd(7.1, 9.1) 4.10 m	ax 4.34 d(10.2) eq 4.50 d(10.2)	4.63 m 4.37 m
27	0.97 d(6.7)	1.10 d(6.3)	1.10 d(6.5)	4.96 s 5.06 s	5.36 br s 5.07 br s
22-OMe	—	—	—	—	3.26 s
1'	4.95 d(7.6)	5.06 d(7.1)	5.05 d(7.1)	4.76 d(7.5)	4.96 d(7.7)
2'	—	4.20 m	4.22 m	—	4.19 dd(9.2, 7.7)
3'	—	4.25 m	3.99 m	—	4.23 dd(9.4, 9.2)
4'	—	4.05 m	4.35 m	—	4.13 dd(9.4, 8.8)
5'	—	4.03 m	3.83 m	—	4.01 ddd (8.8, 5.5, 1.7)
6'	—	4.32 m 4.40 m	4.12 m 4.32 m	—	4.76 dd(11.6, 1.7) 4.33 dd(11.6, 5.5)
1''	6.27 s	6.30 s	6.36 s	4.84 d(7.8)	6.32 d(0.6)
2''	—	4.81 m	4.85 m	—	4.78 dd(3.3, 0.6)
3''	—	4.57 m	4.60 m	—	4.61 dd(9.6, 3.3)
4''	—	4.33 m	4.36 m	—	4.34 dd(9.6, 9.6)
5''	—	4.88 m	4.89 m	—	4.96 dq(9.6, 6.2)
6''	1.67 d(6.2)	1.73 d(6.8)	1.72 d(6.1)	—	1.77 d(6.2)

Table 3-11-8 (continued)

H	3-11-31	3-11-36	3-11-37	3-11-38	3-11-45
1 ^{'''}	4.79 d(7.8)	4.85 d(7.7)	5.82 s		5.09 d(7.8)
2 ^{'''}	—	4.02 m	4.69 m		4.02 dd(8.4, 7.8)
3 ^{'''}	—	4.21 m	4.52 m		4.19 dd(9.2, 8.4)
4 ^{'''}	—	4.22 m	4.36 m		4.21 dd(9.2, 8.3)
5 ^{'''}	—	3.95 m	4.90 m		3.91 ddd (8.3, 5.1, 2.3)
6 ^{'''}	—	4.40 m, 4.55 m	1.66 d(6.1)		4.50 dd(11.8, 2.3) 4.36 dd(11.8, 5.1)
1 ^{'''}			4.87 d(7.7)		4.92 d(7.8)
2 ^{'''}			4.05 m		4.08 dd(8.5, 7.8)
3 ^{'''}			4.22 m		4.26 dd(8.9, 8.5)
4 ^{'''}			4.22 m		4.24 dd(9.1, 8.9)
5 ^{'''}			3.99 m		3.96 ddd (8.9, 5.4, 2.4)
6 ^{'''}			4.41 m, 4.56 m		4.55 dd(11.9, 2.4) 4.43 dd(11.9, 5.4)

Table 3-11-9: ¹H NMR spectroscopic data of steroidal saponins 3-11-32~3-11-35 and 3-11-39.

H	3-11-32	3-11-33	3-11-34	3-11-35	3-11-39
1	1.69 m, 0.96 m	1.68	1.79 (ov) 2.08 dt(13.0, 7.0)	0.71 (ov), 1.43 (ov)	0.98 m, 1.72 m
2	2.06 m, 1.69 m	(ov)	1.30 (ov), 1.70 (ov)	1.59 (ov) 1.98~2.02 m	2.12 m, 2.14 m
3	3.98 m	3.94	3.39 m	3.84 (ov)	3.88 m
4	2.65 d(13.0) 2.43 t(13.0)	2.64, 2.74	2.25 t(10.0) 2.21 dd(10.0, 2.5)	1.30~1.34 m 1.72~1.76 m	2.72 m, 2.78 m
5				0.78~0.84 m	
6	5.28 br s	5.31	5.60 br d(5.0)	1.01 (ov), 1.08 (ov)	5.31 d(4.0)
7	1.51 m	1.84	1.99 (ov) 1.52 (ov)	1.24 (ov) 1.36 (ov)	1.50 (ov) 2.10 m
8	1.82 m	1.92	1.57 m	1.20~1.26 m	1.50 (ov)
9	0.86 m	0.82	1.28 (ov)	0.36~0.42 m	0.92 m
11	1.41 m	1.33, 1.38	2.45 dd(10.9, 3.0) 1.44 (ov)	1.08 (ov) 1.27 (ov)	1.32 m 1.46 m
12	1.09 m, 1.73 m	1.03, 1.64	1.68 (ov), 1.19 (ov)	0.93 (ov), 1.58 (ov)	1.15 m, 1.72 (ov)
14	1.06 m	0.96	1.14 m	0.89 (ov)	0.88 m
15	1.44 m	1.36	2.00 (ov), 1.25 (ov)	1.27 (ov) 1.88~1.92 m	1.50 m, 1.88 m
16	4.98 m	4.40	4.39 q(6.0)	4.70~4.74 m	4.79 (ov)
17	1.94 m	1.70	1.74 (ov)	2.34~2.37 m	2.44 d(10.5)
18	0.86 s	0.75 s	0.87 s	0.70 s	0.71 s
19	0.88 s	0.98 s	1.12 s	0.59 s	1.06 s

Table 3-11-9 (continued)

H	3-11-32	3-11-33	3-11-34	3-11-35	3-11-39
20	2.21 dq(6.5, 7.5)	2.16	2.22 (ov)		
21	1.31 d(7.0)	1.12 d(6.9)	1.04 d(6.6)	1.55 s	1.63 s
23	1.95 m, 2.04 m	0.93, 1.70	1.66 (ov), 1.86 (ov)	1.94 (ov)	2.22 m, 2.23 m
24	1.74 m, 2.00 m	1.72	1.63 (ov), 1.18 (ov)	(ov)	1.46 (ov), 1.82 (ov)
25	1.91 m	1.84	1.78 (ov)	1.78~1.84 m	1.94 m
26	3.46 dd(6.5, 9.5)	3.54	3.76 dd(9.5, 4.5)	3.53 (ov), 4.08 (ov)	3.62 dd(6.0, 9.5)
	4.06 m		3.42 dd(9.5, 3.5)		3.94 (ov)
27	1.01 d(7.0)	0.94 s	0.98 d(6.6)	0.94 d(6.4)	1.01 d(6.5)
22-OMe		3.24 s	3.15 s		
1'	4.89 d(7.5)	4.89 d(7.5)	4.21 d(7.8)	4.83 d(7.4)	4.89 d(8.0)
2'	3.98 m	4.10	3.28 dd(9.5, 7.8)	4.31 (ov)	4.54 (ov)
3'	4.05 m	4.10	3.35 t(9.5)	4.09 (ov)	4.26 (ov)
4'	4.57 m	4.14	3.38 t(9.5)	4.50 (ov)	4.58 (ov)
5'	4.48 m	3.58	3.29 m	3.70~3.74 m	4.24 (ov)
6'	4.18 m, 4.73 m	3.98, 4.13	3.89 dd(12.0, 3.5)	4.14 (ov), 4.46 (ov)	4.18 (ov), 4.56 (ov)
			3.69 dd(12.0, 5.0)		
1''	5.12 d(8.0)	6.20 s	4.41 d(7.5)	5.03 d(7.5)	6.25 s
2''	4.14 m	4.75	3.56 dd(9.5, 7.5)	4.20 (ov)	4.76 m
3''	4.09 m	4.55	3.74 t(9.5)	3.99 (ov)	4.60 m
4''	4.20 m	4.30	3.43 t(9.5)	4.31 (ov)	4.32 t(9.5)
5''	4.23 m	4.83	3.52 m	3.97 (ov)	4.96 m
6''	4.34 m, 4.58 m	1.68 d(6.2)	4.41 dd(12.0, 3.0)	4.26 (ov), 4.36 (ov)	1.71 d(6.0)
			4.33 dd(12.0, 5.0)		
OAc			2.05 s(6''-OAc)		
1'''	5.21 d(7.5)	5.66 s	4.51 d(7.5)	5.45 d(7.7)	5.17 d(8.5)
2'''	4.00 m	4.48	3.28 dd(9.0, 7.5)	3.93 (ov)	4.08 m
3'''	4.24 m	4.43	3.29 t(9.0)	4.09 (ov)	4.19 m
4'''	4.21 m	4.31	3.32 t(9.0)	4.02 (ov)	4.02 m
5'''	3.78 m	4.72	3.41 m	3.81 (ov)	3.95 m
6'''	4.34 m, 4.56 m	1.48 d(6.0)	3.93 dd(12.0, 3.0)	4.28 (ov)	4.40 m
			3.66 dd(12.0, 5.5)	4.52 (ov)	4.60 m
1''''	4.78 d(7.5)	6.12 s	5.48 d(1.8)	5.04 d(7.7)	4.82 d(7.5)
2''''	4.01 m	4.39	3.96 dd(2.5, 1.8)	3.81 (ov)	4.02 m
3''''	4.26 m	4.43	3.69 dd(9.0, 2.5)	4.02 (ov)	4.24 m
4''''	4.23 m	4.30	3.44 t(9.0)	4.25 (ov)	4.24 m
5''''	3.96 m	4.23	4.14 m	3.56 t(10.3), 4.11 (ov)	3.96 m
6''''	4.55 m, 4.35 m	1.51 d(5.2)	1.25 d(6.5)		4.40 m, 4.57 m
1'''''		4.76 d(7.9)		4.71 d(7.5)	
2'''''		3.93		3.92 (ov)	
3'''''		4.20		4.15 (ov)	
4'''''		4.09		4.01 (ov)	
5'''''		3.90		3.83 (ov)	
6'''''		4.25, 4.46		4.18 (ov), 4.36 (ov)	

Table 3-11-10: ^1H NMR spectroscopic data of steroidal saponins **3-11-40~3-11-44**.

H	3-11-40	3-11-41	3-11-42	3-11-43	3-11-44
1	0.98 m, 1.71 m	0.98 m, 1.74 m	1.70 (ov), 0.95 (ov)	1.72 (ov), 0.96 (ov)	1.71 (ov), 0.95 m
2	2.14 m, 2.15 m	1.85 m, 2.09 m	2.05 (ov), 1.83 (ov)	2.05 (ov), 1.83 (ov)	2.10 m, 1.87 (ov)
3	3.90 m	3.87 m	3.85 m	3.86 m	3.93 (ov)
4	2.73 m, 2.78 m	2.71 m, 2.78 m	2.76 br d(10.5) 2.70 br t(12.0)	2.77 br d(10.0) 2.70 br t(12.0)	2.78 br d(10.0) 2.72 br t(12.0)
6	5.30 d(4.0)	5.30 d(4.2)	5.29 br s	5.29 br s	5.28 br s
7	1.51 (ov), 2.11 m	1.50 m, 1.87 m	1.43 m, 1.83 (ov)	1.44 m, 1.83 (ov)	1.44 m, 1.84 (ov)
8	1.49 (ov)	1.52 m	1.50 t(4.0)	1.49 m	1.52 m
9	0.93 m	0.91 m	0.84 m	0.88 m	0.84 m
11	1.32 m, 1.46 m	1.43 m, 1.46 m	1.40 m	1.40 m	1.40 m
12	1.13 m, 1.71 (ov)	1.15 m, 1.73 m	1.17 d(7.0), 1.86 (ov)	1.16 m, 1.90 m	1.16 d(7.0), 1.88 (ov)
14	0.88 m	0.87 m	0.95 (ov)	0.96 (ov)	0.97 d(6.5)
15	1.50 m, 1.87 m	1.50 m, 2.12 m	1.54 d(5.0), 2.05 (ov)	1.53 d(4.0), 2.06 (ov)	1.50 m, 2.06 (ov)
16	4.80 (ov)	4.79 m	5.19 dd(10.5, 7.0)	5.20 dd(10.0, 7.0)	5.19 dd(9.5, 6.5)
17	2.43 d(10.0)	2.44 d(10.2)	2.21 d(6.0)	2.22 d(6.0)	2.22 d(6.0)
18	0.69 s	0.72 s	0.89 s	0.90 s	0.89 s
19	1.06 s	1.05 s	1.04 s	1.04 s	1.03 s
21	1.61 s	1.63 s	1.70 s	1.72 s	1.71 s
23	2.22 m, 2.23 m	2.22 m	4.50 (ov)	4.50 (ov)	4.49 (ov)
24	1.43 (ov) 1.84 (ov)	1.47 1.83 m	2.49 m 2.13 q(7.0)	2.40 m 2.26 q(7.5)	2.38 m 2.25 t(7.5)
25	1.94 m	1.93 m	2.07 (ov)	2.05 (ov)	2.03 (ov)
26	3.48 dd(7.0, 9.5) 4.06 (ov)	3.61 dd(6.0, 9.0) 3.94 m	4.13 dd(9.5, 6.0) 3.50 dd(9.5, 7.5)	3.96 dd(9.5, 7.5) 3.68 dd(9.5, 6.0)	3.93 dd(9.5, 7.5) 3.66 dd(9.5, 6.0)
27	1.00 d(6.0)	1.02 d(6.6)	1.05 d(5.0)	1.05 d(6.5)	1.04 d(5.5)
1'	4.89 d(8.0)	4.95 d(7.2)	4.93 d(8.0)	4.94 d(7.0)	4.96 d(7.5)
2'	4.52 (ov)	4.20 m	4.20 (ov)	4.22 (ov)	4.26 (ov)
3'	4.26 (ov)	4.25 m	4.20 (ov)	4.22 (ov)	4.23 (ov)
4'	4.57 (ov)	4.34 dd(9.6, 9.6)	4.36 t(9.5)	4.39 t(9.0)	4.10 t(9.0)
5'	4.24 (ov)	3.76 m	3.62 m	3.59 m	3.87 m
6'	4.17 (ov), 4.56 (ov)	4.21, 4.30 m	4.19 (ov)	4.18 (ov)	4.46 br d(12.0)
1''	6.24 s	6.28 br s	4.08 br d(12.0) 6.38 br s	4.02 br d(12.0) 6.40 br s	4.31 br d(11.5) 6.36 br s
2''	4.76 m	4.78 m	4.80 br s	4.89 br s	4.78 br s
3''	4.60 m	4.58 dd(3.0, 9.6)	4.60 dd(9.0, 2.5)	4.64 dd(9.0, 2.5)	4.60 dd(10.0, 2.5)
4''	4.32 t(9.5)	4.34 dd(9.6, 9.6)	4.33 t(9.0)	4.36 t(9.0)	4.32 t(9.5)

Table 3-11-10 (continued)

H	3-11-40	3-11-41	3-11-42	3-11-43	3-11-44
5''	4.96 m	4.94 (ov)	4.93 m	4.94 m	4.96 m
6''	1.71 d(6.0)	1.77 d(6.0)	1.74 d(5.5)	1.76 d(6.5)	1.75 d(6.0)
1'''	5.16 d(8.5)	5.92 br s	5.83 br s	5.84 br s	4.80 d(8.0)
2'''	4.07 m	4.84 (ov)	4.66 br s	4.55 (ov)	4.00 t(8.5)
3'''	4.19 m	4.83 (ov)	4.50 dd(8.5, 2.5)	4.54 (ov)	4.20 (ov)
4'''	4.03 m	4.85 (ov)	4.30 t(8.5)	4.43 t(9.5)	4.20 (ov)
5'''	3.95 m	4.16 dd(3.6, 12.0)	4.89 m	4.97 m	3.90 m
		4.26 m			
6'''	4.38 m, 4.59 m		1.60 d(6.0)	1.58 d(6.0)	4.52 dd(11.5, 2.5)
					4.36 dd(11.5, 5.0)
1''''	4.82 d(7.5)	4.83 d(7.8)	4.81 d(8.0)	6.28 br s	
2''''	4.03 m	4.03 m	4.00 t(8.5)	4.90 br s	
3''''	4.24 m	4.24 m	4.20 (ov)	4.54 dd(9.0, 2.5)	
4''''	4.24 m	4.23 m	4.21 (ov)	4.29 t(9.0)	
5''''	3.96 m	3.95 m	3.91 m	4.35 m	
6''''	4.39 m, 4.55 m	4.40 dd(5.4, 12.0)	4.52 dd(11.5, 3.0)	1.58 d(5.5)	
		4.56 dd(1.8, 12.0)	4.36 dd(11.5, 4.5)		
1'''''				4.83 d(8.0)	
2'''''				4.01 t(9.0)	
3'''''				4.22 (ov)	
4'''''				4.22 (ov)	
5'''''				3.92 m	
6'''''				4.52 dd(12.0, 3.5)	
				4.38 dd(12.0, 4.5)	

Table 3-11-11: ¹H NMR spectroscopic data of steroidal saponins 3-11-46~3-11-50.

H	3-11-46	3-11-47	3-11-48	3-11-49	3-11-50
1	0.69 m, 1.31 m	—	—	0.70, 1.21	0.75, 1.30
2	1.58 m, 2.00 m	—	1.36 m, 1.88 m	1.40, 2.01	1.55, 1.95
3	3.87 m	4.23 m	4.28 m	3.90	3.85
4	1.28 m, 1.80 m	—	—	1.45, 1.65	1.32, 1.80
5	0.86 m	2.24 m	2.20 m	0.82	0.85
6	1.12 m	—	—	1.10	1.15
7	0.70 m, 1.52 m	0.89 m, 1.29 m	0.89 m, 1.28 m	0.71, 1.52	0.77, 1.50
8	1.72 m	1.76 m	1.85 m	1.79	1.63

Table 3-11-11 (continued)

H	3-11-46	3-11-47	3-11-48	3-11-49	3-11-50
9	0.89 m	1.71 m	1.69 m	1.89	0.87
11	2.22 m, 2.39 m	2.17 dd(4.1, 13.1) 2.35 m	2.21 m, 2.36 m	2.20, 2.35	2.20, 2.30
14	1.34 m	1.42 m	1.42 m	1.25	1.12
15	1.60 m, 2.10 m	—	—	1.51, 1.98	1.55, 2.12
16	4.86 m	4.91 dd(7.3, 14.2)	4.93 m	4.90	4.69
17	2.89 m	2.94 t(7.3)	2.95 t(7.6)	2.88	3.38 d(10.2)
18	1.11 s	1.12 s	1.12 s	1.10 s	0.90 s
19	0.67 s	0.95 s	0.96 s	0.62 s	0.63 s
20	2.18 m	2.21 m	2.21 m	2.17	
21	1.53 d(7.2)	1.55 d(6.7)	1.56 d(6.7)	1.52 d(6.4)	1.72 s
23	2.03 m	2.04 m(2H)	2.03 m, 2.20 m	1.82	2.20
24	1.65 m, 2.04 m	1.66 m, 2.01 m	1.66 m, 2.19 m	2.00	1.42, 1.79
25	1.91 m	1.91 m	2.06 m	1.90	1.90
26	3.61 dd(6.0, 9.0)	3.61 dd(6.2, 9.7)	3.61 m, 3.95 m	3.57, 3.90	3.60, 3.87
	4.08 m	3.94 m			
27	0.98 d(6.6)	0.97 d(6.6)	0.97 d(4.1)	0.92 d(6.5)	1.00 d(6.6)
1'	4.86 d(7.2)	4.80 d(7.4)	4.89 d(7.7)	4.85 d(7.2)	4.87 d(7.2)
2'	4.45 m	—	4.68 t(8.8)	4.28	4.32
3'	4.05 m	4.37 m	4.39 m	4.09	4.08
4'	4.55 m	4.77 d(2.4)	4.57 br s	4.55	4.54
5'	4.06 m	—	—	—	4.01
6'	4.22 m, 4.75 m	—	—	4.56, 4.49	4.35, 4.53
1''	5.12 d(7.8)	5.58 d(7.8)	5.30 d(7.6)	5.15 d(7.6)	5.15 d(8.0)
2''	4.12 m	4.02 m	—	4.51	4.51
3''	3.92 m	—	—	4.11	4.11
4''	3.92 m	4.17 t(9.1)	4.21 t(9.2)	3.75	3.74
5''	3.86 m	—	—	3.88	3.85
6''	4.33 m, 4.57 m	—	—	4.02, 4.49	4.00, 4.49
1'''	5.20 d(7.2)	5.40 d(7.7)	4.83 d(7.7)	5.45 d(7.7)	5.45 d(8.0)
2'''	4.04 m	—	—	4.60	4.57
3'''	4.22 m	—	4.22 t(9.2)	3.90	3.88
4'''	3.96 m	—	4.33 t(9.2)	4.22	4.25
5'''	3.93 m	—	3.85 m	4.01	4.01
6'''	4.07 m, 4.61 m	—	—	4.17, 4.68	4.15, 4.63
1''''	4.79 d(7.2)	4.83 d(7.1)		5.10 d(7.2)	5.04 d(7.2)
2''''	4.04 m	—		3.92	3.91
3''''	4.22 m	—		4.20	3.96
4''''	4.21 m	4.19 m		4.07	4.04
5''''	3.79 m	—		3.58, 4.19	3.55, 4.17
6''''	4.35 m, 4.55 m	—			
1'''''				4.79 d(7.7)	4.81 d(8.0)
2'''''				4.04	4.01
3'''''				4.22	4.20
4'''''				3.97	4.18
5'''''				4.01	3.92
6'''''				4.39, 4.66	4.59, 4.37

Table 3-11-12: ¹H NMR spectroscopic data of steroidal saponins **3-11-51~3-11-55**.

H	3-11-51	3-11-52	3-11-53	3-11-54	3-11-55
1	0.97 d(3.5), 1.69 (ov)	1.80 m	0.95, 1.67 (ov)	0.92, 1.67 (ov)	3.83 dd(11.4, 3.7)
2	1.84 (ov), 2.07 d(8.0)	1.97 m, 2.17 m	1.85, 2.06 (ov)	1.83, 2.06 (ov)	—
3	3.87 m	3.88 m	3.87 m	3.85 m	3.87 m
4	2.79 dd(13.0, 3.5) 2.71 (ov)	2.85 m	2.70, 2.78 m	2.71, 2.80 m	—
6	5.28 br s	5.43 s	5.30 br s	5.28 br s	5.58 d(5.5)
7	1.44 (ov), 1.71 m	1.65 m, 1.93 m	1.85 (ov)	1.87 (ov)	—
8	1.41 d(4.0)	1.65 m	1.45 (ov)	1.52 (ov)	—
9	0.99 (ov)	1.06 m	0.85 (ov)	0.90 (ov)	—
11	1.36 (ov), 1.44 (ov)	1.53 m	1.44 (ov)	1.48 (ov)	—
12	1.31 (ov), 1.83 (ov)	1.70 m	1.08, 2.12 (ov)	1.10, 2.46 (ov)	—
14	1.33 m	1.58 m	0.81 m	0.84 m	—
15	1.69 (ov), 2.03 d(7.5)	2.36 d(11.5)	1.31, 2.40 (ov)	1.55, 2.42 (ov)	—
16	—	—	5.67 m	5.75 m	5.60 m
17	2.73 (ov)	2.54 d(6.8)	2.47 d(9.6)	2.49 d(9.0)	—
18	0.66 s	0.85 s	1.20 s	1.20 s	1.21 s
19	1.04 s	1.11 s	1.04 s	1.03 s	1.42 s
20	2.70 (ov)	2.85 m	—	—	—
21	1.02 d(6.5)	1.58 d(5.0)	2.11 s	2.10 s	2.08 s
23	3.13 m 3.01 m	2.70 m 2.85 m	1.32 2.43 (ov)	4.68 m	—
24	2.21 (ov)	2.10 m	1.54, 1.88 (ov)	1.94, 2.39 (ov)	—
25	2.20 (ov)	2.00 m	1.80 (ov)	1.86 (ov)	—
26	4.14 br s	4.04 d(4.8)	3.46, 3.95 m	4.09, 4.20 m	4.53 d(12.5) 4.26 m
27	4.16 br s	1.06 d(4.4)	0.88 d(6.3)	1.04 d(5.7)	5.31 br s 4.98 br s
1'	4.95 d(7.5)	4.97 m	4.94 d(7.8)	4.95 d(6.9)	4.72 d(7.0)
2'	4.24 (ov)	4.20 m	4.44	4.42	4.58 m
3'	4.24 (ov)	4.22 m	4.45	4.22	4.15 m
4'	4.41 t(9.0)	4.00 m	4.21	4.40	4.15 m
5'	3.66 m	4.22 m	3.87	3.85	4.24 m
6'	4.22 (ov) 4.09 brd(11.5)	4.28 m	4.10, 4.23	4.12, 4.25	4.24 m 3.66 d(11.8)
1''	6.42 br s	6.32 br s	6.38 br s	6.41 br s	6.29 br s
2''	4.84 br s	4.59 m	4.80	4.81	4.70 m
3''	4.64 brd(6.0)	4.18 m	4.60	4.60	4.61 dd(9.1, 3.1)
4''	4.37 t(9.5)	4.36 m	4.35	4.36	4.26 m
5''	4.97 m	4.05 m	4.92	4.94	4.80 m
6''	1.77 d(6.5)	1.78 d(6.7)	1.74 d(6.0)	1.75 d(5.4)	1.71 d(6.2)
1'''	5.87 br s	5.11 m	5.11 d(7.0)	5.87 br s	4.86 d(7.7)
2'''	4.69 br s	4.05 m	4.03	4.68	4.03 t(7.7)
3'''	4.55 d(6.5)	4.20 m	4.30	4.55	4.20 m
4'''	4.36 t(9.0)	4.16 m	4.32	4.32	4.19 m

Table 3-11-12 (continued)

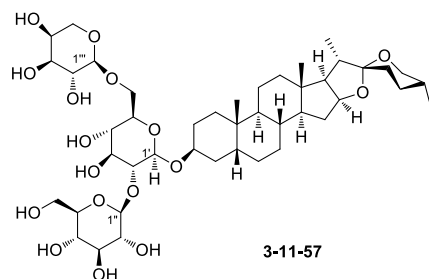
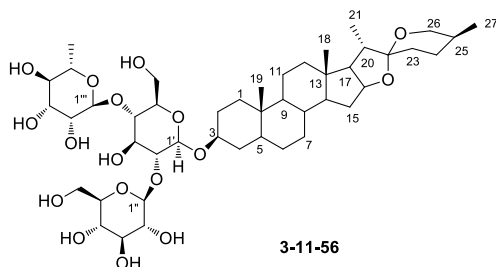
H	3-11-51	3-11-52	3-11-53	3-11-54	3-11-55
5'''	4.95 m	4.03 m	4.05	4.92	3.92 m
6'''	1.63 d(6.0)	4.38 m	4.28, 4.40	1.62 d(5.4)	4.53 d(11.8) 4.37 dd(11.8, 5.3)
1''''		4.87 d(7.2)	4.79 d(7.2)	4.80 d(7.2)	
2''''		4.05 m	4.01	4.03	
3''''		4.03 m	4.27	4.28	
4''''		4.90 m	4.32	4.30	
5''''		4.22 m	4.00	4.02	
6''''		4.20 m	4.34, 4.47	4.36, 4.49	

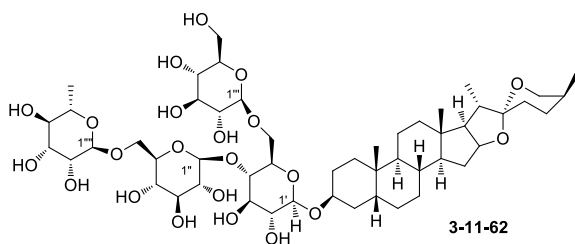
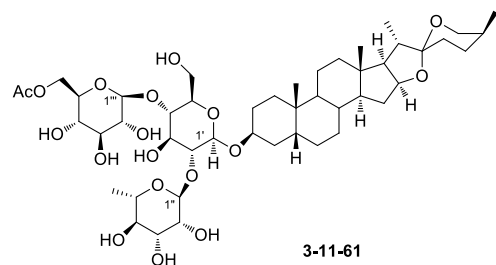
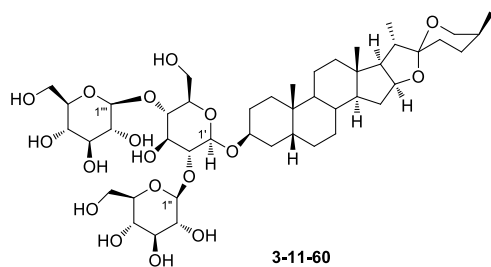
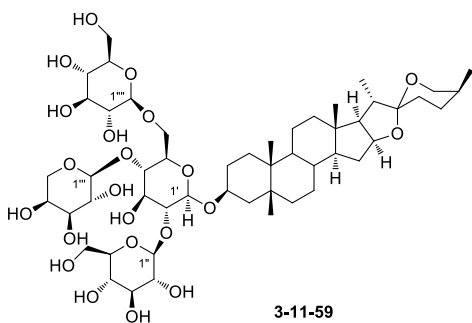
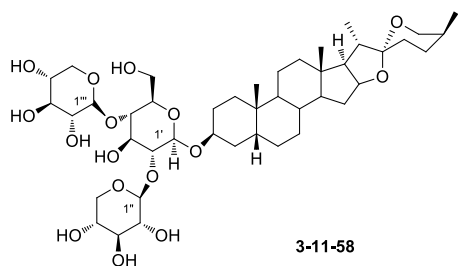
Table 3-11-13: Cos, MFs, and TSs of steroidal saponins 3-11-56~3-11-86.

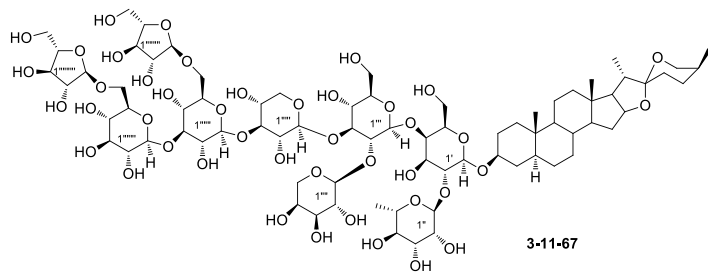
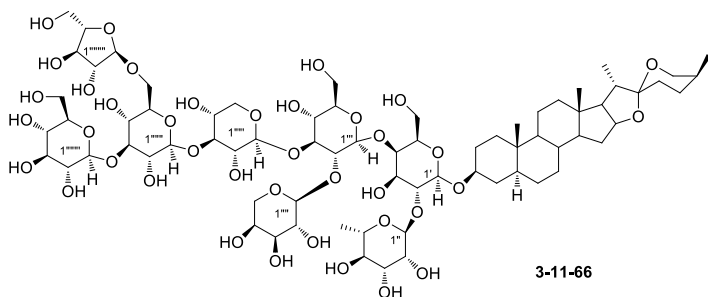
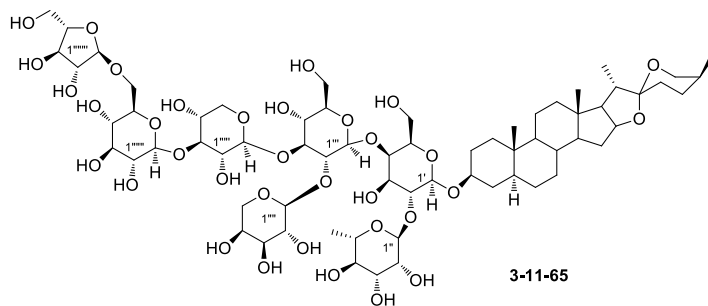
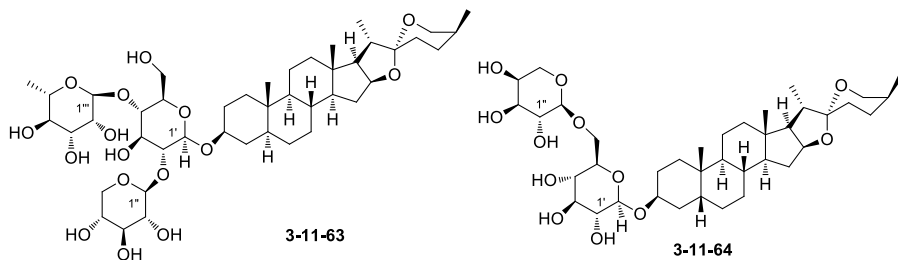
No.	Compounds	MFs	Test solvents	References
3-11-56	shatavarin IV	C ₄₅ H ₇₄ O ₁₇	C ₅ D ₅ N	[282]
3-11-57	(25 <i>R</i>)-5β-spirostane-3β-ol-3- <i>O</i> -{β-D-glucopyranosyl-(1→2)-[α-L-arabinopyranosyl-(1→6)]-β-D-glucopyranoside}	C ₄₄ H ₇₂ O ₁₇	C ₅ D ₅ N	[283]
3-11-58	(25 <i>S</i>)-5β-spirostane-3β-ol-3- <i>O</i> -β-D-xylopyranosyl-(1→2)-[β-D-xylopyranosyl-(1→4)]-β-D-glucopyranoside	C ₄₃ H ₇₀ O ₁₆	C ₅ D ₅ N	[279]
3-11-59	shatavarin VIII	C ₅₀ H ₈₂ O ₂₂	C ₅ D ₅ N	[300]
3-11-60	shatavarin IX	C ₄₅ H ₇₄ O ₁₈	C ₅ D ₅ N	[300]
3-11-61	shatavarin X	C ₄₇ H ₇₆ O ₁₈	C ₅ D ₅ N	[300]
3-11-62	racemoside A	C ₅₁ H ₈₄ O ₂₂	C ₅ D ₅ N	[301]
3-11-63	filiasparoside C	C ₄₄ H ₇₂ O ₁₆	C ₅ D ₅ N	[302]
3-11-64	filiasparoside D	C ₃₈ H ₆₂ O ₁₂	C ₅ D ₅ N	[302]
3-11-65	orchidastroside A	C ₆₆ H ₁₀₈ O ₃₄	C ₅ D ₅ N	[303]
3-11-66	orchidastroside B	C ₇₂ H ₁₁₈ O ₃₉	C ₅ D ₅ N	[303]
3-11-67	orchidastroside C	C ₇₇ H ₁₂₆ O ₄₃	C ₅ D ₅ N	[303]
3-11-68	(25 <i>S</i>)-5β-spirostane-3β-ol-3- <i>O</i> -α-L-rhamnopyranosyl-(1→2)-β-D-glucopyranosyl-(1→2)-β-D-glucopyranoside	C ₄₅ H ₇₄ O ₁₇	C ₅ D ₅ N	[280]
3-11-69	shatavaroside A	C ₄₄ H ₇₂ O ₁₆	DMSO- <i>d</i> ₆	[304]
3-11-70	shatavaroside B	C ₅₀ H ₈₂ O ₂₁	C ₅ D ₅ N	[304]
3-11-71	hemeroside B	C ₅₀ H ₈₂ O ₂₃	C ₅ D ₅ N	[305]
3-11-72	orchidastroside D	C ₆₆ H ₁₀₈ O ₃₅	C ₅ D ₅ N	[303]
3-11-73	orchidastroside E	C ₇₃ H ₁₂₀ O ₄₂	C ₅ D ₅ N	[303]
3-11-74	orchidastroside F	C ₆₇ H ₁₁₀ O ₃₇	C ₅ D ₅ N	[303]
3-11-75	chlorogenin-3- <i>O</i> -[α-L-rhamnopyranosyl-(1→4)-β-D-glucopyranosyl-(1→3)-{β-D-glucopyranosyl-(1→3)-β-D-glucopyranosyl-(1→2)}-β-D-glucopyranosyl-(1→4)-β-D-galactopyranoside]	C ₆₃ H ₁₀₄ O ₃₃	C ₅ D ₅ N	[306]

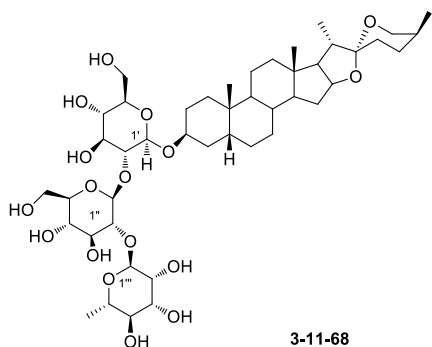
Table 3-11-13 (continued)

No.	Compounds	MFs	Test solvents	References
3-11-76	—	C ₄₅ H ₇₄ O ₁₈	C ₅ D ₅ N	[307]
3-11-77	(25 <i>R</i>)-12β-hydroxy-5α-spirostan-3β-yl- <i>O</i> -β-D-glucopyranosyl-(1→3)- <i>O</i> -β-D-glucopyranosyl-(1→2)- <i>O</i> -[<i>O</i> -α-L-rhamnopyranosyl-(1→4)-β-D-glucopyranosyl-(1→3)]- <i>O</i> -β-D-glucopyranosyl-(1→4)-β-D-galactopyranoside	C ₆₃ H ₁₀₄ O ₃₃	C ₅ D ₅ N	[308]
3-11-78	solanigriside G	C ₅₀ H ₈₂ O ₂₃	C ₅ D ₅ N	[309]
3-11-79	aspaoligonin A	C ₃₉ H ₆₄ O ₁₄	C ₅ D ₅ N	[310]
3-11-80	aspaoligonin B	C ₄₄ H ₇₂ O ₁₇	C ₅ D ₅ N	[310]
3-11-81	(25 <i>S</i>)-5β-spirostan-3β,17α-diol-3- <i>O</i> -β-D-xylopyranosyl-(1→2)-[β-D-xylopyranosyl-(1→4)]-β-D-glucopyranoside	C ₄₃ H ₇₀ O ₁₇	C ₅ D ₅ N	[279]
3-11-82	(25 <i>S</i>)-5β-spirostan-3β,17α-diol-3- <i>O</i> -β-D-glucopyranosyl-(1→2)-[β-D-xylopyranosyl-(1→4)]-β-D-glucopyranoside	C ₄₄ H ₇₂ O ₁₈	C ₅ D ₅ N	[279]
3-11-83	aspafliside E	C ₄₃ H ₇₀ O ₁₇	C ₅ D ₅ N	[311]
3-11-84	aspafliside F	C ₃₈ H ₆₂ O ₁₃	C ₅ D ₅ N	[311]
3-11-85	sarsasapogenin M	C ₃₉ H ₆₄ O ₁₄	C ₅ D ₅ N	[312]
3-11-86	sarsasapogenin N	C ₄₅ H ₇₄ O ₁₇	C ₅ D ₅ N	[312]

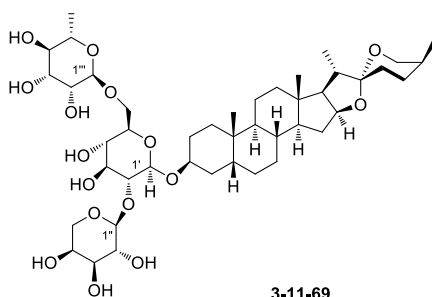




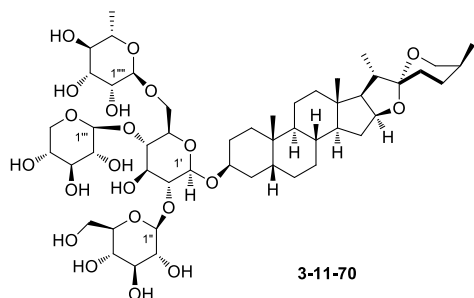




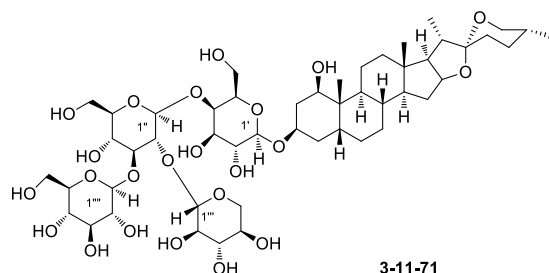
3-11-68



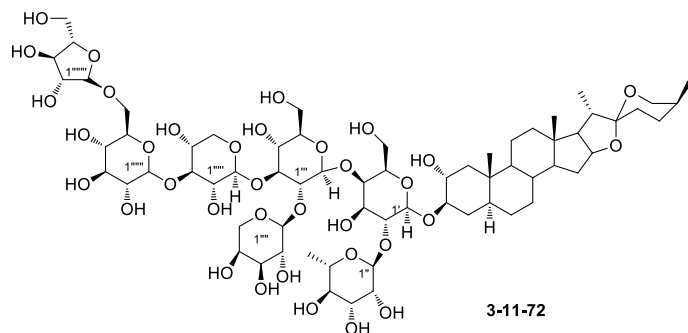
3-11-69



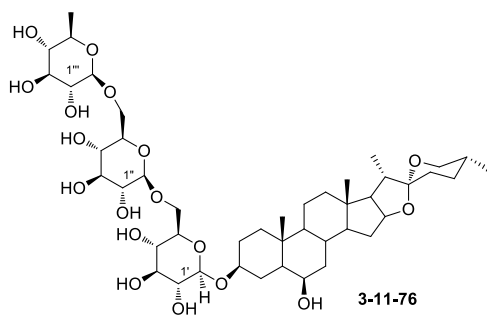
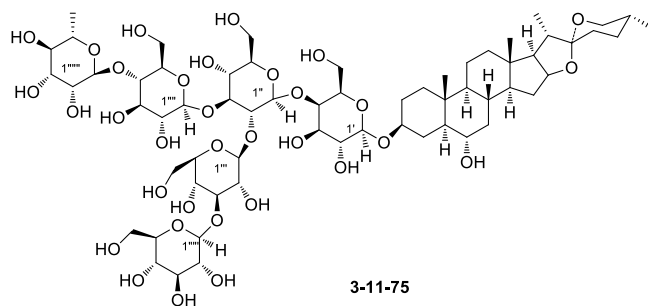
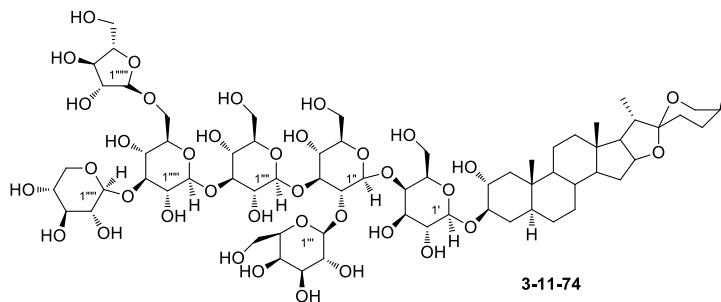
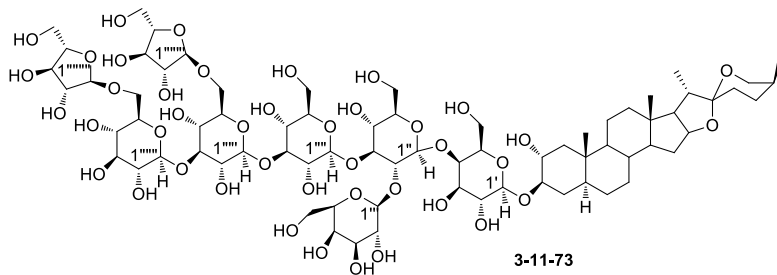
3-11-70

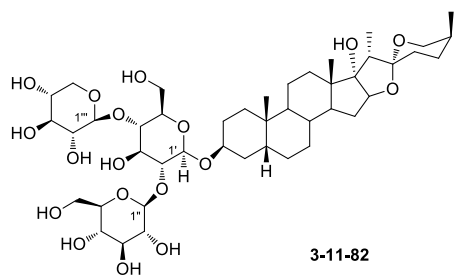
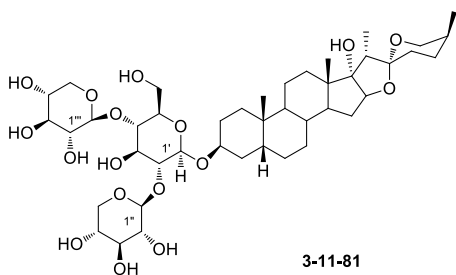
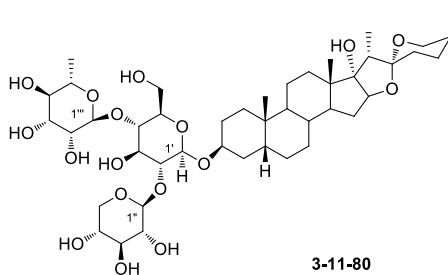
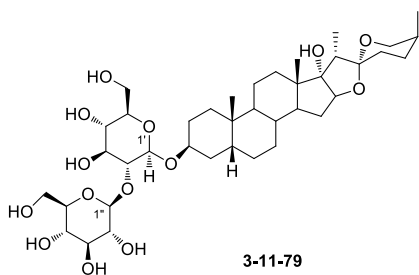
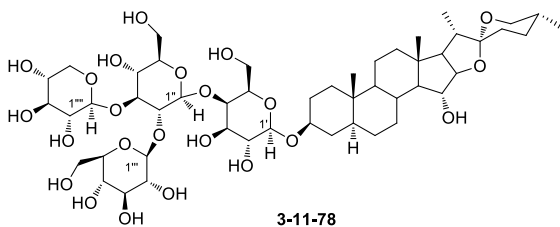
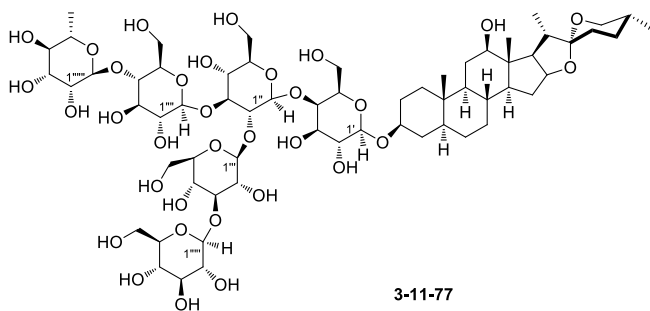


3-11-71



3-11-72





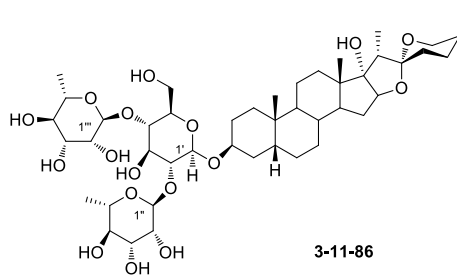
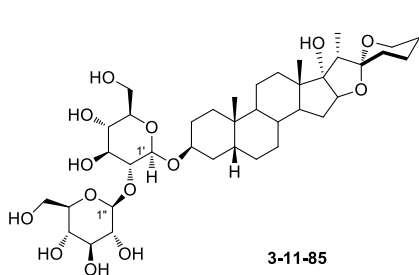
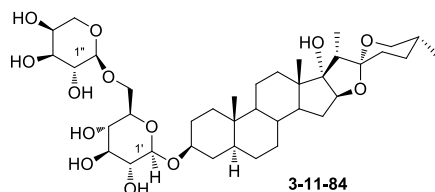
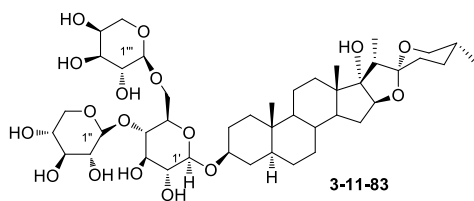


Table 3-11-14: ^1H NMR spectroscopic data of steroidal saponins **3-11-56**–**3-11-60**.

H	3-11-56	3-11-57	3-11-58	3-11-59	3-11-60
1	0.94 m 1.24 m	1.86 1.55	1.42 (ov) 1.76 (ov)	1.46 m (ov) 1.83 m (ov)	1.45 m (ov) 1.81 m (ov)
2	1.45 m 2.05 ddd (5.9, 7.6, 12.6)	2.01 1.53	1.44 (ov) 1.70 (ov)	1.47 m (ov) 1.82 m (ov)	1.48 m (ov) 1.85 m (ov)
3	4.26 m	4.30	4.16 m	4.22 m (ov)	4.22 m (ov)
4	1.82 m 1.82 m	1.79 1.79	1.78 (ov) n.d.	1.75 m (ov) 1.75 m (ov)	1.77 m (ov) 1.77 m (ov)
5	2.21 m	2.14	2.14 (ov)	2.22 m (ov)	2.17 m (ov)
6	1.53 m 1.91 m	1.82 1.19	1.70 (ov) 1.86 (ov)	1.18 m (ov) 1.84 m (ov)	1.15 m (ov) 1.78 m (ov)
7	1.17 m 1.79 m	1.27 0.95	1.08 (ov) 1.40 (ov)	0.92 m (ov) 1.23 m (ov)	0.92 m (ov) 1.22 m (ov)
8	1.48 m	1.51	1.44 m	1.47 m (ov)	1.47 m (ov)
9	1.28 m	1.28	1.22 (ov)	1.25 m (ov)	1.25 m (ov)
11	1.20 m 1.32 m	1.35 1.21	1.18 (ov) 1.38 (ov)	1.18 m (ov) 1.31 m (ov)	1.18 m (ov) 1.31 m (ov)

Table 3-11-14 (continued)

H	3-11-56	3-11-57	3-11-58	3-11-59	3-11-60
12	1.10 m	1.68	1.48 (ov)	1.08 m (ov)	1.06 m (ov)
	1.71 m	1.08	n.d.	1.66 m (ov)	1.67 m (ov)
14	1.06 m	1.08	1.00 (ov)	1.05 m (ov)	1.03 m (ov)
15	1.45 m	2.03	1.40 (ov)	1.40 m (ov)	1.40 m (ov)
	1.98 m	1.41	1.97 (ov)	2.09 m (ov)	2.00 m (ov)
16	4.63 dt(7.2, 7.2)	4.60	4.54 m	4.58 m (ov)	4.57 m (ov)
17	1.88 dd(6.7, 8.5)	1.86		1.81 m (ov)	1.82 m (ov)
18	0.85 s	0.82	0.76 s	0.81 s	0.81 s
19	0.97 s	1.10	0.90 s	0.98 s	0.96 s
20	1.96 dq(6.8, 6.8)	1.97	1.87 m	1.91 m (ov)	1.91 m (ov)
21	1.19 d(6.9)	1.15	1.10 d(6.9)	1.12 d(7.0)	1.14 d(7.0)
23	1.47 m	1.71	1.30 (ov)	1.45 m (ov)	1.44 m (ov)
	1.84 m	1.66	n.d.	1.90 m (ov)	1.90 m (ov)
24	1.40 m	1.57	1.07 (ov)	1.35 m (ov)	1.35 m (ov)
	2.17 dt(4.4, 12.7)	1.57	n.d.	2.12 m (ov)	2.13 m (ov)
25	1.61 m	1.60	1.54 (ov)	1.59 m (ov)	1.57 m (ov)
26	3.43 br d(10.6)	3.58	3.34 m	3.36 br d(11.0)	3.36 br d(11.6)
	4.11 dd(2.7, 11.2)	3.53	4.02 (ov)	4.07 br dd(2.2, 11.0)	4.07 dd(2.9, 11.6)
27	1.10 d(7.1)	0.71	0.98 d(5.7)	1.07 d(6.7)	1.07 d(7.2)
1'	4.87 d(7.6)	4.25 d(7.8)	4.79 d(8.1)	4.75 d(8.2)	4.84 d(8.0)
2'	4.30 dd(7.6, 9.0)	3.78	4.04 (ov)	4.11 dd(8.2, 9.2)	4.26 dd(9.2, 8.0)
3'	4.26 dd(9.0, 9.0)	5.36	4.13 (ov)	4.16 dd(9.2, 9.2)	4.29 dd(9.2, 9.2)
4'	4.34 dd(9.0, 9.0)	5.06	4.00 (ov)	4.34 dd(9.2, 9.2)	4.23 dd(9.1, 9.1)
5'	3.61 ddd (2.1, 3.6, 9.6)	3.45	3.72 (ov)	3.75 br d(9.2)	3.80 br d(9.0)
6'	4.04 dd(3.6, 12.2)	3.91	4.30 (ov)	4.60 dd(1.3, 12.0)	4.42~4.51 m
	4.19 dd(2.1, 12.2)	3.56	4.37 (ov)	4.73 dd(2.8, 12.0)	
1''	5.48 d(7.8)	4.74 d(7.8)	5.17 d(7.5)	5.36 d(8.0)	5.40 d(8.0)
2''	4.07 dd(8.4, 8.4)	5.25	3.94 (ov)	3.98 dd(8.2, 9.0)	4.02 dd(8.0, 8.8)
3''	4.27 dd(8.8, 8.8)	5.39	4.12 (ov)	4.23 dd(9.1, 9.1)	4.24 dd(8.8, 9.0)
4''	4.23 dd(8.8, 8.8)	5.32	4.20 (ov)	4.22 dd(9.2, 9.0)	4.29 dd(9.0, 9.0)
5''	3.99 ddd (2.9, 5.5, 8.8)	3.46	3.66 (ov)	3.95 ddd (3.1, 4.9, 9.2)	3.95 ddd (3.3, 5.0, 9.0)
6''	4.43 dd(5.8, 12.0)	4.51		4.44 dd(5.0, 12.0)	4.47 br d(12.0)
	4.61 dd(2.9, 12.0)	4.18		4.57 dd(3.1, 12.0)	4.56 br d(12.0)
1'''	5.78 d(1.4)	4.37 d(6.9)	4.93 d(7.4)	5.29 d(8.1)	5.14 d(8.3)
2'''	4.68 dd(1.4, 3.2)	5.45	3.86 (ov)	4.43 dd(8.2, 8.3)	4.05 dd(8.3, 8.7)
3'''	4.56 dd(3.2, 9.4)	5.17	4.06 (ov)	4.22 m (ov)	4.19 m
4'''	4.36 dd(9.4, 9.4)	5.24	4.08 (ov)	4.22 m (ov)	4.21 m
5'''	4.91 dq(6.1, 9.3)	3.72	3.58 (ov)	4.22 m (ov)	3.98 m
		3.02	4.10 (ov)		
6'''	1.67 d(6.2)				4.28 m 4.49 br d(12.0)

Table 3-11-14 (continued)

H	3-11-56	3-11-57	3-11-58	3-11-59	3-11-60
1 ^{'''}				5.27 d(8.0)	
2 ^{'''}				4.04 dd(8.0, 8.7)	
3 ^{'''}				4.22 dd(8.8, 8.8)	
4 ^{'''}				4.24 dd(9.8, 9.6)	
5 ^{'''}				3.94 ddd (2.8, 5.2, 8.6)	
6 ^{'''}				4.35 dd(5.2, 12.0)	
				4.49 dd(2.8, 12.0)	

Table 3-11-15: ¹H NMR spectroscopic data of steroidal saponins 3-11-61~3-11-64 and 3-11-68.

H	3-11-61	3-11-62	3-11-63	3-11-64	3-11-68
1	1.50 m (ov) 1.84 m (ov)	1.78 dd(3.6, 11.4) 1.46 (ov)	1.46 m, 1.82 m	1.68 m, 1.76 m	1.28 (ov)
2	1.51 m (ov) 1.85 m (ov)	1.92 (ov), 1.46 (ov)	1.49 m, 1.92 m	1.70 m, 1.98 m	1.52 (ov) 1.80 (ov)
3	4.22 m (ov)	4.28 (ov)	4.22 m	4.38 m	4.26 m
4	1.82 m (ov) 1.825 m (ov)	1.75 (ov), 1.85 (ov)	1.50 m, 1.78 m	1.48 m, 1.70 m	1.70 (ov)
5	2.16 m (ov)	2.15 (ov)	2.14 m	1.98 m	2.35 (ov)
6	1.35 m (ov), 1.98 m (ov)	1.77 (ov), 1.14 (ov)	1.28 m, 1.34 m	1.02, 1.05 m	1.30 (ov), 1.40 (ov)
7	0.98 m (ov), 1.28 m (ov)	1.19 (ov)	0.97 m, 1.31 m	0.93, 1.22 m	(ov)
		0.91 br d(10.8)			
8	1.54 m (ov)	1.46 (ov)	1.53 m	1.45 m	1.30 m
9	1.31 m (ov)	1.24 (ov)	1.02 m	1.02 m	1.28 (ov)
11	1.22 m (ov) 1.32 m (ov)	1.31 (ov), 1.14 (ov)	1.32 m	1.26 m, 1.30 m	1.10 (ov)
12	1.08 m (ov) 1.68 m (ov)	1.66 (ov), 1.04 (ov)	1.29 m	1.24 m, 1.64 m	1.00 (ov), 1.60 (ov)
14	1.08 m (ov)	1.04 (ov)	1.08 m	1.03 m	1.00 (ov)
15	1.38 m (ov) 2.01 m (ov)	2.01 ddd (4.8, 7.2, 11.4) 1.46 (ov)	1.38 m 2.01 m	1.38 m 2.00 m	1.30 (ov) 1.62 (ov)
16	4.56 m (ov)	4.35 (ov)	4.55 m	4.57 m	4.55 m
17	1.81 m (ov)	1.80 dd(6.6, 8.4)	1.80 m	1.82 m	1.80 dd(6.7, 8.8)
18	0.81 s	0.82 s	0.78 s	0.78 s	0.74 s
19	1.06 s	0.96 s	1.06 s	0.80 s	0.88 s
20	1.90 m (ov)	1.83 (ov)	1.88 m	1.99 m	1.84 m

Table 3-11-15 (continued)

H	3-11-61	3-11-62	3-11-63	3-11-64	3-11-68
21	1.14 d(7.0)	1.17 d(6.6)	1.12 d(6.6)	1.14 d(7.0)	1.10 d(6.7)
23	1.42 m (ov)	1.89 br d(9.6)	1.38 m	1.42 m	1.25 (ov)
	1.88 m (ov)	1.24 (ov)	1.88 m	1.88 m	1.95 (ov)
24	1.34 m (ov)	2.15 (ov)	1.43 m	1.33 m	1.30 (ov)
	2.13 m (ov)	1.37 (ov)	2.13 m	2.12 m	2.08 (ov)
25	1.56 m (ov)	1.66 (ov)	1.57 m	1.56 m	1.80
26	3.36 br d(11.6)	4.10 (ov)	3.34 d(11.3)	3.36 d(9.3)	3.34 d(10.9)
	4.06 br dd (2.6, 11.6)	3.38 d(10.8)	4.04 m	4.04 m	4.00 (ov)
27	1.06 d(7.2)	1.09 d(6.6)	1.04 d(7.0)	1.04 d(7.0)	0.99 d(6.9)
1'	4.82 d(7.8)	4.82 d(7.2)	4.82 d(7.2)	4.86 d(7.8)	4.84 (ov)
2'	4.24 m (ov)	4.26 (ov)	4.20 m	4.00 m	4.34 (ov)
3'	4.22 m (ov)	4.08 t(9)	4.22 m	4.20 m	4.02
4'	4.15 dd(9.4, 9.4)	4.35 (ov)	4.25 m	4.14 m	3.94 (ov)
5'	3.84 ddd (3.3, 3.3, 9.4)	3.85 dd(5.4, 8.4)	3.78 m	4.08 m	3.82 br d(9.3)
6'	4.47 m (ov)	4.23 dd(1.8, 12) 3.64 d(11.4)	4.40 dd(3.1, 12.4) 4.50 dd(3.7, 12.4)	4.32 m 4.84 dd(2.0, 11.6)	4.12 (ov) 4.50 (ov)
1''	6.32 br d(1.1)	5.47 d(7.8)	5.02 d(7.5)	4.98 d(7.4)	5.54 d(7.5)
2''	4.72 br s	4.11 (ov)	3.96 dd(8.4, 7.5)	4.48 m	3.94 (ov)
3''	4.52 dd(3.2, 9.6)	4.33 (ov)	4.08 m	4.18 m	4.02 dd(8.6, 8.8)
4''	4.30 dd(9.6, 9.6)	4.36 (ov)	4.14 m	4.32 m	3.78 dd(8.6, 9.8)
5''	4.78 dq(6.3, 9.6)	4.05 (ov)	3.66 t(10.4)	3.76 dd(2.9, 10.5)	3.84 m
6''	1.73 d(6.3)	4.33 (ov) 4.65 dd(2.4, 11.4)	4.24 m	4.28 m	4.12 (ov) 4.32 (ov)
1'''	5.06 d(7.9)	4.78 d(7.8)	6.38 s		6.0 s
2'''	4.00 dd(8.0, 9.3)	4.43 t(8.4)	4.77 m		4.63 br s
3'''	4.17 dd(9.3, 9.3)	4.03 (ov)	4.55 m		4.52 (ov)
4'''	3.93 dd(9.3, 9.3)	4.18 (ov)	4.32 t(9.2)		4.22 (ov)
5'''	4.10 ddd (2.2, 8.0, 9.3)	4.59 (ov)	4.78 m		4.86 dq(5.9, 9.3)
6'''	4.57 dd(8.0, 12.0) 4.90 dd(2.2, 12.0)	4.62 dd(2.4, 11.4) 4.54 (ov)	1.74 d(6.3)		1.70 d(6.2)
1''''		5.59 br s			
2''''		4.67 br s			
3''''		4.56 (ov)			
4''''		4.30 t(10.2)			
5''''		4.41 t(3.6)			
6''''		1.68 d(6.6)			

Table 3-11-16: ^1H NMR spectroscopic data of steroidal saponins **3-11-65~3-11-67**, **3-11-69**, and **3-11-70**.

H	3-11-65	3-11-66	3-11-67	3-11-69	3-11-70
1	0.74, 1.49	0.75, 1.50	0.73, 1.48	1.43 m, 1.82 m	1.23 m, 1.90 m
2	1.68, 1.96	1.68, 1.96	1.68, 1.94	1.46 m, 1.90 m	1.44 m, 1.94 m
3	3.83	3.84	3.83	4.30 m (ov)	4.31 m
4	1.57, 1.84	1.83 (ov)	1.82 (ov)	1.58 m, 1.79 m	1.58 m, 1.78 m
5	0.85	0.84	0.83	2.15 m	2.16 m
6	1.10, nd	1.11, nd	1.08, nd	1.26 m, 1.34 m	1.23 m, 1.39 m
7	1.34, 1.94	1.30, 1.92	1.30, 1.90	0.94 m, 1.30 m	1.07 m, 1.31 m
8	1.34	1.33	1.31	1.60 m	1.67 m
9	0.46	0.45	0.44	1.24 m	1.23 m
11	1.32, 1.40	1.32, 1.40	1.30, nd	1.30 m	1.35 m
12	0.97, 1.60	0.98, 1.60	0.97, 1.59	1.27 m	1.27 m
14	0.96	0.96	0.93	1.09 (ov)	0.95 (ov)
15	0.72, 1.46	0.76, 1.42	0.72, 1.46	1.39, 1.94 m	1.38, 1.95 m
16	4.46	4.46	4.45	4.52 m	4.31 m
17	1.73	1.74	1.72	1.85 m	1.83 m
18	0.74 s	0.74 s	0.72 s	0.77 s	0.81 s
19	0.77 s	0.77 s	0.76 s	0.98 s	0.95 s
20	1.84	1.84	1.83	1.78 m	1.76 m
21	1.07 d(6.6)	1.07 d(6.7)	1.06 d(6.6)	1.12 d(6.7)	1.17 d(6.7)
23	1.40, 1.83	1.39, 1.82	1.38, 1.81	1.36 (ov), 1.88 (ov)	1.35 (ov), 1.87 (ov)
24	1.29, 2.08	1.30, 2.08	1.28, 2.06	1.47 (ov), 2.11 (ov)	1.44 (ov), 2.01 (ov)
25	1.52	1.54	1.52	1.56 (ov)	1.56 (ov)
26	3.32, 3.98	3.32, 3.98	3.32, 3.98	3.31 d(10.5)	3.39 d(10.5)
				3.97 m	4.09 m
27	1.00 d(6.9)	1.00 d(6.9)	0.99 d(6.6)	1.07 d(6.6)	1.09 d(6.6)
1'	4.74 d(7.6)	4.74 d(7.6)	4.74 d(7.6)	4.21 d(7.6)	4.78 d(7.3)
2'	4.24	4.23	4.23	4.19 (ov)	4.23 (ov)
3'	4.04	4.06	4.03	4.30 (ov)	4.38 (ov)
4'	4.40	4.41	4.40	4.36 (ov)	4.04 (ov)
5'	3.92	3.91	3.92	3.75 (ov)	3.84 (ov)
6'	4.11, 4.57	4.13, 4.55	4.12, 4.55	4.00 (ov)	3.82 (ov), 4.04 (ov)
				4.45 br d(11.1)	
1''	6.10 brs	6.08 brs	6.08 brs	4.10 d(7.4)	4.76 d(7.3)
2''	4.67	4.67	4.68	4.09 (ov)	3.88 (ov)
3''	4.42	4.42	4.41	4.29 (ov)	4.23 (ov)
4''	4.21	4.21	4.21	4.23 (ov)	4.27 (ov)
5''	4.78	4.78	4.76	3.82 (ov), 4.06 (ov)	4.09 (ov)
6''	1.62 d(6.1)	1.63 d(6.1)	1.62 d(6.0)		4.36 (ov), 4.52 (ov)
1'''	4.82 d(7.6)	4.81 d(7.6)	4.81 d(7.6)	4.59 brs	5.44 d(6.8)
2'''	4.04	4.04	4.03	4.55	4.09 (ov)

Table 3-11-16 (continued)

H	3-11-65	3-11-66	3-11-67	3-11-69	3-11-70
3'''	3.96	3.95	3.95	4.36	4.23 (ov)
4'''	3.86	3.87	3.86	4.62	4.27 (ov)
5'''	3.68	3.68	3.67	4.45	4.82 (ov)
6'''	3.92, 4.39	3.92, 4.39	3.91, 4.38	1.69 d(6.9)	
1''''	5.22 d(7.4)	5.21 d(7.5)	5.21 d(7.5)		5.56 br s
2''''	4.29	4.28	4.28		4.52 (ov)
3''''	3.95	3.96	3.95		4.49 (ov)
4''''	4.02	4.04	4.03		4.60 (ov)
5''''	3.50 d- like(12.1), 4.44	3.52 d- like(12.0), 4.45	3.50 d- like(12.1), 4.43		4.49 (ov)
6''''					1.66 d(6.9)
1'''''	5.16 d(7.6)	5.15 d(7.6)	5.15 d(7.6)		
2'''''	3.87	3.87	3.85		
3'''''	3.98	4.01	4.00		
4'''''	3.68	3.67	3.66		
5'''''	3.56 t- like(10.0), 4.06	3.57 t- like(10.0), 4.07	3.55 t- like(10.1), 4.04		
1''''''	4.98 d(8.3)	5.05 d(7.9)	5.05 d(7.8)		
2''''''	3.94	3.92	3.92		
3''''''	4.04	4.03	4.01		
4''''''	3.82	3.83	3.83		
5''''''	3.96	3.96	3.97		
6''''''	3.83, 4.56	3.85, 4.57	3.85, 4.54		
1'''''''	5.49 br s	5.10 d(7.8)	5.02 d(7.7)		
2'''''''	4.77	3.94	3.92		
3'''''''	4.63	4.12	4.06		
4'''''''	4.66	3.82	3.82		
5'''''''	4.09, 4.21	3.72	3.70		
6'''''''		4.24, 4.44	3.82, 4.41		
1''''''''		5.48 br s	5.47 br s		
2''''''''		4.76	4.76		
3''''''''		4.62	4.62		
4''''''''		4.64	4.65		
5''''''''		4.08, 4.20	4.10, 4.20		
1'''''''''			5.49 br s		
2'''''''''			4.74		
3'''''''''			4.60		
4'''''''''			4.64		
5'''''''''			4.09, 4.19		

Table 3-11-17: ¹H NMR spectroscopic data of steroidal saponins **3-11-71~3-11-75**.

H	3-11-71	3-11-72	3-11-73	3-11-74	3-11-75
1	3.93 dd(4.0, 5.0)	1.00, 2.07	1.00, 2.07	1.06 (ov)	0.84 m, 1.49 m
2	ax 1.40 ddd(4.0, 4.0, 13.0) eq 1.86 br dd(5.0, 13.0)	3.84	3.86	3.82	1.63 m, 2.01 m
3	3.95 m	3.80	3.82	3.82	3.87 m
4	ax 1.39 ddd(4.0, 8.0, 13.0) eq 1.87 ddd(4.0, 13.0, 13.0)	1.37 1.76	1.37 1.76	1.88 (ov)	1.47 m 1.78 br d(12.5)
5	2.10 ddd(6.0, 8.0, 13.0)	0.95	0.95	0.90	1.17 m
6	ax 1.58 m eq 1.71 ddd(4.0, 8.0, 10.0)	0.92 1.06	0.92 1.06	0.92 1.06	3.55 br d(8.8)
7	ax 1.33 m, eq 1.61 m	1.31, 1.94	1.31, 1.94	1.38, 1.93	1.14 m, 2.18 m
8	1.86 m	1.26	1.26	1.26	1.58 m
9	2.07 m	0.48	0.48	0.48	0.60 ddd(3.6, 13.1, 13.1)
11	1.63 m, 2.10 m	1.08, 1.32	1.08, 1.32	1.32, nd	1.15 m, 1.38 m
12	ax 1.79 ddd(4.0, 12.0, 12.0) eq 1.54 m	0.92, 1.54	0.92, 1.54	0.92, 1.52	1.01 ddd (4.0, 12.3, 12.3) 1.64 br d(12.3)
14	2.05 m	0.92	0.92	0.92	1.01 m
15	1.49 ddd(6.5, 11.5, 13.5) 2.03 ddd(4.0, 6.5, 13.5)	0.68, 1.42	0.68, 1.42	1.42	1.43 m, 2.07 ddd (6.0, 7.0, 13.0)
16	4.56 m	4.44	4.44	4.44	4.51 br d(6.8)
17	1.91 dd(6.5, 8.0)	1.72	1.72	1.72	1.79 dd(6.8, 7.9)
18	0.92 s	0.71 s	0.71 s	0.71 s	0.81 s
19	0.85 s	0.59 s	0.59 s	0.59 s	0.68 s
20	1.98 dd(6.5, 13.0)	1.82	1.82	1.82	1.94 dq(6.5, 7.8)
21	1.11 d(7.0)	1.06 d(6.4)	1.06 d(6.4)	1.06 d(6.5)	1.12 d(6.5)
23	ax 1.67 m	1.37, 1.82	1.37, 1.82	1.36, 1.81	1.67 m
24	1.17 ddd(4.0, 13.0, 13.0) 1.61 dd(4.0, 13.0)	1.28, 2.06	1.28, 2.06	1.26, 2.05	1.54 m, 1.65 m
25	1.56 m	1.53	1.53	1.52	1.56 m
26	ax 3.49 t(10.0) eq 3.55 dd(4.0, 10.0)	3.32, 3.98	3.32, 3.98	3.32, 3.98	3.48 dd(11.0, 12.0) 3.57 dd(4.0, 12.0)
27	0.69 d(6.0)	1.00 d(6.7)	1.00 d(6.7)	1.00 d(6.6)	0.67 d(6.0)
1'	4.85 d(7.5)	4.78 d(7.6)	4.84 d(7.6)	4.84 d(7.6)	4.86 d(7.7)
2'	4.39 dd(7.5, 9.0)	4.29	4.42	4.41	4.37 br t(9.6)
3'	4.09 (ov)	4.06	4.06	4.07	4.06 m
4'	4.58 m	4.39	4.44	4.43	4.54 br s
5'	3.91 m	3.91	4.02	4.02	3.98 m
6'	4.16 dd(9.0, 10.5) 4.65 dd(9.0, 10.5)	4.20, 4.44	4.17, 4.43	4.18, 4.42	4.16 m, 4.63 m
1''	5.17 d(7.5)	6.08 br s	4.99 d(7.6)	5.00 d(7.6)	5.11 d(7.8)
2''	4.41 dd(7.5, 9.0)	4.69	4.13	4.15	4.30 br t(9.0)
3''	4.17 dd(9.0, 9.0)	4.42	4.09	4.09	4.09 m

Table 3-11-17 (continued)

H	3-11-71	3-11-72	3-11-73	3-11-74	3-11-75
4''	3.82 dd(9.0, 10.0)	4.20	3.86	3.84	3.72 m
5''	3.87 ddd(2.5, 8.0, 10.0)	4.75	3.66	3.66	3.78 m
6''	4.03 dd(8.0, 12.0) 4.50 dd(2.5, 12.0)	1.58 d(6.0)	3.88, 4.29	3.88, 4.29	3.97 m, 4.40 m
1'''	5.56 d(7.5)	4.82 d(7.6)	5.45	5.47	5.53 d(7.5)
2'''	4.11 dd(5.0, 7.5)	4.06	3.90	3.90	4.05 m
3'''	3.91 ddd(2.5, 5.0, 10.0)	3.96	4.00	4.00	4.02 m
4'''	4.11 (ov)	3.85	3.84	3.65	4.07 m
5'''	3.67 dd(10.0, 11.0) 4.22 dd(5.0, 11.0)	3.68	3.97	3.97	3.75 m
6'''		3.92, 4.38	4.01, 4.31	3.99, 4.30	4.26 m 4.45 br d(11.0)
1''''	5.23 d(7.5)	5.32 d(7.4)	5.21 d(7.9)	5.21 d(7.9)	5.17 d(8.0)
2''''	3.96 dd(7.5, 9.0)	4.31	3.90	3.90	3.95 m
3''''	4.09 dd(9.0, 9.0)	3.95	4.07	4.07	4.07 m
4''''	4.21 t(9.0)	4.04	3.64	3.98	4.36 t(9.5)
5''''	4.10 (ov)	4.47, nd	3.85	3.85	3.77 m
6''''	4.36 dd(5.0, 12.0) 4.58 dd(2.5, 12.0)		3.90, 4.38	3.90, 4.38	4.04 m, 4.21 m
1'''''		5.16 d(7.6)	5.02 d(7.6)	5.02 d(7.6)	5.08 d(7.5)
2'''''		3.86	3.88	3.89	3.97 br t(8.5)
3'''''		4.00	3.94	4.05	4.15 m
4'''''		3.69	3.74	3.69	4.16 m
5'''''		3.56 tl(10.1) 4.05	3.99	3.82	3.88 m
6'''''			3.82, 4.42	3.85, 4.54	4.24 m 4.48 br d(11.6)
1''''''		4.97 d(8.3)	5.02 d(7.8)	5.15 d(7.6)	5.79 s
2''''''		3.94	3.92	3.93	4.63 br s
3''''''		4.04	4.06	3.99	4.52 br d(9.0)
4''''''		3.82, 3.96	3.99, 3.80	3.88, 3.55t-like(10.1)	4.33 d(8.5)
5''''''				4.06	4.95 dq(6.0, 8.5)
6''''''		3.85, 4.56	3.88, 4.55		1.68 d(6.0)
1'''''''		5.49 br s	5.47 br s	5.48 br s	
2'''''''		4.77	4.74	4.77	
3'''''''		4.64	4.59	4.64	
4'''''''		4.65	4.64	4.66	
5'''''''		4.10, 4.20	4.09, 4.19	4.21, 4.44	
1''''''''			5.49 br s		
2''''''''			4.75		
3''''''''			4.62		
4''''''''			4.64		
5''''''''			4.10, 4.20		

Table 3-11-18: ¹H NMR spectroscopic data of steroidal saponins **3-11-76~3-11-80**.

H	3-11-76	3-11-77	3-11-78	3-11-79	3-11-80
1	—	—	1.55	1.80 m	1.76 m
2	—	—	2.05 m, 1.57	1.17 m	2.18 m
3	3.72 m	3.88 br m (ov)	3.90	4.27 m	4.17 m
4	—	—	1.76, 1.36 m	1.80 m	1.76 m
5	1.42 m	—	0.96 m	2.20 m	2.14 m
6	4.32 m	—	1.21 m	1.93 m	2.18 m
7	1.27 m 2.51 dd(3.8, 12.0)	—	2.60 m	1.93 m	2.18 m
8	—	—	1.78	1.59 m	1.58 m
9	—	—	0.66	1.32 m	1.32 m
11	—	—	1.43 m	1.50 m	1.48 m
12	—	3.50 dd(11.6, 6.1)	1.62, 1.18	1.47 m	1.76 m
14	—	—	1.48 m	2.10 m	2.14 m
15	—	—	4.38	1.80 m	1.76 m
16	α 4.47 q(7.5)	—	4.67 m	4.44 m	4.41 m
17	—	—	2.04 m	—	—
18	0.83 s	1.08 s	0.91 s	0.96 s	0.93 s
19	0.83 s	0.66 s	0.68 s	1.02 s	1.08 s
20	—	—	2.01 m	2.23 m	2.18 m
21	1.14 d(7.0)	1.43 d(6.5)	1.14 d(6.6)	1.23 d(7.1)	1.20 d(7.1)
23	—	—	1.68 m	1.38 m	1.32 m
24	—	—	1.57	1.02 m	1.32 m
25	—	—	1.57	1.59 m	1.58 m
26	α 3.35 d(11) β 4.05 dd (11.0, 2.0)	ax 3.54 dd (10.4, 10.4) eq 3.60 dd (10.4, 3.3)	3.48 m, 3.37 m	4.05 m 3.27 d(10.7)	4.02 m 3.24 d(10.6)
27	0.87 d(6.5)	0.70 d(5.0)	0.66 d(5.6)	1.07 d(7.1)	1.04 d(7.1)
1'	4.85 d(7.5)	4.82 d(7.2)	4.89 d(7.6)	4.96 d(7.3)	4.79 d(6.8)
2'	4.00 t(7.5)	—	4.43	4.26 m	4.17 m
3'	4.15 t(8.5)	—	4.02	3.97 m	4.11 m
4'	3.72~3.81 m	—	4.63	4.34 m	4.17 m
5'	4.22 m	—	4.10	3.87 m	3.75 m
6'	3.72~3.81 m 4.32 m	—	4.71 m 4.23	4.58 m	4.41 m
1''	4.88 d(7.5)	5.12 d(7.8)	5.21 d(7.9)	5.40 d(7.8)	4.99 d(7.8)
2''	4.05 t(7.5)	—	4.45	4.07 m	—
3''	4.17 t(9.5)	—	4.19 m	4.28 m	—
4''	3.72~3.81 m	—	3.86 m	4.19 m	—
5''	4.22 m	—	3.90	3.87 m	—
6''	3.72~3.81 m 4.32 m	—	4.59 4.38	4.30 m	—
1'''	4.79 d(7.0)	5.54 d(7.6)	5.59 d(7.3)	—	6.33 d(1.2)
2'''	4.48 t(8.5)	—	4.11	—	4.75 m
3'''	4.16 t(9.0)	—	4.11	—	4.52 m
4'''	3.72~3.81 m	—	4.22	—	4.30 m
5'''	3.72~3.81 m	—	4.11	—	4.75 m
6'''	1.64 d(6.5)	—	4.53 m, 4.07	—	—

Table 3-11-18 (continued)

H	3-11-76	3-11-77	3-11-78	3-11-79	3-11-80
1 ^{'''}		5.19 d(7.8)	5.26 d(7.7)		
2 ^{'''}		—	3.98		
3 ^{'''}		—	4.10		
4 ^{'''}		—	4.11		
5 ^{'''}		—	4.25		
6 ^{'''}		—	3.69 m		
1 ^{''''}		5.77 br s			
6 ^{''''}		1.68 d(6.1)			
1 ^{'''''}		5.08 d(7.9)			

Table 3-11-19: ¹H NMR spectroscopic data of steroidal saponins 3-11-81~3-11-83.

H	3-11-81	3-11-82	3-11-83	H	3-11-81	3-11-82	3-11-83
1	1.42 (ov)	1.42 (ov)	0.85 m	25	1.54 (ov)	1.52 (ov)	1.62 m
	1.76 (ov)	1.75 (ov)	1.58 m				
2	1.44 (ov)	1.44 (ov)	1.68 m	26	3.26 m	3.28 (ov)	3.52 m
	1.70 (ov)	1.70 (ov)	2.11 m		4.02 (ov)	4.02 (ov)	3.53 m
3	4.16 m	3.84 m	3.94 m	27	0.98 d(5.7)	0.96 d(5.9)	0.69 d(5.2)
4	1.78 (ov)	1.42 (ov)	1.42 m	1'	4.77 d(8.2)	4.78 d(7.9)	4.95 d(7.6)
	n.d.	1.78 (ov)	1.81 m				
5	2.14 (ov)	2.14 m	0.94 m	2'	4.04 (ov)	4.20 (ov)	3.90 m
6	1.70 (ov)	1.68 (ov)	1.11 m	3'	4.13 (ov)	4.18 (ov)	4.25 m
	1.86 (ov)	1.88 (ov)					
7	1.08 (ov)	1.10 (ov)	1.49 m	4'	4.00 (ov)	4.02 (ov)	4.50 m
	1.40 (ov)	1.42 (ov)	2.14 m				
8	1.44 m	1.42 m	1.50 m	5'	3.72 (ov)	3.74 (ov)	4.02 m
9	1.22 (ov)	1.20 (ov)	0.61 m	6'	4.30 (ov)	4.30 (ov)	4.75 dd(2.4, 10.6)
					4.37 (ov)	4.35 (ov)	4.85 d(10.6)
11	1.18 (ov)	1.18 (ov)	1.33 m	1''	5.16 d(7.4)	5.34 d(7.2)	5.56 d(7.6)
	1.38 (ov)	1.32 (ov)	1.59 m				
12	1.48 (ov)	1.44 (ov)	0.83 m	2''	3.94 (ov)	3.90 (ov)	4.06 m
			1.60 m				
14	2.01 (ov)	1.98 (ov)	2.07 m	3''	4.12 (ov)	4.16 (ov)	4.35 m
15	1.35 (ov)	1.35 (ov)	1.49 m	4''	4.20 (ov)	4.06 (ov)	4.24 m
	1.97 (ov)	1.94	2.23 m				
16	4.40 m	4.40 m	4.46 m	5''	3.66 (ov)	3.90 (ov)	3.96
					4.38 (ov)		4.28 m
18	0.88 s	0.86 s	0.97 s	6''		4.28 (ov)	
						4.50 (ov)	
19	0.90 s	0.88 s	0.70 s	1'''	4.91 d(7.3)	4.86 d(7.0)	5.09 d(7.6)
20	2.14 m	2.12 m	2.28 m	2'''	3.86 (ov)	3.84 (ov)	4.48 m
21	1.16 d(7.1)	1.16 d(7.1)	1.25 d(7.0)	3'''	4.06 (ov)	4.04 (ov)	4.05 m
23	1.30 (ov)	1.30 (ov)	1.49 m	4'''	4.08 (ov)	4.05 (ov)	4.25 m
			1.71 m				
24	1.07 (ov)	1.06 (ov)	1.62 m	5'''	3.58 (ov)	3.58 (ov)	3.71 d(11.6)
					4.10 (ov)	4.12 (ov)	4.28 m

Table 3-11-20: ^1H NMR spectroscopic data of steroidal saponins **3-11-84~3-11-86**.

H	3-11-84	3-11-85	3-11-86
1	0.86 m, 1.58 m	1.84 m, 1.48 m	1.74 m, 1.47 m
2	1.32 m, 2.15 m	1.89 m, 1.40 m	1.93 m, 1.36 m
3	4.00 m	4.26 m	4.16 m
4	1.37 m, 1.80 m	1.78 m, 1.74 m	1.78 m, 1.73 m
5	0.88 m	2.17 m	2.13 m
6	1.12 m	1.82 m, 1.17 m	1.87 m, 1.36 m
7	1.57 m, 2.15 m	1.29 m, 0.97 m	1.37 m, 1.02 m
8	1.49 m	1.55 m	1.61 m
9	0.58 m	1.35 m	1.37 m
11	1.30 m	1.47 m	1.48 m, 1.30 m
	1.53 m	1.29 m	
12	0.79 m, 1.57 m	2.17 m, 1.49 m	2.18 m, 1.49 m
14	2.06 m	2.11 m	2.13 m
15	1.50 m, 2.22 m	2.18 m, 1.45 m	2.19 m, 1.44 m
16	4.47 m	4.41 m	4.41 m
18	0.96 s	0.94 s	0.93 s
19	0.70 s	1.01 s	1.08 s
20	2.29 m	2.21 m	2.19 m
21	1.24 d(7.3)	1.21 d(7.2)	1.21 d(7.2)
23	1.46 m, 1.71 m	1.91 m, 1.46 m	1.92 m, 1.45 m
24	1.60 m	2.16 m, 1.34 m	2.16 m, 1.34 m
25	1.60 m	1.57 m	1.57 m
26	3.52 m	4.04 dd(11, 2.5)	4.04 dd(11, 2.5)
	3.53 m	3.25 d(11)	3.26 d(11)
27	0.68 d(5.8)	1.06 d(7.2)	1.05 d(7.2)
1'	4.98 d(7.8)	4.94 d(7.7)	4.77 d(7.7)
2'	4.03 m	4.22 m	4.36 m
3'	4.27 m	4.29 m	4.17 m
4'	4.19 m	4.16 m	4.22 m
5'	4.17 m	3.84 m	3.55 m
6'	4.36 m	4.32 m	4.05 m
	4.88 d(9.7)	4.48 m	4.18 m
1''	5.01 d(7.0)	5.38 d(7.7)	5.84 s
2''	4.49 m	4.07 m	4.66 m
3''	4.19 m	4.23 m	4.53 m
4''	4.33 m	4.32 m	4.54 m
5''	3.76 dd(2.4, 12.6)	3.95 m	4.88 m
	4.35 m		
6''		4.53 m, 4.48 m	1.59 d(6.2)
1'''			6.49 s
2'''			4.78 m
3'''			4.31 m
4'''			4.32 m
5'''			4.79 m
6'''			1.73 d(6.1)

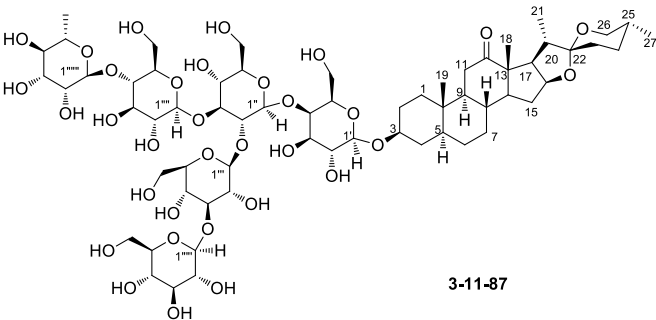
Table 3-11-21: Cos, MFs, and TSs of steroidal saponins **3-11-87~3-11-127**.

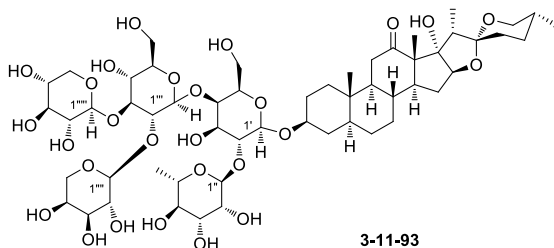
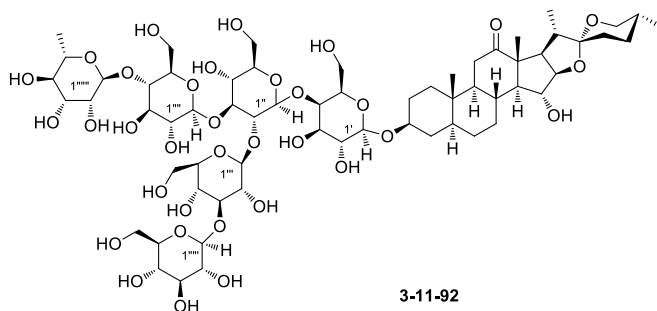
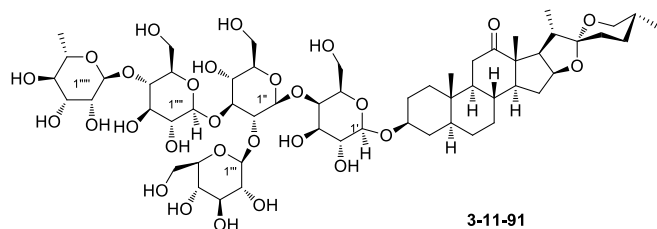
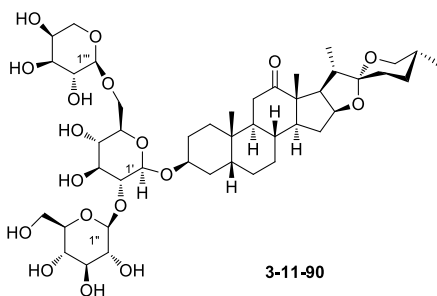
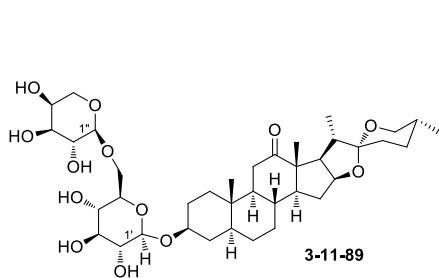
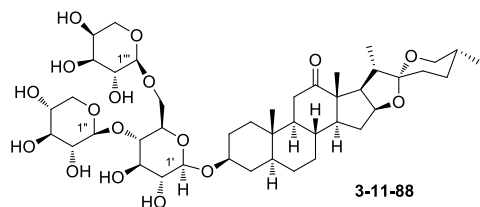
No.	Compounds	MFs	Test solvents	References
3-11-87	furcreastatin	C ₆₃ H ₁₀₂ O ₃₃	C ₅ D ₅ N- CD ₃ OD (10:1)	[313]
3-11-88	filiaparoside A	C ₄₃ H ₆₈ O ₁₇	C ₅ D ₅ N	[302]
3-11-89	filiaparoside B	C ₃₈ H ₆₀ O ₁₃	C ₅ D ₅ N	[302]
3-11-90	(25 <i>R</i>)-3β-hydroxy-5β-spirostan-12-one-3- <i>O</i> -{β-D-glucopyranosyl-(1→2)-[α-L-arabinopyranosyl-(1→6)]-β-D-glucopyranoside}	C ₄₄ H ₇₀ O ₁₈	C ₅ D ₅ N	[283]
3-11-91	(25 <i>R</i>)-3β-[(<i>O</i> -β-D-glucopyranosyl-(1→2)- <i>O</i> -[<i>O</i> -α-L-rhamnopyranosyl-(1-4)-β-D-glucopyranosyl-(1→3)]- <i>O</i> -β-D-glucopyranosyl-(1→4)-β-D-galactopyranosyl)oxy]-5α-spirostane-12-one	C ₅₇ H ₉₂ O ₂₈	C ₅ D ₅ N	[308]
3-11-92	(25 <i>R</i>)-3β-[(<i>O</i> -β-D-glucopyranosyl-(1→3)- <i>O</i> -β-D-glucopyranosyl-(1→2)- <i>O</i> -[<i>O</i> -α-L-rhamnopyranosyl-(1→4)-β-D-glucopyranosyl-(1→3)]- <i>O</i> -β-D-glucopyranosyl-(1→4)-β-D-galactopyranosyl)oxy]-15α-hydroxy-5α-spirostan-12-one	C ₆₃ H ₁₀₂ O ₃₄	C ₅ D ₅ N	[308]
3-11-93	nigrumnin II	C ₅₅ H ₈₈ O ₂₇	C ₅ D ₅ N	[314]
3-11-94	polygonatoside C	C ₃₉ H ₆₀ O ₁₅	C ₅ D ₅ N	[315]
3-11-95	(25 <i>R</i>)-3β,6α-dihydroxy-5α-spirostan-12-one-3,6-di- <i>O</i> -β-D-glucopyranoside	C ₃₉ H ₆₂ O ₁₅	C ₅ D ₅ N	[316]
3-11-96	polygonatoside A	C ₄₅ H ₇₀ O ₁₉	C ₅ D ₅ N	[315]
3-11-97	polygonatoside B	C ₄₅ H ₇₀ O ₂₀	C ₅ D ₅ N	[315]
3-11-98	wattoside I ^①	C ₃₃ H ₅₂ O ₁₅	C ₅ D ₅ N	[317]
3-11-99	solanigroside C	C ₅₁ H ₈₂ O ₂₆	C ₅ D ₅ N	[309]
3-11-100	solanigroside D	C ₅₅ H ₈₈ O ₂₇	C ₅ D ₅ N	[309]
3-11-101	solanigroside E	C ₅₅ H ₈₈ O ₂₈	C ₅ D ₅ N	[309]
3-11-102	(25 <i>R</i>)-spirost-5-ene-3β,17α-diol(pennogenin)-3- <i>O</i> -{ <i>O</i> -α-L-rhamnopyranosyl-(1→2)- <i>O</i> -[<i>O</i> -β-xylopyranosyl-(1→5)-α-L-arabinofuranosyl-(1→4)]-β-D-glucopyranoside}	C ₄₉ H ₇₈ O ₂₁	C ₅ D ₅ N	[318]
3-11-103	neosibiricoside C	C ₅₂ H ₈₂ O ₂₃	C ₅ D ₅ N	[319]
3-11-104	neosibiricoside D	C ₄₅ H ₇₂ O ₁₈	C ₅ D ₅ N	[319]
3-11-105	solanigroside H	C ₅₁ H ₈₂ O ₂₂	C ₅ D ₅ N	[309]
3-11-106	diosegenin-3- <i>O</i> -β-D-glucopyranosyl-(1→4)-α-L-rhamnopyranosyl-(1-4)-β-D-glucopyranosyl-(1→4)-[α-L-rhamnopyranosyl-(1→2)]-β-D-glucopyranoside	C ₅₇ H ₉₂ O ₂₆	C ₅ D ₅ N	[288]
3-11-107	yamogenin-3- <i>O</i> -α-L-rhamnopyranosyl-(1→4)-β-D-glucopyranosyl-(1→4)-[α-L-rhamnopyranosyl-(1→2)]-β-D-glucopyranoside	C ₅₁ H ₈₂ O ₂₁	C ₅ D ₅ N	[288]

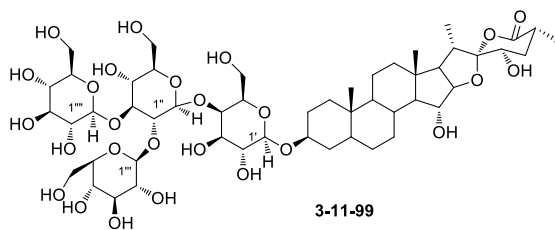
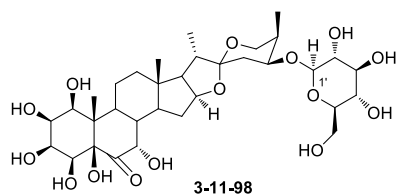
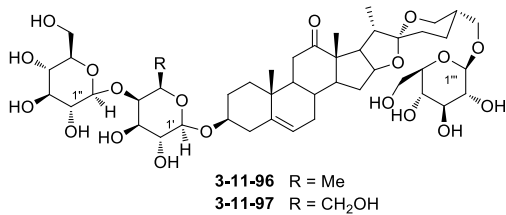
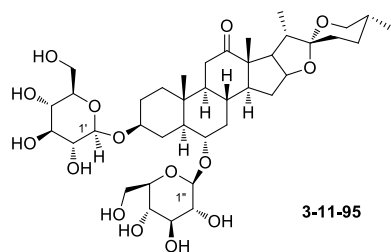
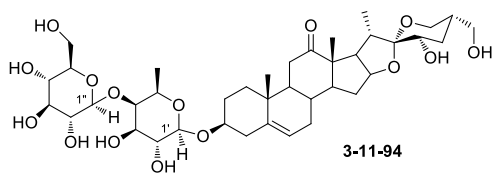
Table 3-11-21 (continued)

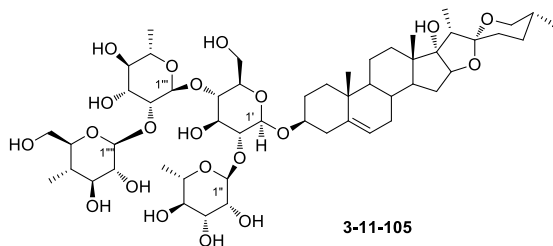
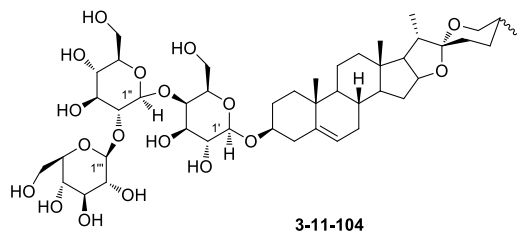
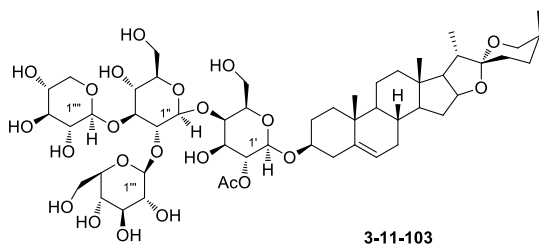
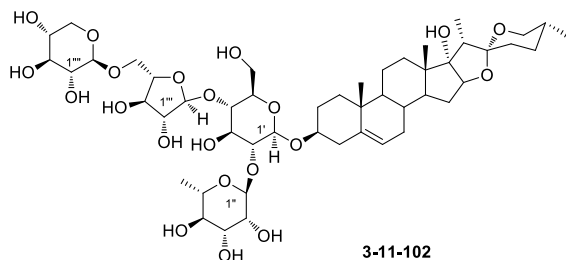
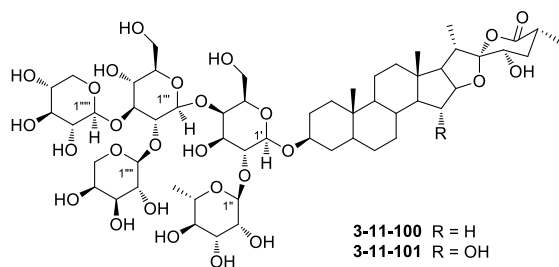
No.	Compounds	MFs	Test solvents	References
3-11-108	22-epiyamogenin-3- <i>O</i> - α -L-rhamnopyranosyl-(1 $\rightarrow$ 4)- β -D-glucopyranosyl-(1 $\rightarrow$ 4)-[α -L-rhamnopyranosyl-(1 $\rightarrow$ 2)]- β -D-glucopyranoside	C ₅₁ H ₈₂ O ₂₁	C ₅ D ₅ N	[288]
3-11-109	deistelianoside A	C ₃₉ H ₆₂ O ₁₅ S	C ₅ D ₅ N	[320]
3-11-110	ophiopogonin E	C ₃₈ H ₆₀ O ₁₃	C ₅ D ₅ N	[321]
3-11-111	smilacinocide A	C ₃₉ H ₆₂ O ₁₂	C ₅ D ₅ N	[289]
3-11-112	smilacinocide B	C ₅₅ H ₉₂ O ₁₃	C ₅ D ₅ N	[289]
3-11-113	lyconoside II	C ₄₅ H ₇₂ O ₁₇	C ₅ D ₅ N	[322]
3-11-114	lyconoside III	C ₄₂ H ₇₂ O ₁₈	C ₅ D ₅ N	[322]
3-11-115	neosibiricoside B	C ₅₂ H ₈₂ O ₂₄	C ₅ D ₅ N	[319]
3-11-116	parisyunnanoside C	C ₅₁ H ₈₂ O ₂₁	C ₅ D ₅ N	[287]
3-11-117	arboreasaponin A	C ₄₇ H ₇₄ O ₁₈	C ₅ D ₅ N	[320]
3-11-118	lyconoside Ia	C ₄₅ H ₈₂ O ₁₉	C ₅ D ₅ N	[322]
3-11-119	lyconoside Ib	C ₄₆ H ₇₄ O ₁₉	C ₅ D ₅ N	[322]
3-11-120	turrillianoside	C ₃₉ H ₆₂ O ₁₄	C ₅ D ₅ N	[323]
3-11-121	arboreasaponin B	C ₄₅ H ₇₂ O ₁₈	C ₅ D ₅ N	[320]
3-11-122	3- <i>O</i> -[α -L-rhamnopyranosyl-(1 $\rightarrow$ 2)]-[β -D-glucopyranosyl-(1 $\rightarrow$ 3)]- β -D-glucopyranosyl-27-hydroxypennogenin	C ₄₅ H ₇₂ O ₁₉	C ₅ D ₅ N	[298]
3-11-123	neosibiricoside A	C ₄₇ H ₇₄ O ₂₁	C ₅ D ₅ N	[319]
3-11-124	chantrieroside A	C ₅₁ H ₈₂ O ₂₁	C ₅ D ₅ N	[324]
3-11-125	parisvietnaside A	C ₄₅ H ₇₂ O ₁₉	C ₅ D ₅ N	[325]
3-11-126	shatavarin VII	C ₄₅ H ₇₂ O ₁₇	C ₅ D ₅ N	[300]
3-11-127	25(27)-ene-2 β ,3 β -diol-3- <i>O</i> - β -D-glucopyranosyl(1 $\rightarrow$ 2)- β -D-galactopyranoside	C ₃₉ H ₆₂ O ₁₄	C ₅ D ₅ N	[294]

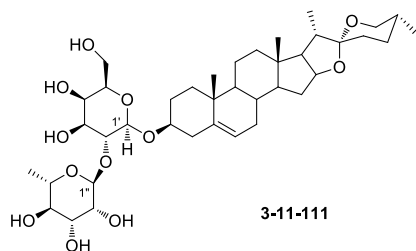
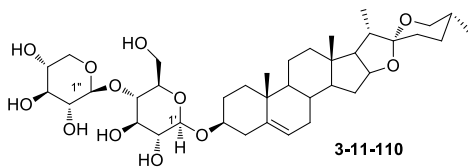
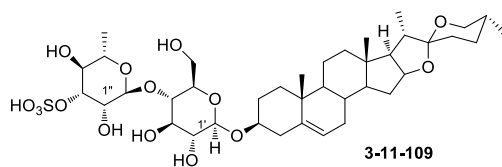
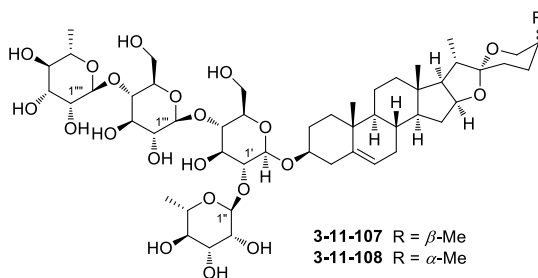
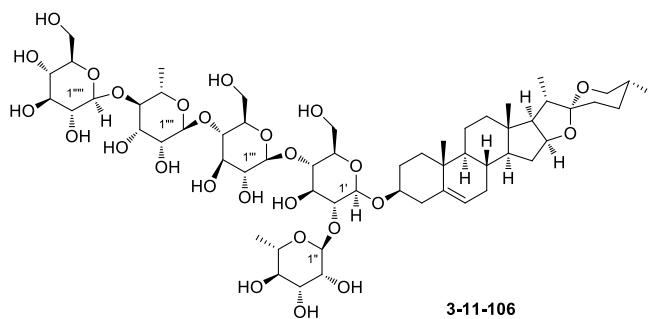
① Inconsistency of nomenclature for compound exists in the literature, wattoside I and wattoside H being designated with the same compound.

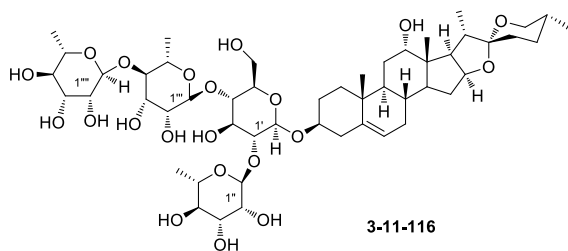
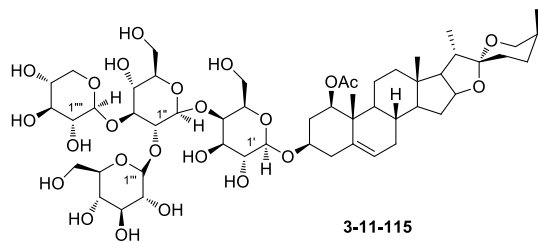
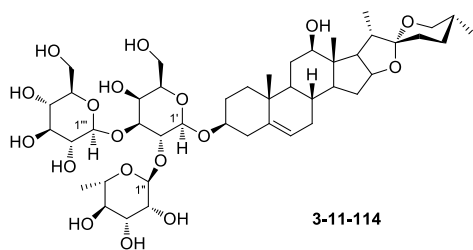
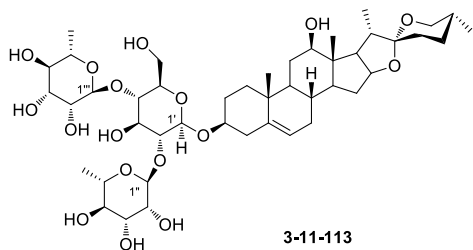
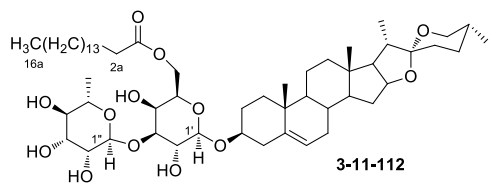


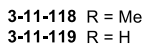












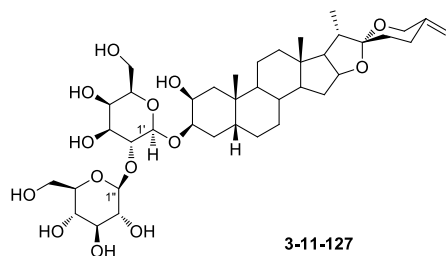
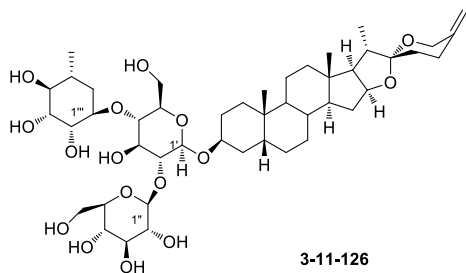
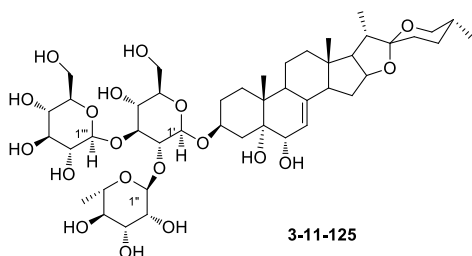
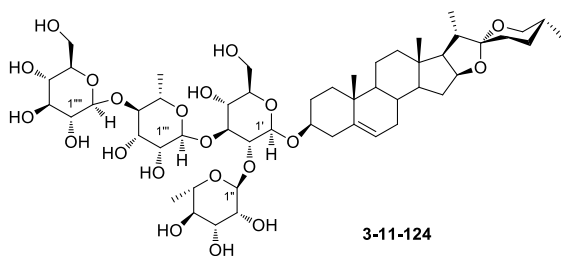
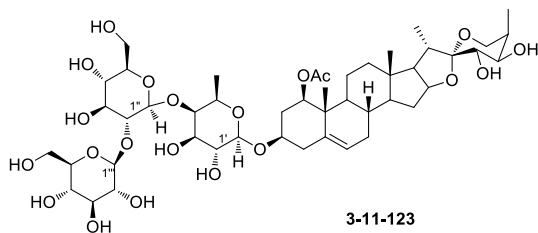


Table 3-11-22: ^1H NMR spectroscopic data of steroidal saponins **3-11-87~3-11-91**.

H	3-11-87	3-11-88	3-11-89	3-11-90	3-11-91
1	0.72 m, 1.33 m	0.82 m, 1.36 m	1.32 m, 0.78 m	1.86, 1.35	—
2	1.57 m, 1.98 m	1.65 m, 2.10 m	1.58 m, 2.07 m	1.89, 1.35	—
3	3.87 m	3.92 m	3.95 m	4.24	3.87 br m(21.8)
4	1.33 m, 1.78 m	1.43 m, 1.85 m	1.32 m, 1.79 m	1.79, 1.70	—
5	0.86 m	0.90 m	0.82 m	2.21	—
6	1.14 m	1.13 m	1.10 m	1.83, 1.21	—
7	0.80 m, 1.58 m	1.67 m, 1.72 m	1.60 m, 1.68 m	1.32, 0.95	—
8	1.78 m	1.76 m	1.71 m	1.84	—
9	0.91 m	0.92 m	0.84 m	1.72	—
11	2.23 dd(5, 14) 2.39 dd(13, 14)	2.29 dd(5.2, 14.0) 2.40 t(14.0)	2.20 dd(4.6, 14.1) 2.34 t(14.1)	2.20 2.37	—
14	1.38 m	1.36 m	1.30 m	1.45	—
15	1.58 m 2.10 ddd(6, 7, 13)	1.53 m 2.13 m	1.52 m 2.07 m	2.13 1.59	—
16	4.47 m	4.50 m	4.48 m	4.56	—
17	2.74 dd(8, 9)	2.79 dd(1.6, 6.8)	2.74 dd(1.9, 7.0)	2.83	—
18	1.08 s	1.09 s	1.05 s	1.09	1.08 s
19	0.69 s	0.71 s	0.66 s	1.03	0.66 s
20	1.92 dq(7, 8)	1.94 m	1.90 m	1.95	—
21	1.34 d(7)	1.38 d(6.6)	1.30 d(7.0)	1.36	1.36 d(6.9)
23	1.70 m	0.78 m, 1.58 m	1.49 m, 1.58 m	1.72, 1.65	—
24	1.58 m	1.58 m	1.54 m	1.58, 1.58	—
25	1.58 m	1.59 m	1.55 m	1.60	—
26	3.48 dd(11, 12) 3.58 dd(4, 12)	3.50 t(10.4) 3.60 dd(3.3, 10.4)	3.48 m 3.56 dd(2.6, 9.8)	3.59, 3.51 	ax 3.49 dd(10.6, 10.6) eq 3.59 dd(10.6, 3.3)
27	0.71 d(6.4)	0.69 s	0.65 s	0.72	0.65 d(5.7)
1'	4.79 d(8.2)	4.94 d(7.4)	4.95 d(7.8)	4.20 d(7.8)	4.86 d(7.7)
2'	4.34 m	3.89 m	3.98 m	3.75	—
3'	4.08 m	4.26 m	4.24 m	5.33	—
4'	4.56 m	4.51 m	4.14 m	5.04	—
5'	3.97 m	4.02 m	4.14 m	3.43	—
6'	4.19 m 4.61 dd(10, 11)	4.76 dd(3.1, 10.8) 4.86 d(10.8)	4.32 m, 4.86 d(10.1)	3.90, 3.54	—
1''	5.10 d(7.8)	5.56 d(7.8)	4.96 d(7.0)	4.70 d(7.8)	5.13 d(7.9)
2''	4.27 m	4.07 m	4.46 m	5.20	—
3''	4.16 m	4.35 m	4.14 m	5.37	—
4''	3.73 dd(9, 10)	4.23 m	4.30 m	5.30	—
5''	3.79 m	3.97 m, 4.26 m	3.73 d(10.1), 4.28 m	3.45	—
6''	3.97 m, 4.38 m			4.48, 4.16	—
1'''	5.54 d(7.8)	5.10 d(7.4)		4.32 d(6.9)	5.59 d(7.8)
2'''	4.07 m	4.49 m		5.53	—
3'''	4.06 m	4.05 m		5.16	—
4'''	4.10 m	4.24 m		5.24	—

Table 3-11-22 (continued)

H	3-11-87	3-11-88	3-11-89	3-11-90	3-11-91
5'''	3.76 m	3.71 d(11.3) 4.26 m		3.02, 3.73	—
6'''	3.99 m 4.18 m				—
1''''	5.18 d(8.2)				5.28 d(7.9)
2''''	3.93 dd(8.2, 10)				—
3''''	4.04 m				—
4''''	4.28 m				—
5''''	3.76 m				—
6''''	4.25 m, 4.37 m				—
1'''''	5.05 d(8.2)				5.77 d(1.3)
2'''''	4.00 m				—
3'''''	4.12 dd(10, 10)				—
4'''''	4.07 m				—
5'''''	3.87 m				—
6'''''	4.22 m, 4.46 m				1.71 d(6.2)
1''''''	5.69 s				
2''''''	4.55 m				
3''''''	4.45 m				
4''''''	4.25 m				
5''''''	4.85 dq(6.4, 11)				
6''''''	1.66 d(6.4)				

Table 3-11-23: ¹H NMR spectroscopic data of steroidal saponins 3-11-92, 3-11-94, and 3-11-96~3-11-98.

H	3-11-92	3-11-94	3-11-96	3-11-97	3-11-98
3	3.85 br m(ov)	3.89 m	3.84 m	3.84 m	—
6	—	5.32 br d(5.9)	5.31 br d(5.2)	5.32 br d(5.1)	—
7	—	—	—	—	4.52 br s
8	—	—	—	—	2.16 m
9	—	—	—	—	2.44 br s
15	4.54 dd(10.8, 4.0)	—	—	—	—
16	4.59 dd(8.9, 4.0)	4.58 q-like(6.0)	4.42 q-like(7.2)	4.40 q-like(6.8)	—
18	1.18 s	1.28 s	1.08 s	1.07 s	0.80 s
19	0.71 s	0.85 s	0.92 s	0.89 s	1.44 s
21	1.36 d(6.9)	1.42 d(6.8)	1.30 d(6.4)	1.30 d(6.5)	1.04 d(6.8)
23	—	3.85 dd(8.6, 6.8)	—	—	ax 1.95 dd(13.1, 9.6) eq 2.67 dd(13.1, 4.4)
24	—	—	—	—	4.02 m
25	—	—	—	—	1.88 m

Table 3-11-23 (continued)

H	3-11-92	3-11-94	3-11-96	3-11-97	3-11-98
26	ax 3.34 dd (10.6, 10.6) eq 3.49 br d(10.6)	—	—	—	ax 3.52 br t(12.0) eq 3.62 dd(12.0, 3.7)
27	0.65 d(5.7)	—	—	—	1.12 d(6.4)
1'	4.84 d(6.7)	4.79 d(7.8)	4.80 d(7.3)	4.88 d(7.3)	4.92 d(7.7)
6'	—	1.60 d(6.3)	1.61 d(6.5)	—	—
1''	5.13 d(7.9)	5.20 d(7.6)	5.20 d(7.7)	5.27 d(8.6)	
1'''	5.54 d(7.6)		4.76 d(7.7)	4.78 d(7.9)	
1''''	5.18 d(7.8)				
1'''''	5.77 br s				
6'''''	1.69 d(6.2)				
1''''''	5.08 d(7.7)				

Table 3-11-24: ¹H NMR spectroscopic data of steroidal saponins 3-11-93, 3-11-95, and 3-11-99~3-11-101.

H	3-11-93	3-11-95	3-11-99	3-11-100	3-11-101
1	0.74 m, 1.37 (ov)	eq 1.32, ax 0.78	0.75 m, 1.50	0.79 m, 1.56 m	0.78 m, 1.55
2	1.72 (ov), 1.98 m	eq 2.01, ax 1.63	1.57, 1.98 m	1.78 m, 2.03 m	1.59, 2.01 m
3	3.88 m	3.94	3.83	3.91 m	3.83
4	1.63 (ov), 1.91 m	eq 3.40 br d(12.1) ax 1.45 q-like(12.1)	1.32, 1.70	1.67, 1.91	1.35, 1.72
5	0.86 (ov)	1.23	0.90	0.90	0.94
6	0.87 (ov), 1.15 m	3.69 ddd (10.8, 10.8, 4.7)	1.19	1.18	1.20
7	0.82 (ov), 1.60 (ov)	eq 2.65, ax 1.16	1.29, 2.52 m	0.77 m, 1.51 m	1.31, 2.54 m
8	1.76 m	1.92	1.69	1.40	1.71
9	0.99 m	0.95	0.59 m	0.48 m	0.63 m
11	2.37 dd(14.0, 14.0) 2.24 (ov)	eq 2.22 dd(13.9, 5.0) ax 2.37 dd (13.9, 13.9)	1.11, 1.34	1.21, 1.38	1.13, 1.36
12			1.60, 1.07 m	1.67, 1.01	1.63, 1.09
14	2.45 m	1.37	1.42	1.00	1.44
15	1.61 (ov), 2.25 (ov)	α 2.03, β 1.54	4.24	1.96, 1.29	4.27
16	4.40 (ov)	4.36 q-like(6.7)	4.96 dd(9.1, 3.9)	4.87 m	4.99
17		2.70 dd(8.5, 6.7)	2.11 m	1.89 m	2.13 m
18	0.99 s	1.05 s	0.96 s	0.90 s	0.98 s
19	0.87 s	0.76 s	0.64 s	0.85 s	0.89 s
20	2.22 q(6.7)	1.90	2.75 m	2.71 m	2.76 m

Table 3-11-24 (continued)

H	3-11-93	3-11-95	3-11-99	3-11-100	3-11-101
21	1.33 d(6.7)	1.34 d(6.9)	1.26 d(6.9)	1.29 d(6.9)	1.28 d(6.9)
23	1.27 (ov), 1.59 (ov)	ax 1.61, eq 1.68	4.67 br d(8.3)	4.67 m	4.69
24	1.55 (ov), 1.55 (ov)	1.56	2.97, 1.92 m	2.98 m, 1.94	2.97, 1.94 m
25	1.57 (ov)	1.57	2.96	3.09 m	2.97
26	3.49 dd (10.4, 10.4) 3.59 dd(10.4, 3.3)	ax 3.58 dd (10.8, 10.8) eq 3.46 dd(10.8, 3.3)			
27	0.68 d(6.1)	0.72 d(5.8)	1.13 d(6.4)	1.19 d(7.2)	1.16 d(6.4)
1'	4.88 d(7.4)	5.10 d(7.6)	4.84 d(7.9)	4.87 d(7.7)	4.84 d(7.7)
2'	—	4.05 dd(8.3, 7.6)	4.40	4.41 m	4.42 m
3'	—	4.23 dd(8.8, 8.3)	4.09	4.15	4.18
4'	—	4.26 dd(8.8, 8.8)	4.57	4.50 m	4.49
5'	—	3.84 ddd (8.8, 5.3, 2.4)	4.00	3.96	3.95
6'	—	4.42 dd(11.8, 2.4) 4.32 dd(11.8, 5.3)	4.20, 4.67	4.20, 4.73 m	4.22, 4.72
1''	6.29 brs	4.90 d(7.8)	5.13 d(7.9)	6.31 brs	6.29 brs
2''	—	4.04 dd(8.1, 7.8)	4.36	4.79 m	4.77 m
3''	—	4.26 dd(8.8, 8.1)	4.18	4.55 m	4.57 m
4''	—	4.24 dd(8.8, 8.8)	3.82	4.32 m	4.36 m
5''	—	3.95 ddd (8.8, 5.3, 2.5)	3.82	4.93 m	4.93 m
6''	—	5.54 dd(11.6, 2.5) 4.41 dd(11.6, 5.3)	4.24, 4.54	1.73 d(6.1)	1.71 d(6.2)
1'''	4.96 d(7.7)		5.56 d(7.8)	4.97 d(7.9)	4.99 d(7.9)
2'''	—		4.02	4.25 m	4.29
3'''	—		4.16	4.07	4.08
4'''	—		4.15	3.81	3.81
5'''	—		3.82	3.82	3.83
6'''	—		4.54, 4.35	4.52, 4.03	4.51, 4.04
1''''	5.34 d(7.4)		5.28 d(7.8)	5.34 d(7.6)	5.33 d(7.7)
2''''	—		4.02	4.42	4.44
3''''	—		4.11	4.02	4.03
4''''	—		4.23	4.17	4.20
5''''	—		4.02	4.67	4.69, 3.58 m
6''''				3.58 br d(12.2)	
1'''''	5.19 d(7.8)		4.50, 4.00		
2'''''	—			5.21 d(7.8)	5.21 d(7.8)
3'''''	—			3.96	3.98
4'''''	—			4.07	4.09
5'''''	—			4.11 m	4.12
				4.21, 3.65 m	4.25, 3.67 m

Table 3-11-25: ¹H NMR spectroscopic data of steroidal saponins **3-11-102~3-11-106**.

H	3-11-102	3-11-103	3-11-104	3-11-105	3-11-106
1	0.98 dd, 1.77 dd	0.90, 1.62	0.93, 1.65 br d	0.95, 1.75	0.98 m, 1.73 m
2	1.87 m, 2.08 m	ax 1.69, eq 2.02	ax 1.72 m eq 2.07 br d	1.86 m, 2.00 m	1.85 m, 2.07 m
3	3.84 m	3.79 m	3.90 m	3.82 m	3.86 m
4	2.75 m	2.53 dd(11.4, 4.1) 2.32 m	2.64 dd(11.6, 4.2) 2.40 br t	2.74 br s	2.73 m
6	5.31 br s	5.33 m	5.26 m	5.26	5.27 br d(6.0)
7	1.95 m	1.76, 1.45	1.80 m, 1.45 m	1.93 m, 1.50	1.41 m, 1.87 m
8	1.54 m	1.50 m	1.46 m	1.50	1.55 m
9	0.99 m	0.83	0.91	0.98	0.87 m
11	1.60 m, 1.53 m	1.25	1.42	1.59, 1.50	1.40 m
12	1.70 m, 1.53 m	1.66, 1.03	1.67, 1.06	1.68, 1.62	1.05 m, 1.64 m
14	2.09 m	1.02	1.01	2.07	1.02 m
15	1.53 m, 2.23 m	1.38, 1.96	1.37, 1.96	1.50, 2.16 m	1.48 m 2.02 ddd(6.0, 7.0, 13.0)
16	4.45 t(7.0, 7.2)	4.51 m	4.49 m	4.46 m	4.54 q-like(7.5)
17		1.75 m	1.74 m		1.76 m
18	0.96 s	0.80	0.79 s	0.94 s	0.81 s
19	1.09 s	0.93	0.84 s	1.07 s	1.03 s
20	2.28 q	1.87	1.88 m	2.26 d(7.1)	1.94 dq(7.0, 7.5)
21	1.23 d(7.2)	1.12 d(6.9)	1.11 d(6.7) 1.12 d(6.7) ^①	1.21 d(7.2)	1.12 d(7.0)
23	2.19 m, 1.70 m	1.44, 1.34	1.63, 1.32 1.94 ^① , 1.37 ^①	2.22 m, 1.68	1.63 m, 1.66 m
24	1.58 m	1.87	1.64, 1.54, 1.64 ^①	1.58	1.52 m
25	1.60 m	1.54 m	1.55, 1.53 ^①	1.58	1.54 m
26	3.51 d(7.3)	ax 4.03 br d eq 3.33 d(10.4)	ax 3.48 t(10.8) eq 3.56 br d ax 4.19 br d ^① eq 3.34 d(10.9) ^①	3.49 d(7.3)	3.49 br d(12.0) 3.57 dd
27	0.70 d(5.9)	1.04 d(7.1)	0.66 d(5.1) 1.04 d(7.0) ^①	0.66 d(5.7)	0.68 d(6.5)
1'	4.92 d(7.5)	4.84 d(8.0)	4.89 d(7.7)	4.91	4.92 d(7.5)
2'	4.18 t	5.78 dd(9.7, 8.0)	4.46 dd(8.1, 7.7)	4.19	4.18 m
3'	4.21 t	4.20	4.05 dd(8.1, 8.1)	4.19	4.12 m
4'	4.30 t	4.33	4.20 dd(8.1, 8.1)	4.40 m	4.14 m
5'	3.76 dd	3.96	3.66 m	3.64 br d(10.1)	3.78 m
6'	4.17 d, 4.24 dd	4.18 m, 4.58 m	4.35 br d 4.24 dd(10.5, 4.9)	4.28	4.03 br d(12.0) 4.17 m
OAc		2.04 s(6'-OAc)			
1''	6.24 br s	5.18 d(7.9)	5.12 d(7.8)	6.44 br s	6.19 s
2''	4.83 br s	4.26 dd(9.0, 7.9)	4.13 dd(8.7, 7.8)	4.84 m	4.70 br s
3''	4.59 dd	4.33 dd(9.0, 9.0)	4.29 dd(8.7, 8.7)	4.61 m	4.57 dd(2.7, 9.4)

Table 3-11-25 (continued)

H	3-11-102	3-11-103	3-11-104	3-11-105	3-11-106
4''	4.33 dd	4.16 dd(9.0, 8.8)	3.94 dd(8.7, 8.7)	4.36 m	4.33 t(9.5)
5''	4.92 m	3.89 m	3.91 m	4.94	4.93 m
6''	1.76 d(6.2)	4.53 br d	4.60 br d	1.75 d(6.2)	1.75 d(6.4)
		4.38 br d	4.07 dd(11.4, 6.2)		
1'''	5.90 br s	5.69 d(7.8)	5.20 d(7.6)	6.08 br s	5.06 d(7.5)
2'''	4.85 br s	4.21 dd(9.1, 7.8)	4.02 dd(9.1, 7.6)	4.64 m	3.96 br t(8.0)
3'''	4.79 dd	4.25 dd(9.1, 8.8)	4.09 dd(9.1, 9.0)	4.50 m	4.15 m
4'''	4.96 d	4.49 dd(8.8, 8.8)	4.20 dd(9.1, 9.0)	4.18	4.49 m
5'''	4.23 d, 4.43 dd	3.94 m	3.76 m	4.94	3.70 m
6'''		4.57 dd(12.0, 4.5)	4.37 br d, 4.56 br d	1.59 d(6.1)	4.42 m, 4.48 m
		4.52 br d			
1''''	4.80 d(7.2)	5.26 d(7.8)		5.25 d(7.6)	5.86 s
2''''	3.95 t(7.8, 8.1)	3.93 dd(9.0, 7.8)		4.08 m	4.64 br s
3''''	4.10 t(8.5, 8.6)	4.40 dd(8.9, 7.8)		3.93 m	4.67 dd(2.7, 9.4)
4''''	4.16 dd	4.19 dd(9.0, 8.9)		4.07 m	4.45 t(9.5)
5''''	3.60 t, 4.27 d	4.15 dd(12.0, 5.9)		4.19	5.04 dq(9.5, 6.0)
		3.89 m			
6''''				4.55, 4.27	1.74 d(6.4)
1'''''					5.25 d(8.0)
2'''''					4.13 m
3'''''					4.28 t(9.1)
4'''''					4.21 t(9.1)
5'''''					3.80 m
6'''''					4.35 dd(5.0, 12.8)
					4.42 m

① Data of C₂₅(S) configuration of compound 3-11-104 (Other data are from C₂₅(R) configuration).

Table 3-11-26: ¹H NMR spectroscopic data of steroidal saponins 3-11-107~3-11-111.

H	3-11-107	3-11-108	3-11-109	3-11-110	3-11-111
1	0.96 m, 1.72 m	0.96 m, 1.71 m	0.92 t(10.7) 1.64	0.94 (ov), 1.71 m	—
2	1.83 m, 2.07 m	1.84 m, 2.07 m	1.65 2.03 br d(11.6)	—	—
3	3.86 m	3.87 m	3.83 m	4.12 m	3.96 m
4	2.73 m	2.73 m	2.41 br d(11.9) 2.70 br d(13.3)	2.65 dd-like 2.45 m	—
6	5.27 br d(6.0)	5.26 br d(5.5)	5.34 d(4.04)	5.27 br s	5.28 br s
7	1.40 m 1.84 m	1.44 m 1.85 m	1.82 br d(10.9) 1.99 m	—	—
8	1.51 m	1.51 m	1.44 m	0.94 (ov)	—

Table 3-11-26 (continued)

H	3-11-107	3-11-108	3-11-109	3-11-110	3-11-111
9	0.88 m	0.88 ddd (4.6, 11.6, 11.6)	0.82	—	0.95 m
11	1.41 m	1.21 m, 1.48 m	1.35, (ov)	1.58 m	—
12	1.07 m, 1.66 m	1.06 m, 1.65 m	1.04 d(4.0), 1.63	2.08 m	—
14	1.39 m	0.95 m	1.02	2.20 m	1.08 m
15	1.51 m 2.00 ddd (6.0, 7.0, 13.0)	1.44 m, 2.00 ddd (6.0, 7.0, 13.0)	1.76, 1.96 m	4.43 m	—
16	4.50 q-like(7.5)	4.29 q-like(7.5)	4.46 t(7.5)	—	4.53 m
17	1.76 m	1.56 m	1.76 t(7.5)	0.94 s	1.78 dd(8.2, 6.6)
18	0.80 s	0.94 s	0.84 s	0.92 s	0.81 s
19	1.03 s	1.01 s	0.76 s	2.26 d(7.2)	1.05 s
20	1.89 m	2.31 dq(7.0, 7.3)	1.90 t(6.7)	1.22 d(7.2)	1.93 dd(6.6, 8.2)
21	1.13 d(6.6)	0.99 d(7.2)	1.08 d(6.9)	—	1.13 d(6.8)
23	1.40 m, 1.88 m	1.66 m	1.62 d(3.3) 1.64	—	—
24	1.34 m, 2.13 m	1.41 m, 1.50 m	1.52 m, (ov)	1.54 m	—
25	1.57 m	1.61 m	1.25 m	2.07 m	—
26	3.34 br d(11.0) 4.04 m	3.67 m	3.43 br d(10.7) 3.53 d(8.5)	3.49 d like	α 3.51 t(10.1) β 3.58 t(10.1)
27	1.06 d(6.6)	0.67 d(6.5)	0.63 d(5.0)	0.67 d(5.4)	0.68 d(4.9)
1'	4.93 d(8.0)	4.93 d(7.8)	4.83 d(7.6)	4.98 d(7.8)	4.98 d(7.7)
2'	4.20 m	4.19 m	3.88 t(8.6)	4.05 m	—
3'	4.14 m	4.13 m	4.04 t(8.8)	4.31 t(8.8)	—
4'	4.16 m	4.16 m	4.27 t(9.2)	4.37 t(9.2)	—
5'	3.80 m	3.80 m	3.41 t(9.0)	3.90 m	—
6'	4.04 m, 4.17 m	4.07 br d(12.0) 4.18 m	4.00 dd(3.5, 11.7) 4.11 d(11.7)	4.59 dd(3.8, 12.1) 4.45 m	4.41 d(6.4)(2H)
1''	6.20 s	6.20 s	5.74 br s	5.14 d(7.7)	6.30 br s
2''	4.72 br s	4.71 br s	5.07 br s	4.02 m	—
3''	4.56 dd(3.0, 9.0)	4.58 dd(3.0, 9.0)	5.54 dd(2.8, 9.3)	3.86 m	—
4''	4.34 t(9.0)	4.34 t(9.0)	4.48 d(4.7)	4.18 m	—
5''	4.94 m	4.93 m	4.92 d(3.1)	4.25 dd(5.0, 11.1)	—
6''	1.76 d(6.0)	1.75 d(6.0)	1.58 d(6.1)	—	1.69 d(6.1)
1'''	5.06 d(8.5)	5.06 d(7.8)	—	—	—
2'''	3.98 br t(7.8)	3.98 br t(7.8)	—	—	—
3'''	4.14 m	4.13 m	—	—	—
4'''	4.45 m	4.46 m	—	—	—
5'''	3.73 m	3.71 m	—	—	—
6'''	4.43 m, 4.49 m	4.43 br d(11.5) 4.50 m	—	—	—
1''''	5.87 s	5.87 s	—	—	—
2''''	4.66 br s	4.65 br s	—	—	—
3''''	4.51 m	4.51 br d(9.5)	—	—	—
4''''	4.34 t(9.5)	4.34 t(9.5)	—	—	—
5''''	4.99 m	4.99 dq(6.0, 9.5)	—	—	—
6''''	1.71 d(6.0)	1.71 d(6.0)	—	—	—

Table 3-11-27: ^1H NMR spectroscopic data of steroidal saponins **3-11-112**~**3-11-114**, **3-11-118**, and **3-11-119**.

H	3-11-112	3-11-113	3-11-114	3-11-118	3-11-119
3	3.95 m	3.78 m	3.78 m	3.78 m	3.87 m
6	5.32 br s	5.24 br d	5.32 br d	5.26 br d	5.32 br d
9	0.94 m	—	—	—	—
12	—	3.49 m	3.56 m	3.50 m	3.57 m
14	1.11 m	—	—	—	—
16	4.57 m	4.56 m	4.60 m	4.65 dd-like (6.8, 13.7)	4.67 m
17	1.82 dd(7.8, 7.0)	—	—	—	—
18	0.87 s	1.02 s	1.15 s	1.00 s	1.11 s
19	1.07 s	1.00 s	1.15 s	1.00 s	1.09 s
20	1.96 m	—	—	—	—
21	1.14 d(7.0)	1.36 br s	1.43 br s	1.33 d(6.2)	1.52 d(6.4)
26	α 3.50 t(10.3) β 3.58 t(11.9)	—	—	4.43 d(9.6)	—
27	0.68 d(5.3)	0.63 br s	0.69 br s	0.88 d(6.2)	1.18 d(6.3)
26-OMe				3.44 s	
1'	4.95 d(8.0)	4.86 d(6.2)	4.92 d(7.9)	4.83 d(6.2)	4.95 d(6.1)
6'	α 4.89 dd(7.6, 4.6) β 4.70 dd(4.6, 7.6)	—	—	—	—
1''	6.27 br s	6.33 s	6.29 s	6.28 s	6.41 s
6''	1.66 d(6.1)	—	—	—	—
1'''		5.79 s	5.20 s	5.74 s	5.87 s
2a	2.37 t(7.6)				
3a~15a	1.24~1.27 (ov)				
16a	0.89 t(7.3)				

Table 3-11-28: ^1H NMR spectroscopic data of steroidal saponins **3-11-115**~**3-11-117**, **3-11-120**, and **3-11-121**.

H	3-11-115	3-11-116	3-11-117	3-11-120	3-11-121
1	4.82 dd(11.7, 4.6)	0.99 m, 1.76 m	0.92, 1.67	ax 0.92 dt (2.5, 13.0, 12.0) eq 1.66 m	0.83, 1.63
2	ax 1.89 br d(11.7) eq 2.49 m	1.84 m, 2.01 m	1.52, 2.04	ax 1.64 m, eq 1.84 m	1.72 dd(4.0, 14.5) 2.07 t(14.5)
3	3.95 m	3.83 m	3.77	3.83 m	3.81 t(7.5)
4	2.61 dd(11.6, 4.3) 2.40 t(11.6)	2.72 m 2.79 m	2.58 d(11.9) 2.65 d(11.9)	ax 2.38 m eq 2.68 ddd (1.2, 5.8, 13.5)	2.56 d(11.9) 2.64 d(11.9)
6	5.44 m	5.32 br s	5.28 d(4.2)	5.28 d(5.0)	5.28 d(4.2)

Table 3-11-28 (continued)

H	3-11-115	3-11-116	3-11-117	3-11-120	3-11-121
7	1.75	1.60 m	1.42	ax 1.85 m	1.47
	1.45	1.93 m	1.86	eq 2.06 m	1.86
8	1.44	1.69 m	1.50	1.52 d(4.4)	1.49
9	1.08	1.68 m	0.88	1.03 dt (4.6, 12.2, 12.0)	0.83
11	1.37	1.79 m, 1.86 m	1.98, 1.46	1.63 m, 1.99 m	n.d., 1.46
12	1.65	3.97 m	1.85	3.57 d(0.9)	1.86
	1.03		2.16 dd(3.9, 7.0)		2.16
14	0.98 m	2.12 m	1.97	1.14 d(5.7)	1.96
15	1.38 m, 1.93 m	1.58 m, 2.14 m	1.43, 2.14 m	α 1.85 m β 1.45 d(7.0)	1.42 m, 1.45
16	4.48 m	4.64 m	4.42	4.66 dd(7.1, 15.7)	4.42 t(7.4)
17	1.71 dd(8.5, 7.5)	3.07 dd(7.2, 8.4)		2.25 m	
18	0.81 s	0.94 s	0.88	1.23 s	0.85 s
19	1.04 s	1.08 s	0.98 s	0.85 s	0.95 s
20	1.87	2.02 m	2.21 d(7.6)	3.21 t(6.9)	2.26 d(7.3)
21	1.18 d(7.0)	1.18 d(7.2)	1.18 d(7.1)	1.48 d(6.9)	1.16 d(7.4)
23	1.45	1.70 m	nd	4.10 m	1.98
	1.33		nd		2.31 dd(12.4, 4.7)
24	2.17	1.58 (ov)	1.52	ax 2.25 m	3.98 dd(5.0, 5.0)
	1.87		nd	eq 1.93 m	
25	1.55 m	1.58 (ov)	1.50	1.85 m	1.78 m
26	ax 4.03 dd (11.2, 2.6)	3.51 m	3.43	ax 4.04 dd (11.0, 2.6)	3.50 dd (11.1, 11.6)
	eq 3.34 d(11.2)	3.57 m	3.48	eq 3.31 d(11.0)	3.58 dd(4.5, 11.1)
27	1.05 d(6.9)	0.68 d(4.8)	0.62 d(5.1)	1.10 d(7.2)	0.98 d(6.4)
OAc	2.03 s(1-OAc)		1.94 br s(6'-OAc)		
1'	4.87 d(7.6)	4.91 d(6.6)	4.73 d(7.8)	4.93 d(7.8)	4.73 d(7.8)
2'	4.40 dd(8.7, 7.6)	4.19 m	3.90	3.98 dd(7.8, 8.9)	3.83 dd(8.8, 7.8)
3'	4.08 dd(9.1, 8.7)	4.20 m	4.05 t(9.0)	3.69 dd(8.8, 9.4)	4.01 t(8.8)
4'	4.56	4.39 m	3.76	4.48 dd(9.3, 9.4)	3.82 t(8.8)
5'	3.95	3.57 m	3.90	4.23 m	3.76 m
6'	4.16, 4.60	4.04 m, 4.16 m	4.62 dd(5.2, 11.9)	4.12 dd(2.9, 11.9)	4.18 dd(5.2, 12.1)
			4.75 d(11.9)	4.28 dd(6.2, 11.9)	4.35 d(12.1)
1''	5.15 d(7.9)	6.38 br s	5.70 br s	5.92 bs	5.58 br s
2''	4.43 dd(8.8, 7.9)	4.84 m	4.75	4.71 bd(3.3)	4.66 br s
3''	4.15 dd(9.0, 8.8)	4.63 m	4.41	4.60 dd(3.3, 9.3)	4.67
4''	3.79 dd(9.5, 9.0)	4.37 m	4.24	4.36 dd(9.3, 9.3)	4.21
5''	3.86 ddd (9.5, 6.8, 3.1)	4.92 (ov)	4.65	5.04 dq(9.3, 6.2)	4.64

Table 3-11-28 (continued)

H	3-11-115	3-11-116	3-11-117	3-11-120	3-11-121
6''	4.50 dd(11.6, 1.7) 4.02 dd(11.6, 6.8)	1.76 d(6.0)	1.58 d(5.9)	1.73 d(6.2)	1.56 d(5.9)
1'''	5.60 d(7.5)	5.82 br s	5.63 br s		5.63 br s
2'''	4.14 dd(9.1, 7.5)	4.54 m	4.64		4.61 br s
3'''	4.21 dd(9.1, 8.8)	4.52 m	4.72		4.71
4'''	4.08 t ^①	4.43 dd(9.0, 9.6)	4.24 t(9.2)		4.22
5'''	3.92 m	4.91 (ov)	4.70 m		4.68
6'''	4.56 br d 4.35 dd(11.6, 1.8)	1.58 d(5.4)	1.66 d(5.9)		1.66 d(5.9)
1''''	5.23 d(8.1)	6.27 br s			
2''''	3.95 dd(8.7, 8.0)	4.89 m			
3''''	4.06 dd(8.9, 8.7)	4.50 dd(3.0, 9.6)			
4''''	4.10 ddd (11.3, 8.9, 4.4)	4.29 dd(9.0, 9.6)			
5''''	4.21 dd(11.3, 4.9) 3.66 dd(11.3, 10.2)	4.35 m			
6''''		1.59 d(6.0)			

^① Distorted t.Table 3-11-29: ¹H NMR spectroscopic data of steroidal saponins 3-11-122~3-11-126.

H	3-11-122	3-11-123	3-11-124	3-11-125	3-11-126
1	1.82 m	4.87 dd(11.8, 4.3)	1.70 m 0.95 m	2.02 1.53	1.42 m (ov) 1.78 m (ov)
2	1.94 m 2.08 m	ax 1.95 m eq 2.57 m	2.06 m 1.84 m	2.0	1.14 m (ov) 1.75 m (ov)
3	3.82 m	3.98 m	3.90 m	4.82	4.28 m (ov)
4	2.77 m	2.63 dd(11.9, 4.1) 2.42 br t	ax 2.68 br d eq 2.74 br d	2.9~3.0 2.58~2.61	1.77 m (ov) 1.77 m (ov)
5					2.16 br s
6	5.40 s	5.44 m	5.30 d(3.6)	4.25 d	1.46 m (ov) 1.84 m (ov)
7	1.64 m 1.98 m	1.72 m 1.44 m	1.43 m (ov)	5.66 d(5)	0.91 m (ov) 1.20 m (ov)
8	1.64 m	1.48 m	1.64 m	2.46	1.48 m (ov)
9	0.97 m	1.13 m	0.88 m	1.59	1.25 m (ov)
11	1.79 m 1.84 m	1.27 m	eq 1.42 m	1.69~1.72	1.16 m (ov) 1.28 m (ov)
12	1.54 m	1.65 m 1.08 m	1.68 m (ov)	1.93~1.94	1.05 m (ov) 1.66 m (ov)
14	2.08 m	1.01 m	1.05 m	1.78~1.80	1.08 m (ov)
15	1.52 m 2.20 m	1.99 m 1.40 m	1.43 m (ov)	4.52	1.43 m (ov) 2.03 m (ov)

Table 3-11-29 (continued)

H	3-11-122	3-11-123	3-11-124	3-11-125	3-11-126
16	4.49 t(6.8)	4.58 q-like(7.0)	4.82 m	1.83~1.85	4.63 dt(6.8, 7.6)
17		1.79 dd(8.4, 7.2)	1.80 m	0.75 s	1.86 dd(6.8, 7.6)
18	0.98 s	1.02 s	0.81 s	1.49 s	0.84 s
19	1.10 s	1.03 s	1.09 s	1.88	0.97 s
20	2.25 q(7.2)	2.98 q	1.94 m	1.08 d(6.5)	1.99 dq(6.8, 7.0)
21	1.25 d(7.0)	1.19 d(7.0)	0.69 d(4.8)	—	1.08 d(7.0)
23	2.20 m	4.03 m	2.01 m	1.70	1.82 m (ov)
			1.86 m		1.82 m (ov)
24	1.79 m	4.47 dd(9.6, 3.8)	1.56 m	1.50	2.24 br d(12.0)
	1.83 m				2.70 td(5.4, 12.0)
25	2.08 m	2.23 m	1.57 m	1.52	
26	4.04 m	ax 4.11 dd	3.59 m	3.40~3.44	4.06 d(12.0)
	3.90 m	(10.5, 2.4)	3.50 m	3.51~3.53	4.49 d(12.0)
		eq 3.48 d(10.5)			
27	3.65 dd(7.1, 10.5)	1.37 d(7.0)	1.30 d(7.2)	0.65~0.66 d(6)	4.80 br s
	3.70 dd(4.9, 10.5)				4.82 br s
OAc		2.03 s(1-OAc)			
1'	4.93 d(6.8)	4.80 d(7.7)	4.90 d(7.8)	4.85 d(8)	4.88 d(8.0)
2'	4.20 m	4.51 dd(9.1, 7.7)	4.08 dd(9.1, 7.8)	4.21	4.27 dd(9.2, 8.0)
3'	4.19 m	3.98	4.19 m	4.05~4.06	4.28 dd(9.2, 9.2)
4'	4.06 m	3.95	4.08 m	4.05~4.06	4.38 dd(9.1, 9.1)
5'	3.90 m	3.70 m	3.74 m	3.99	3.62 br d(9.0)
6'	4.28 m	1.60 d(6.4)	4.44 m(2H)	4.32~4.38	4.07 dd(3.6, 12.0)
				4.23~4.24	4.23 br d(12.0)
1''	6.35 br s	5.10 d(7.7)	5.81 br s	6.38	5.45 d(7.8)
2''	4.28 m	4.10 dd(8.4, 7.7)	4.72 br s	4.57~4.59	4.07 dd(7.8, 8.6)
3''	4.46 m	4.21 dd(8.8, 8.4)	4.51 m	4.79	4.25 dd(8.9, 8.9)
4''	4.30 m	4.26 dd(9.1, 8.8)	4.33 m	4.26	4.27 dd(8.8, 8.8)
5''	4.05 m	3.82 m	4.86 m	5.05~5.04	3.97 ddd
					(2.7, 5.1, 9.2)
6''	1.75 d(6.6)	4.46 br d	1.75 d(6.6)	1.75 d(6)	4.45 dd(5.2, 12.0)
		4.30 br d			4.58 dd(2.7, 12.0)
1'''	5.10 d(7.7)	5.28 d(7.5)	5.75 br s	5.07 d(7.5)	5.82 br s
2'''	4.02 m	4.06 dd(9.1, 7.5)	4.80 m	3.97~3.99	4.67 br s
3'''	4.05 m	4.14 dd(9.3, 9.1)	4.57 m	4.14~4.15	4.55 dd(3.8, 9.1)
4'''	4.10 m	4.22 dd(9.1, 9.1)	4.44 m	4.10~4.08	4.35 dd(9.2, 9.2)
5'''	3.85 m	3.77 m	4.83 m	4.23~4.24	4.93 dq(6.2, 9.2)
6'''	4.20 m	4.52 br d	1.68 d(6.6)	4.57~4.59	1.66 d(6.2)
		4.38 br d			
1''''			5.24 d(7.8)		
2''''			4.08 m		
3''''			4.19 m		
4''''			4.33 m		
5''''			3.74 m		
6''''			4.33 m(2H)		

Table 3-11-30: ^1H NMR spectroscopic data of steroidal saponin **3-11-127**.

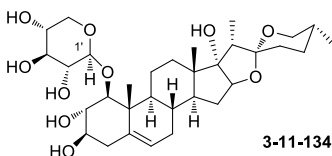
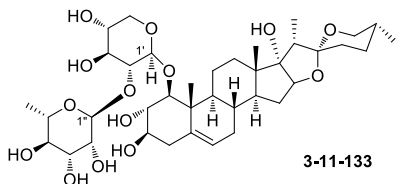
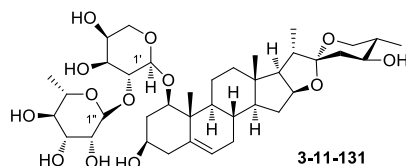
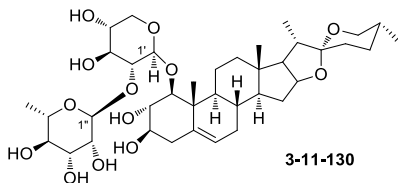
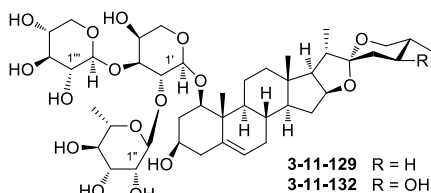
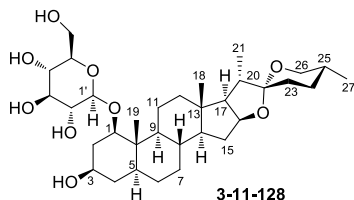
H	3-11-127	H	3-11-127
2	4.30 m	24	ax 2.24, eq 2.72
3	4.46 m	26	ax 4.02 d(11.6), eq 4.45 t(11.6)
16	4.60 m	27	4.78 s, 4.82 s
18	0.78 s	1'	4.98 d(7.8)
19	0.92 s	2'	4.66 t(8.0)
21	1.06 d(8.0)	1''	5.28 d(7.6)

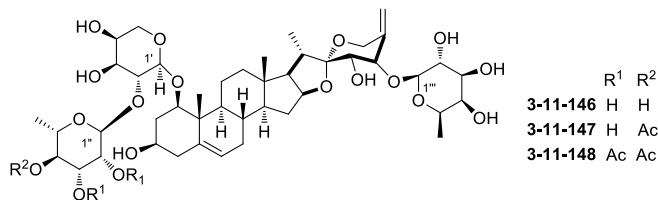
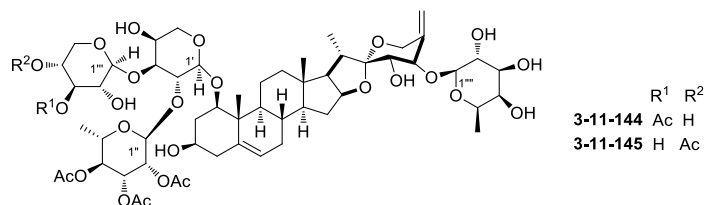
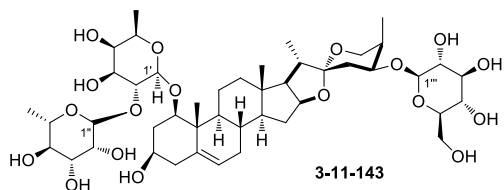
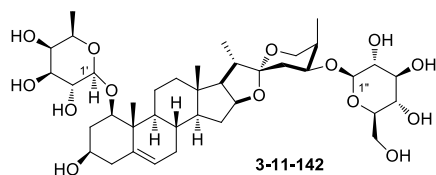
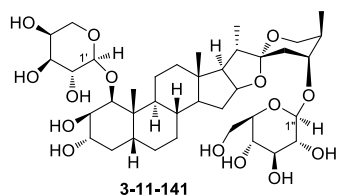
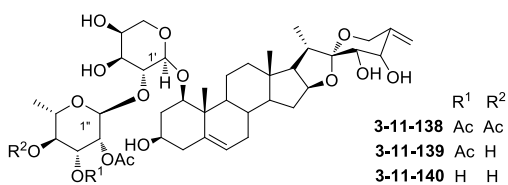
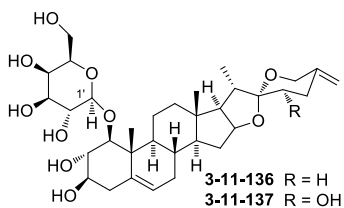
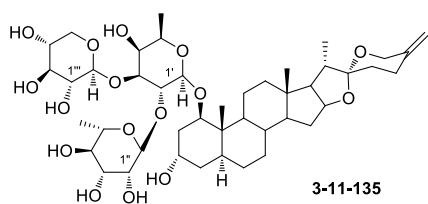
Table 3-11-31: Cos, MFs, and TSs of steroidal saponins **3-11-128~3-11-157**.

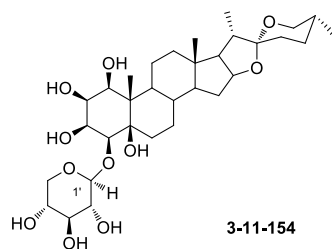
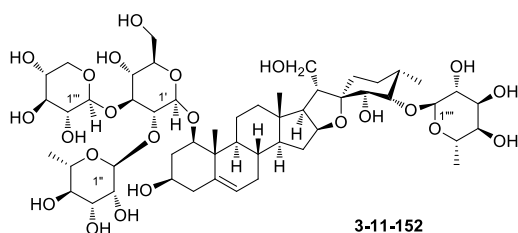
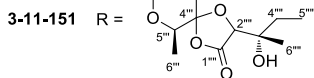
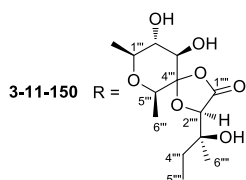
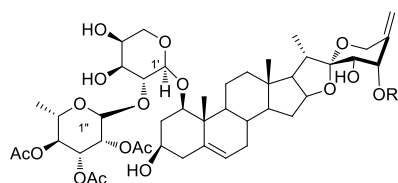
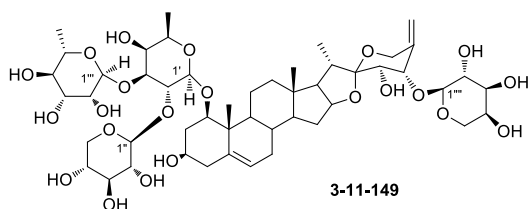
No.	Compounds	MFs	Test solvents	References
3-11-128	(25 <i>R</i>)-3 β -hydroxy-5 α -spirostan-1 β -yl- β -D-glucopyranoside	C ₃₃ H ₅₄ O ₉	C ₅ D ₅ N	[326]
3-11-129	(25 <i>R</i>)-3 β -hydroxyspirost-5-en-1 β -yl- <i>O</i> - α -L-rhamnopyranosyl-(1 $\rightarrow$ 2)- <i>O</i> -[β -D-xylopyranosyl-(1 $\rightarrow$ 3)]- α -L-arabinopyranoside	C ₄₃ H ₆₈ O ₁₆	C ₅ D ₅ N	[326]
3-11-130	atropuroside A	C ₃₈ H ₆₀ O ₁₃	C ₅ D ₅ N	[276]
3-11-131	(24 <i>S</i> ,25 <i>S</i>)-3 β ,24-dihydroxyspirost-5-en-1 β -yl- <i>O</i> - α -L-rhamnospyranosyl-(1 $\rightarrow$ 2)- α -L-arabinopyranoside	C ₃₈ H ₆₀ O ₁₃	C ₅ D ₅ N	[326]
3-11-132	(24 <i>S</i> ,25 <i>S</i>)-3 β ,24-dihydroxyspirost-5-en-1 β -yl- <i>O</i> - α -L-rhamnopyranosyl-(1 $\rightarrow$ 2)- <i>O</i> -[β -D-xylopyranosyl-(1 $\rightarrow$ 3)]- α -L-arabinopyranoside	C ₄₃ H ₆₈ O ₁₇	C ₅ D ₅ N	[326]
3-11-133	atropuroside B	C ₃₈ H ₆₀ O ₁₄	C ₅ D ₅ N	[276]
3-11-134	atropuroside C	C ₃₂ H ₅₀ O ₁₀	C ₅ D ₅ N	[276]
3-11-135	5 α -spirost-25(27)-ene-1 β ,3 α -diol-1- <i>O</i> -{ <i>O</i> - α -L-rhamnopyranosyl-(1 $\rightarrow$ 2)- <i>O</i> -[β -D-xylopyranosyl-(1 $\rightarrow$ 3)]- β -D-fucopyranoside}	C ₄₄ H ₇₀ O ₁₆	C ₅ D ₅ N- CD ₃ OD (11:1)	[327]
3-11-136	atropuroside D	C ₃₃ H ₅₀ O ₁₀	C ₅ D ₅ N	[276]
3-11-137	atropuroside E	C ₃₃ H ₅₀ O ₁₁	C ₅ D ₅ N	[276]
3-11-138	draconin A	C ₄₄ H ₆₄ O ₁₇	CDCl ₃	[328]
3-11-139	draconin B	C ₄₂ H ₆₂ O ₁₆	CDCl ₃	[328]
3-11-140	draconin C	C ₄₀ H ₆₀ O ₁₅	C ₅ D ₅ N	[328]
3-11-141	hemeroside A	C ₃₈ H ₆₂ O ₁₅	C ₅ D ₅ N	[305]
3-11-142	surculoside B	C ₃₉ H ₆₂ O ₁₄	C ₅ D ₅ N	[329]
3-11-143	surculoside C	C ₄₅ H ₇₂ O ₁₈	C ₅ D ₅ N	[329]
3-11-144	namonin A	C ₅₇ H ₈₄ O ₂₆	C ₅ D ₅ N	[274]
3-11-145	namonin B	C ₅₇ H ₈₄ O ₂₆	C ₅ D ₅ N	[274]
3-11-146	namonin C	C ₄₄ H ₆₈ O ₁₈	C ₅ D ₅ N	[274]
3-11-147	namonin D	C ₄₆ H ₇₀ O ₁₉	C ₅ D ₅ N	[274]

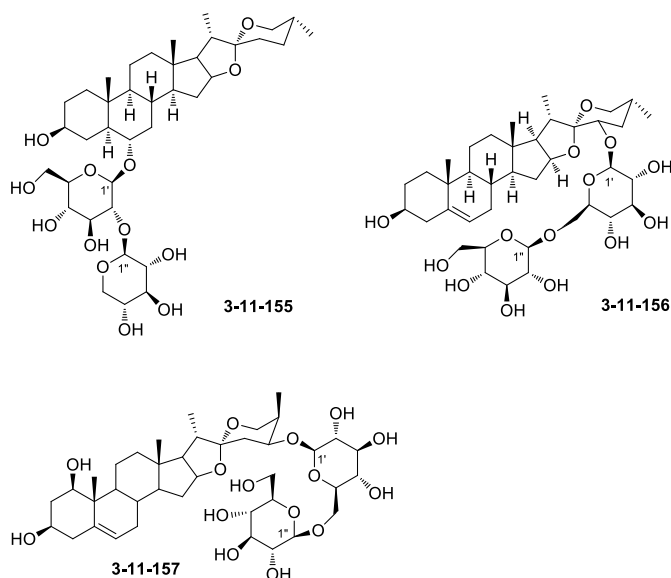
Table 3-11-31 (continued)

No.	Compounds	MFs	Test solvents	References
3-11-148	(23 <i>S</i> ,24 <i>S</i>)-spirosta-5,25(27)-diene-1 β ,3 β ,23,24-tetrol-1- <i>O</i> -{ <i>O</i> -(2,3,4-tri- <i>O</i> -acetyl- α -L-rhamnopyranosyl)-(1 $\rightarrow$ 2)- α -L-arabinopyranosyl} 24- <i>O</i> - β -D-fucopyranoside	C ₅₀ H ₇₄ O ₂₁	C ₅ D ₅ N-CD ₃ OD (11:1)	[330]
3-11-149	deistelianoside B	C ₄₉ H ₇₆ O ₂₂	C ₅ D ₅ N	[320]
3-11-150	spilacleoside A	C ₅₆ H ₈₂ O ₂₄	C ₅ D ₅ N-CD ₃ OD (10:1)	[331]
3-11-151	spilacleoside B	C ₅₆ H ₈₂ O ₂₄	C ₅ D ₅ N-CD ₃ OD (10:1)	[331]
3-11-152	padelaoside A	C ₅₀ H ₈₀ O ₂₄	C ₅ D ₅ N	[332]
3-11-153	padelaoside B	C ₅₀ H ₈₀ O ₂₄	C ₅ D ₅ N	[332]
3-11-154	wattoside G	C ₃₂ H ₅₂ O ₁₁	C ₅ D ₅ N	[317]
3-11-155	(25 <i>R</i>)-3 β -hydroxy-5 α -spirostan-6 α -yl- <i>O</i> - β -D-xylopyranosyl-(1 $\rightarrow$ 2)- β -D-glucopyranoside	C ₃₈ H ₆₂ O ₁₃	C ₅ D ₅ N	[308]
3-11-156	(23 <i>S</i> ,25 <i>R</i>)-spirost-5-ene-3 β ,23-diol-23- <i>O</i> -{ <i>O</i> - β -D-glucopyranosyl-(1 $\rightarrow$ 6)- β -D-glucopyranoside}	C ₃₉ H ₆₂ O ₁₄	C ₅ D ₅ N	[333]
3-11-157	wattoside J	C ₃₉ H ₆₄ O ₁₅	C ₅ D ₅ N	[317]







**Table 3-11-32:** ^1H NMR spectroscopic data of steroidal saponins **3-11-128–3-11-132**.

H	3-11-128	3-11-129	3-11-130	3-11-131	3-11-132
1	3.98 dd(11.5, 4.2)	3.82 dd(12.0, 3.9)	3.71 d(9.6)	3.84 dd(12.1, 3.9)	3.83 dd(12.0, 3.9)
2	–	–	4.49 t(9.6)	–	–
3	3.90 br m(22.3)	3.89 br m(21.2)	3.85 m	3.87 m(19.5)	3.88 m(20.0)
4	–	–	α 2.59 dd(5.7, 11.9) β 2.76 brt(11.9)	–	–
6	–	5.58 br d(5.7)	5.59 br d(5.7)	5.58 br d(5.7)	5.58 br d(5.7)
11	–	–	α 2.88 br d(9.6) β 1.61 br d(9.6)	–	–
14	–	–	1.17 m	–	–
15	–	–	α 2.10 m, β 1.51 m	–	–
16	4.54 m	4.52 q-like(7.4)	4.52 m	4.54 q-like(7.4)	4.54 q-like(7.4)
18	0.85 s	0.85 s	0.91 s	0.86 s	0.85 s
19	1.03 s	1.43 s	1.35 s	1.44 s	1.42 s
20	–	–	1.95 m	–	–
21	1.10 d(6.9)	1.09 d(7.0)	1.10 d(6.9)	1.12 d(7.0)	1.12 d(6.9)
23	–	–	–	ax 1.98 dd (12.7, 12.2) eq 2.31 dd (12.7, 4.7)	ax 1.97 dd (12.7, 12.1) eq 2.30 dd (12.7, 4.7)
24	–	–	–	4.01 ddd (12.2, 10.5, 4.7)	4.01 ddd (12.1, 10.3, 4.7)

Table 3-11-32 (continued)

H	3-11-128	3-11-129	3-11-130	3-11-131	3-11-132
25	—	—	—	1.82 m	1.82 m
26	ax 3.51 dd (10.6, 10.6) eq 3.58 dd (10.6, 2.9)	ax 3.48 dd (10.5, 10.5) eq 3.56 dd (10.5, 2.6)	α 3.56 m β 3.48 t(10.5)	ax 3.59 dd (11.3, 11.3) eq 3.69 dd (11.3, 4.8)	ax 3.59 dd (11.3, 11.3) eq 3.71 dd (11.3, 3.3)
27	0.70 d(5.3)	0.68 d(5.3)	0.67 d(5.4)	1.08 d(6.5)	1.08 d(6.5)
1'	5.05 d(7.7)	4.73 d(7.3)	5.57 d(7.9)	4.73 d(7.3)	4.74 d(7.3)
2'	4.03 dd(8.9, 7.7)	—	4.27 t(8.1)	—	—
3'	4.24 dd(8.9, 8.9)	—	4.13 m	—	—
4'	4.15 dd(8.9, 8.9)	—	4.13 m	—	—
5'	3.88 ddd (8.9, 5.8, 3.3)	—	3.56 m	—	—
6'	4.59 dd(11.5, 3.3) 4.36 dd(11.5, 5.8)	1.74 d(6.2)			
1''		6.34 br s	6.51 br s	6.34 br s	6.34 br s
2''		—	4.79 dd(1.3, 3.3)	—	—
3''		—	4.72 dd(3.3, 9.2)	—	—
4''		—	4.34 t(9.2)	—	—
5''		—	4.90 m	—	—
6''		—	1.79 d(6.2)	1.75 d(6.1)	1.74 d(6.2)
1'''		4.98 d(7.5)			4.98 d(7.5)

Table 3-11-33: ¹H NMR spectroscopic data of steroidal saponins 3-11-133~3-11-137.

H	3-11-133	3-11-134	3-11-135	3-11-136	3-11-137
1	3.71 d(9.5)	3.59 d(9.2)	4.35 dd(11.5, 4.3)	3.56 d(9.2)	3.54 d(10.0)
2	4.51 t(9.5)	4.30 t(9.2)	ax 2.20 ddd (12.5, 12.5, 2.7) eq 2.45 br dd (12.5, 4.3)	4.29 t(9.2)	4.28 br t(10.0)
3	3.82 m	3.88 m	4.25 br d(2.7)	3.92 m	3.91 m
4	α 2.59 dd (5.6, 12.3) β 2.76 t(12.3)	α 2.61 dd (5.8, 12.7) β 2.79 t(12.7)	ax 1.61 br dd (13.5, 13.5) eq 1.52 br d(13.5)	α 2.63 dd (5.7, 13.2) β 2.79 br t(13.2)	α 2.63 dd (5.6, 12.9) β 2.78 br t(12.9)
5			1.98		
6	5.58 br d(5.5)	5.63 br d(6.0)	ax 1.25 eq 1.33	5.64 br d(5.5)	5.63 br d(5.5)
7	—	1.92 dd(5.8, 12.7)	ax 0.92 dddd(13.1, 13.1, 13.1, 3.5) eq 1.59	—	—
8	—	—	1.60	—	2.02 m

Table 3-11-33 (continued)

H	3-11-133	3-11-134	3-11-135	3-11-136	3-11-137
9	1.69 m	1.63 m	1.19	1.61 m	1.58 m
11	α 3.03 br d(10.0) β 1.69 m	α 3.12 br d(9.9) β 1.63 m	ax 1.36 eq 3.20 br dd (13.8, 3.2)	α 3.10 br d(12.4) β 1.48 m	α 3.07 br d(10.8) β 1.58 m
12	—	2.38 m	ax 1.23, eq 1.57	—	—
14	2.20 m	2.21 m	1.14	—	—
15	α 2.20 m β 1.51 m	α 2.21 m β 1.53 m	α 2.00 β 1.40	α 2.03 m β 1.53 m	α 2.01 m β 1.51 m
16	—	4.48 t(6.5)	4.50 q-like(6.8)	4.48 m	4.48~4.55 m
17	—	—	1.79 dd(8.6, 6.8)	1.86 m	—
18	1.05 s	1.02 s	0.83	0.87 s	0.86 s
19	1.40 s	1.29 s	1.20	1.25 s	1.23 s
20	2.29 q(7.1)	2.27 q(7.1)	1.93	1.90 m	2.01 m
21	1.23 d(7.1)	1.20 d(7.1)	1.01 d(7.0)	0.96 d(6.8)	0.99 d(10.7)
23	—	—	1.78, 1.74	—	5.03 dd(5.8, 11.8)
24	—	—	ax 2.68 ddd (13.0, 13.0, 5.4) eq 2.23 br d(13.0)	α 2.71 br t(10.9) β 2.23 br d(10.9)	α 2.05 t(11.8) β 2.42 dd (5.8, 11.8)
26	3.47~3.51 m	3.51 m(2H)	4.43 br d(12.1) 3.99 br d(12.1)	4.02 br d(12.4) 4.44 d(12.4)	4.22 br d(12.1) 4.48~4.55 m
27	0.66 d(5.5)	0.67 d(5.7)	4.80 br s 4.77 br s	4.77 br s 4.81 br s	5.04 br s 5.66 br s
1'	5.55 d(7.9)	5.38 d(7.5)	4.71 d(8.0)	5.35 d(7.9)	5.33 d(7.9)
2'	4.28 t(7.9)	4.06~4.11 m	4.53 dd(9.5, 8.0)	4.55 m	4.48~4.55 m
3'	4.04 m	4.06~4.11 m	4.01 dd(9.5, 2.9)	4.14 br d(8.6)	4.13 br d(9.5)
4'	4.04 m	4.06~4.11 m	4.16 br d(2.9)	4.61 br s	4.61 br s
5'	3.47-3.51 m 4.07 dd(5.6, 11.0)	3.51 m 4.06~4.11 m	3.60 br q(6.3)	4.02 br d(12.4)	4.03 m
6'	—	—	1.43 d(6.3)	4.40 m 4.55 m	4.37 br d(12.1) 4.48~4.55 m
1''	6.51 br s	—	6.27 d(1.1)	—	—
2''	4.79 dd(1.3, 3.3)	—	4.70 dd(3.5, 1.1)	—	—
3''	4.73 dd(3.3, 9.4)	—	4.48 dd(9.4, 3.5)	—	—
4''	4.35 t(9.4)	—	4.19 dd(9.4, 9.4)	—	—
5''	4.90 m	—	4.75 dq(9.4, 6.2)	—	—
6''	1.80 d(6.1)	—	1.70 d(6.2)	—	—
1'''	—	—	4.92 d(7.5)	—	—
2'''	—	—	3.82 dd(8.6, 7.5)	—	—
3'''	—	—	3.98 dd(8.6, 8.6)	—	—
4'''	—	—	4.03 ddd (10.1, 8.6, 5.3)	—	—
5'''	—	—	4.23 dd(11.3, 5.3) 3.62 dd(11.3, 10.1)	—	—

Table 3-11-34: ¹H NMR spectroscopic data of steroidal saponins **3-11-138~3-11-142**.

H	3-11-138	3-11-139	3-11-140	3-11-141	3-11-142
1	3.37 dd(4, 11.7)	3.34 dd(3.8, 11.5)	3.78 m	4.23 d(2.0)	3.83 dd(11.5, 3.9)
2	ax 1.84 dd, eq 2.19 m	ax 2.16, eq 2.62	ax 2.35, eq 2.65	ax 4.11 dd(2.0, 9.2)	
3	3.50	3.45 ddd (2.3, 2.9, 9.5)	3.80 m	4.60 ddd (4.0, 9.2, 11.5)	3.91 br m (ov)
4	2.23 m, 2.34 m	2.21 br s	1.25, 1.55	ax 2.22 ddd (10.0, 11.5, 11.5) eq 1.86 ddd (4.0, 4.0, 11.5)	—
5				2.06 m	
6	5.57 d(5.8)	5.57 d(5.8)	5.49 d(5.5)	ax 1.26 m, eq 1.71 m	5.60 br d(5.7)
7	1.52, 1.97	1.52, 1.97	1.51	ax 1.06 m, eq 1.26 m	—
8	1.55 m	1.55 m	1.50	1.58 br dd(4.0, 10.0)	—
9	1.24	1.18 t(7.0)	1.49	1.44 br dd(4.0, 10.0)	—
11	1.30	1.30	1.60	1.39 m	—
12	1.17 m, 1.72 m	1.17 m, 1.72 m	1.26 m, 1.55 m	ax 0.95 m eq 1.62 br dt(2.0, 10.0)	—
14	1.15 m	1.15 m	1.07	0.95 m	—
15	1.52, 1.96	1.52, 1.96	1.35, 1.90	1.31 ddd(4.0, 6.0, 11.0) 1.96 ddd(5.0, 6.0, 11.0)	—
16	4.50 dd(7.2, 15.4)	4.49 dd(7.2, 15.3)	4.52 m	4.53 ddd (6.0, 6.0, 8.6)	—
17	1.73 dd(6.7, 8.6)	1.73 br d(9.6)	1.69 m	1.76 dd(6.5, 8.6)	—
18	0.85 s	0.85 s	0.98 s	0.77 s	0.82 s
19	1.06 s	1.06 s	1.36 s	1.39 s	1.24 s
20	2.65 m	2.65 m	2.66 m	1.95 dd(6.5, 7.0)	—
21	0.94 d(7.0)	0.94 d(7.0)	1.06 d(7.0)	1.10 d(7.0)	1.05 d(6.9)
23	3.50	3.51 d(3.1)	3.88 d(4.9)	ax 2.12 dd(9.0, 11.0) eq 2.11 dd(5.0, 11.0)	2.10 d-like (8.8) (2H)

Table 3-11-34 (continued)

H	3-11-138	3-11-139	3-11-140	3-11-141	3-11-142
24	4.26 m	4.24 m	4.16 m	4.81 ddd (4.0, 9.0, 5.0)	4.81 td-like (8.5, 5.0)
25				2.27 ddt (2.0, 4.0, 6.0)	—
26	ax 4.35 d(12.0) eq 3.85 d(12.9)	ax 4.34 d(12.9) eq 3.85 d(12.8)	3.95 s, 3.98 s	ax 3.52 dd(2.0, 11.0) eq 3.95 dd(2.0, 11.0)	—
27	5.05 br s 5.11 br s	5.02 s 5.10 br s	5.04 d(1.4)	1.32 d(6.0)	1.32 d(7.0)
1'	4.26 d(7.6)	4.24 d(7.3)	4.62 d(8.0)	5.12 d(7.3)	4.74 d(7.7)
2'	3.62 dd(7.7, 8.5)	3.61 d(7.7)	4.51 m	4.52 dd(7.3, 8.9)	4.32 dd(9.3, 7.7)
3'	3.68 dd(7.0, 3.1)	3.68 dd(8.8, 3.6)	4.07	4.15 dd(3.6, 8.9)	4.06
4'	3.80 br s	3.79 br s	4.06	4.25 ddd (1.5, 2.2, 3.6)	3.89
5'	3.94 dd(12.8, 2.2) 4.32 m	3.92 dd(12.8, 1.9) 4.32 m	3.58 dd(12.0, 0.5) 4.20 m	3.81 dd(1.5, 12.1) 4.35 dd(2.2, 12.1)	3.75 br q(6.3)
6'					1.57 d(6.3)
1''	5.46 d(1.9)	5.36 d(1.9)	6.17 d(1.2)	5.03 d(7.5)	5.04 d(7.7)
2''	5.21 dd(3.2, 1.8)	5.19 d(3.3)	5.96 dd(1.5, 3.5)	4.05 dd(7.5, 8.3)	4.06 dd(8.8, 7.7)
3''	5.46 dd(10.1, 3.4)	5.21 s	4.73 dd(8.6, 3.5)	4.26 dd(8.3, 9.3)	4.26 dd(9.1, 8.8)
4''	5.05 dd(10.0, 9.8)	4.15 m	4.19 m	4.30 dd(8.5, 9.3)	4.31 dd(9.1, 9.1)
5''	4.30 m	4.15 m	4.81 m	3.92 ddd (2.3, 5.0, 8.5)	3.92 m
6''	1.22 d(6.3)	1.33 d(6.1)	1.70 d(6.1)	4.38 dd(5.0, 12.0) 4.47 dd(2.3, 12.0)	4.48 br d(11.6) 4.38
OAc	1.99 s(2''-OAc) 2.05 s(3''-OAc) 2.15 s(4''-OAc)	2.11 s(2''-OAc) 2.06 s(3''-OAc)	1.91 s(2''-OAc)		

Table 3-11-35: ¹H NMR spectroscopic data of steroidal saponins **3-11-143~3-11-147**.

H	3-11-143	3-11-144	3-11-145	3-11-146	3-11-147
1	3.81 dd(11.9, 4.1)	3.77 m	3.76 m	3.81 m	3.83 dd(11.6, 3.6)
3	3.88 br m(21.8)	3.87 m	3.84 m	3.85 m	3.85 m
6	5.59 br d(5.6)	5.61 d(5.4)	5.61 d(5.5)	5.56 d(5.2)	5.63 d(5.5)
16	—	4.49 m	4.60 m	4.59 m	4.57 m
17	—	—	1.69 dd(9.5, 6.8)	—	—
18	0.82 s	0.95 s	0.95 s	0.93 s	0.95 s
19	1.44 s	1.32 s	1.34 s	1.40 s	1.38 s
21	1.04 d(6.9)	1.07 d(6.1)	1.06 d(6.1)	1.06 d(7.1)	1.07 d(7.0)
23	2.09 d-like(9.3)	3.94 d(6.9)	3.95 m	3.96 d(3.2)	3.97 m
24	4.81 td-like(9.3, 4.9)	4.78 d(3.9)	4.77 d(2.7)	4.78 d(3.2)	4.80 m
26	—	4.82 d(10.0)	4.82 d(11.7)	4.82 d(11.5)	4.83 d(11.8)
		3.96 m	3.96 m	3.98 d(11.5)	4.01 d(11.8)
27	1.31 d(6.9)	5.23 br s	5.23 br s	5.24 br s	5.25 br s
		5.10 br s	5.08 br s	5.09 br s	5.10 br s
1'	4.68 d(7.8)	4.59 d(7.5)	4.57 d(7.6)	4.68 d(7.5)	4.68 d(8.0)
2'	4.54 dd(9.2, 7.8)	4.47 dd(8.0, 7.5)	4.50 m	4.55 m	4.52 m
3'	4.11 dd(9.2, 2.9)	3.98 m	3.95 m	4.11 m	4.12 m
4'	3.90 br d(2.9)	4.33 m	4.31 m	4.13 m	3.88 m
5'	3.67 br q(6.3)	4.19 m	4.20 m	4.24 d(11.7)	4.27 m
		3.64 m	3.60 m	3.64 d(11.7)	3.65 m
6'	1.51 d(6.3)				
1''	6.39 br s	6.35 d(1.2)	6.47 br s	6.31 br s	6.39 br s
2''	4.76 br d(3.5)	5.99 dd(3.4, 1.2)	6.08 dd(3.2, 1.5)	4.70 m	4.67 m
3''	4.66 dd(8.9, 3.5)	5.86 dd(10.2, 3.4)	5.89 dd(10.2, 3.2)	4.59 m	4.72 m
4''	4.32 dd(9.3, 8.9)	5.55 t(10.2)	5.63 m	4.28 m	5.80 t(9.6)
5''	4.91 dq(9.3, 6.1)	4.93 m	4.97 m	4.80 m	4.90 m
6''	1.75 d(6.1)	1.39 d(6.1)	1.42 d(6.1)	1.70 d(5.6)	1.41 d(6.3)
OAc		1.99 s(2''-OAc)	1.86 s(2''-OAc)		1.98 s(4''-OAc)
		2.03 s(3''-OAc)	1.92 s(3''-OAc)		
		2.12 s(4''-OAc)	2.11 s(4''-OAc)		
		1.92 s(3'''-OAc)	2.03 s(4'''-OAc)		
1'''	5.04 d(7.7)	4.80 d(7.3)	4.78 d(7.3)	5.15 d(7.8)	5.17 d(7.9)
2'''	4.06 dd(8.9, 7.7)	3.76 m	3.70 t(7.3)	4.38 t(7.8)	4.38 t(7.9)
3'''	4.26 dd(9.3, 8.9)	5.54 t(9.2)	4.09 t(7.3)	4.04 dd(7.8, 2.9)	4.05 dd(7.9, 3.3)
4'''	4.32 dd(9.3, 9.3)	4.05 m	5.16 m	3.96 m	3.97 m
5'''	3.92 ddd(9.3, 4.5, 1.9)	4.20 m	4.16 m	3.75 q(6.4)	3.76 m
6'''	4.48 dd(11.6, 1.9)	3.60 m	3.47 d(10.9)	1.47 d(6.4)	1.48 d(6.5)
	4.39 dd(11.6, 4.5)				
1''''		5.12 d(8.1)	5.15 d(7.8)		
2''''		4.38 dd(10.6, 8.1)	4.38 t(7.8)		
3''''		4.03 m	4.04 dd(7.8, 3.4)		
4''''		3.96 m	3.94 m		
5''''		3.75 m	3.74 m		
6''''		1.46 d(6.4)	1.46 d(6.3)		

Table 3-11-36: ¹H NMR spectroscopic data of steroidal saponins **3-11-148**, **3-11-149**, **3-11-152**, **3-11-153**, and **3-11-156**.

H	3-11-148	3-11-149	3-11-152	3-11-153	3-11-156
1	3.76 dd(11.9, 3.9)	3.77 dd(12.1, 4.0)	3.84 dd(3.9, 12.0)	3.84 dd(3.9, 12.0)	ax 1.10, eq 1.80
2	ax 2.17 q-like(11.9) eq 2.63 br dd(11.9, 3.9)	2.33 q(11.8)	2.34 m, 2.62 m	2.62 m	eq 2.08, ax 1.78
3	3.80 m	3.84 m	3.71 m	3.72 m	3.83 m
4	ax 2.65 dd(12.2, 12.2) eq 2.57 dd(12.2, 4.3)	2.66 br d(11.7) 2.54 dd(12.1, 4.0)	2.51 m, 2.64 m	2.53 m, 2.64 m	ax 2.57 dd(13.2, 13.2) eq 2.61 dd(13.2, 4.6)
6	5.60 br d(5.6)	5.55 d(5.2)	5.54 d(6.0)	5.54 d(5.7)	5.35 br d(4.9)
7	α 1.48 β 1.79 br dd(12.4, 5.6)	1.46, 1.74 m	1.39 m, 1.71 m	1.39 m, 1.71 m	α 1.85, β 1.52
8	1.48	1.48	1.46 m	1.45 m	1.57
9	1.44	1.51 d(2.0)	1.60 m	1.59 m	0.95
11	ax 1.55 eq 2.80 br d(10.8)	1.54 d(5.3) 2.88 br d(12.6)	1.58 m, 2.80 m	1.60 m, 2.80 m	ax 1.40, eq 1.47
12	ax 1.26 ddd(11.6, 11.6, 3.4) eq 1.57 br dd(11.6, 3.2)	1.27 m, 1.57	1.46 m, 1.90 m	1.45 m, 1.92 m	ax 1.19, eq 1.79
14	1.07	1.09 m	1.16 m	1.16 m	1.11
15	α 1.80, β 1.38	1.23 m, 1.56	1.43 m, 1.79 m	1.46 m, 1.79 m	α 1.99, β 1.48
16	4.61 q-like(7.5)	4.57	4.57 m	4.57 m	4.61 q-like(7.7)
17	1.68 dd(8.6, 6.7)	1.70 d(7.3)	2.00 m	2.00 dd(8.3, 6.1)	1.94 dd(8.5, 7.7)
18	0.95 s	0.92 s	1.10 s	1.11 s	1.19 s
19	1.32 s	1.37 s	1.36 s	1.37 s	0.99 s
20	2.84	2.83 t(6.9)	3.32 m	3.33 m	3.19 m
21	1.04 d(7.0)	1.05 d(6.9)	4.17 m, 4.02 m	4.18 m, 4.02 m	1.22 d(7.0)
23	3.90 d(3.8)	3.97 d(4.2)	4.30 dd(3.2, 10.8)	4.31 m	4.16 dd(11.6, 5.1)
24	4.74 d(3.8)	4.78 d(4.2)	4.14 m	4.14 m	ax 2.01 q-like(11.6) eq 2.64
25			1.94 m	1.97 m	2.14 m
26	4.79 br d(11.6) 3.97 d(11.6)	3.99 4.81 br d(11.7)	3.35 m, 3.94 m	3.36 m, 3.97 m	ax 3.51 dd(11.0, 11.0) eq 3.45 dd(11.0, 4.2)

Table 3-11-36 (continued)

H	3-11-148	3-11-149	3-11-152	3-11-153	3-11-156
27	5.22 d(1.3) 5.09 brs	5.23 brs 5.09 brs	1.04 d(6.8)	1.04 d(6.8)	0.78 d(6.5)
1'	4.57 d(7.7)	4.69 d(7.3)	4.75 d(7.5)	4.77 d(7.6)	4.94 d(7.7)
2'	4.38 dd(9.2, 7.7)	4.05 d(3.6)	4.09 m	4.10 m	3.95 dd(9.2, 7.7)
3'	4.03 dd(9.2, 3.3)	4.07	4.01 m	4.01 m	4.17 dd(9.2, 9.2)
4'	4.08 dd(3.3, 1.7)	4.59 t(8.9)	3.73 m	3.74 m	4.02 dd(9.2, 9.2)
5'	4.20 dd(11.6, 1.7) 3.62 d(11.6)	4.39 t(8.5)	3.74 m	3.74 m	4.15 m
6'		1.46 d(6.5)	4.41 m 4.11 m	4.42 m 4.12 m	4.85 dd(11.8, 1.1) 4.33 dd(11.8, 6.8)
1''	6.12 d(1.5)	4.95 d(7.3)	6.36 s	6.37 d(1.0)	5.17 d(7.8)
2''	5.89 dd(1.5, 3.4)	3.89 t(7.9)	4.73 m	4.71 m	4.04 dd(8.6, 7.8)
3''	5.84 dd(10.1, 3.4)	4.07	4.51 m	4.52 m	4.22 dd(8.6, 8.6)
4''	5.55 dd(10.1, 10.1)	4.39	4.25 m	4.26 m	4.25 dd(8.6, 8.6)
5''	4.90 dq(10.1, 6.2)	4.25 m	4.77 m	4.76 m	3.93 m
6''	1.39 d(6.2)	3.67 d(4.8)	1.60 d(6.1)	1.69 d(6.1)	4.53 dd(11.7, 2.0) 4.39 dd(11.7, 5.1)
1'''	5.05 d(7.9)	6.26 brs	4.90 d(7.6)	4.90 d(7.6)	
2'''	4.32 dd(9.4, 7.9)	4.75	3.93 m	3.93 m	
3'''	4.00 dd(9.4, 3.2)	4.57 m	4.02 m	4.02 m	
4'''	3.93 br d(3.2)	4.24 d(9.3)	4.07 m	4.07 m	
5'''	3.72 br q(6.4)	4.75 m	4.22 m, 3.63 m	4.22 m, 3.63 m	
6'''	1.43 d(6.4)	1.68 d(6.1)			
OAc	1.96 s(2''-OAc) 2.01 s(3''-OAc) 2.16 s(4''-OAc)				
1''''		5.11 d(8.1)	5.08 d(7.8)	5.09 d(7.9)	
2''''		4.37 t(8.5)	4.40 m	4.40 m	
3''''		4.04 d(3.2)	4.02 m	4.03 m	
4''''		3.74 d(6.5)	3.93 m	3.93 m	
5''''		3.62, 4.21	3.69 m	3.69 m	
6''''			1.48 d(6.4)	1.48 d(6.4)	

Table 3-11-37: ^1H NMR spectroscopic data of steroidal saponins **3-11-150**, **3-11-151**, **3-11-154**, **3-11-155**, and **3-11-157**.

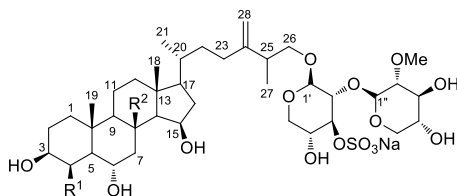
H	3-11-150	3-11-151	3-11-154	3-11-155	3-11-157
1	3.75 dd(12.0, 4.0)	3.74 dd(12.0, 4.0)	—	—	—
3	3.78 m	3.78 m	—	3.93 br m(22.3)	—
6	5.58 br d(5.5)	5.60 br d(5.5)	—	3.75 ddd (10.9, 10.9, 4.5)	—
18	0.90 s	0.94 s	0.85 s	0.81 s	0.81 s
19	1.31 s	1.32 s	1.58 s	0.84 s	1.26 s
21	1.01 d(7.0)	1.02 d(7.0)	1.18 d(6.5)	1.13 d(6.9)	1.10 d(6.4)
23	—	—	—	—	ax 2.00 dd(13.0, 9.8) eq 2.73 dd(13.0, 4.4)
24	—	—	—	—	4.05 m
25	—	—	—	—	1.89 m
26	—	—	—	ax 3.46 dd (10.6, 10.6) eq 3.55 dd (10.6, 2.9)	ax 3.57 brt(11.7) eq 3.65 dd (11.7, 3.5)
27	5.19 d(1.8) 5.07 d(1.8)	5.20 br d(1.8) 5.05 br d(1.8)	0.73 d(6.8)	0.71 d(5.5)	1.16 d(6.8)
1'	4.57 d(7.5)	4.57 d(7.5)	5.18 d(7.3)	4.98 d(7.7)	4.86 d(7.7)
1''	6.12 d(1.5)	6.12 d(1.5)	—	5.34 d(6.7)	5.02 d(7.6)
1'''	5.23 d(7.6)	5.23 d(7.5)	—	—	—
2'''	4.16 dd(10.0, 7.6)	4.32 dd(10.0, 7.5)	—	—	—
3'''	4.25 d(10.0)	4.23 d(10.0)	—	—	—
5'''	3.88 q(6.5)	4.02 q(6.5)	—	—	—
6'''	1.27 d(6.5)	1.54 d(6.5)	—	—	—
2''''	4.67 s	5.10 s	—	—	—
4''''	1.84 m, 1.78 m	1.93 m, 1.83 m	—	—	—
5''''	0.95 t(7.5)	0.92 t(7.5)	—	—	—
6''''	1.53 s	1.53 s	—	—	—

Table 3-11-38: Cos, MFs, and TSs of steroidal saponins **3-11-158~3-11-177**.

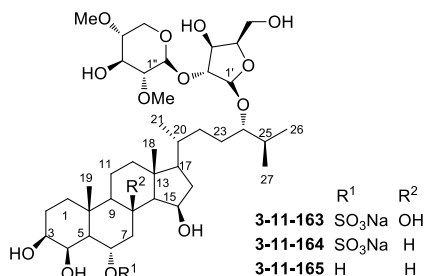
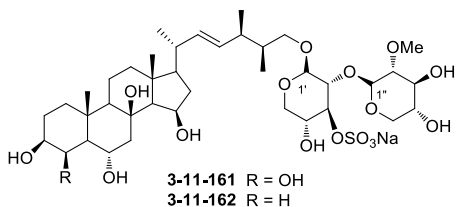
No.	Compounds	MFs	Test solvents	References
3-11-158	certonardoside A	$\text{C}_{39}\text{H}_{65}\text{NaO}_{17}\text{S}$	CD_3OD	[334]
3-11-159	certonardoside B	$\text{C}_{39}\text{H}_{65}\text{NaO}_{15}\text{S}$	CD_3OD	[334]
3-11-160	certonardoside C	$\text{C}_{39}\text{H}_{65}\text{NaO}_{16}\text{S}$	CD_3OD	[334]
3-11-161	certonardoside D	$\text{C}_{39}\text{H}_{65}\text{NaO}_{17}\text{S}$	CD_3OD	[334]
3-11-162	certonardoside E	$\text{C}_{39}\text{H}_{65}\text{NaO}_{16}\text{S}$	CD_3OD	[334]
3-11-163	certonardoside F	$\text{C}_{39}\text{H}_{67}\text{NaO}_{17}\text{S}$	CD_3OD	[334]
3-11-164	certonardoside G	$\text{C}_{39}\text{H}_{67}\text{NaO}_{16}\text{S}$	CD_3OD	[334]
3-11-165	certonardoside H	$\text{C}_{39}\text{H}_{68}\text{O}_{13}$	CD_3OD	[334]

Table 3-11-38 (continued)

No.	Compounds	MFs	Test solvents	References
3-11-166	certonardoside I	$C_{35}H_{61}NaO_{14}S$	CD_3OD	[334]
3-11-167	certonardoside J	$C_{35}H_{61}NaO_{13}S$	CD_3OD	[334]
3-11-168	(22S)-16 β -[(<i>O</i> - β -D-apiofuranosyl-(1 $\rightarrow$ 4)-6- <i>O</i> -acetyl- β -D-glucopyranosyl)oxy]-3 β ,22-dihydroxy-5 α -cholestan-16 β -yl α -L-rhamnopyranoside	$C_{46}H_{78}O_{18}$	C_5D_5N	[326]
3-11-169	(22S)-16 β -[(β -D-glucopyranosyl)oxy]-3 β ,22-dihydroxy-5 α -cholestan-1 β -yl β -D-glucopyranoside	$C_{39}H_{68}O_{14}$	C_5D_5N	[326]
3-11-170	(22S)-16 β -[(α -L-rhamnopyranosyl)oxy]-3 β ,22-dihydroxycholest-5-en-1 β -yl α -L-rhamnopyranoside	$C_{39}H_{66}O_{12}$	C_5D_5N	[326]
3-11-171	(22S)-16 β -[(α -L-rhamnopyranosyl)oxy]-3 β ,22-dihydroxycholest-24-en-1 β -yl α -L-rhamnopyranoside	$C_{39}H_{66}O_{12}$	C_5D_5N	[326]
3-11-172	(22S)-16 β -[(α -L-rhamnopyranosyl)oxy]-3 β ,22-dihydroxycholesta-5,24-dien-1 β -yl α -L-rhamnopyranoside	$C_{39}H_{64}O_{12}$	C_5D_5N	[326]
3-11-173	pentandroside A	$C_{38}H_{62}O_{13}$	CD_3OD	[284]
3-11-174	pentandroside B	$C_{40}H_{64}O_{14}$	CD_3OD	[284]
3-11-175	pentandroside C	$C_{38}H_{62}O_{14}$	CD_3OD	[284]
3-11-176	pentandroside D	$C_{39}H_{64}O_{13}$	CD_3OD	[284]
3-11-177	pentandroside E	$C_{44}H_{76}O_{18}$	CD_3OD	[284]



	R ¹	R ²
3-11-158	OH	OH
3-11-159	H	H
3-11-160	H	OH



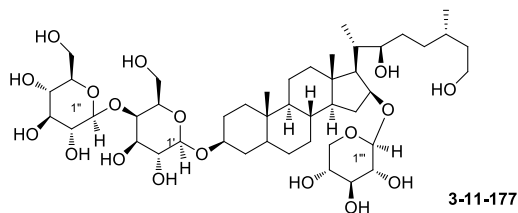
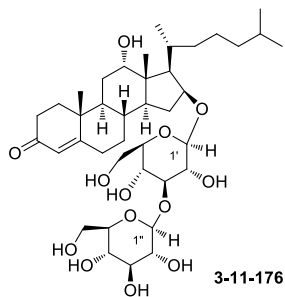
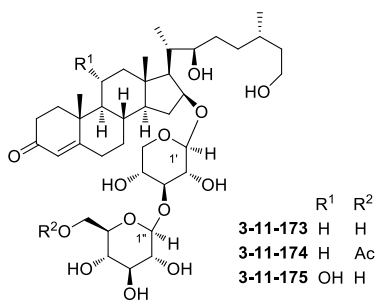
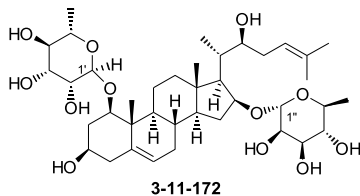
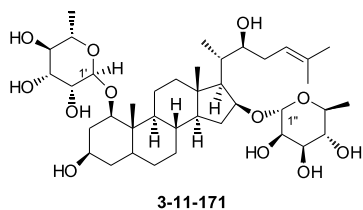
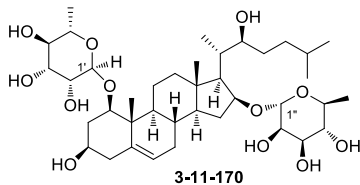
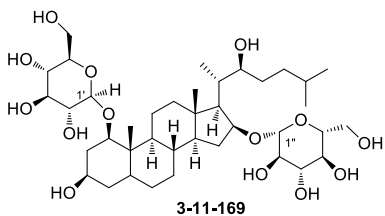
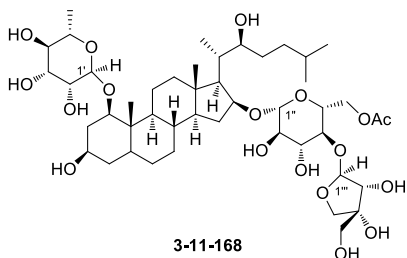
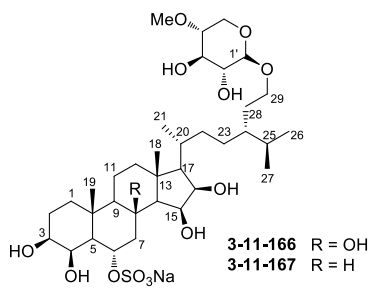


Table 3-11-39: ¹H NMR spectroscopic data of steroidal saponins **3-11-158~3-11-162**.

H	3-11-158	3-11-159	3-11-160	3-11-161	3-11-162
1	1.71 dt(13.1, 3.3) 0.98 m	1.72 dt(13.2, 3.2) 1.04 m	1.72 m 0.99 m	1.70 dt(13.0, 3.3) 0.99 m	1.71 dt(9.5, 3.5) 0.97 m
2	1.83 m, 1.56 m	1.74 m, 1.44 m	1.74 m, 1.48 m	1.82 m, 1.55 m	1.74 m, 1.47 m
3	3.45 m	3.49 m	3.49 m	3.45 m	3.49 m
4	4.27 br s	2.19 dt(12.8, 2.0) 1.17 m	2.20 dt(12.4, 2.1) 1.22 m	4.26 br s	2.18 m, 1.20 m
5	0.95 m	1.03 m	1.05 m	0.95 m	1.04 m
6	4.16 td(10.9, 4.2)	3.38 td(10.9, 4.4)	3.70 td(10.8, 4.2)	4.15 td(11.0, 4.4)	3.69 td(10.8, 3.5)
7	2.46 dd(11.7, 4.2) 1.33 t(11.7)	0.93 m 2.29 dt(11.8, 3.7)	2.39 m 1.30 t(12.1)	2.45 dd(12.5, 4.5) 1.31 t(12.5)	2.37 dd(12.0, 4.3) 1.25 m
8		1.87 qd(11.2, 2.9)			
9	0.83 dd(12.5, 2.6)	0.73 td(11.4, 3.6)	0.85 dd(12.3, 2.6)	0.82 dd(12.5, 2.7)	0.83 dd(12.3, 3.0)
11	1.79 m, 1.44 m	1.53 m, 1.33 m	1.82 m, 1.50 m	1.78 m, 1.43 m	1.80 m, 1.50 m
12	1.98 dt(12.8, 3.4) 1.18 m	1.97 m 1.13 m	1.98 m 1.19 m	1.96 dt(12.5, 3.3) 1.17 m	1.96 dt(12.5, 3.0) 1.18 m
14	1.02 d(5.5)	0.93 m	1.03 m	1.01 d(5.7)	1.02 d(5.3)
15	4.44 td(6.5, 1.9)	4.19 br t(5.6)	4.45 br t(5.5)	4.40 br t(6.0)	4.39 br t(6.3)
16	2.38 dt(14.3, 8.0) 1.39 m	2.41 m 1.37 m	2.39 m 1.39 m	2.21 dt(14.5, 7.0) 1.35 m	2.21 dt(14.5, 8.5) 1.36 m
17	1.03 m	1.11 m	1.03 m	1.01 m	1.01 m
18	1.26 s	0.95 s	1.27 s	1.28 s	1.28 s
19	1.16 s	0.87 s	0.99 s	1.15 s	0.98 s
20	1.58 m	1.57 m	1.58 m	2.13 m	2.13 m
21	0.95 d(6.4)	0.97 d(6.5)	0.96 d(6.5)	0.99 d(6.5)	0.99 d(7.5)
22	1.58 m, 1.21 m	1.57 m, 1.21 m	1.58 m, 1.21 m	5.19 dd(15.0, 8.0)	5.19 dd(15.0, 8.3)
23	2.14 m, 1.96 m	2.14 m, 1.96 m	2.14 m, 1.95 m	5.24 dd(15.0, 7.6)	5.24 dd(15.0, 8.0)
24				2.15 m	2.15 m
25	2.43 m	2.43 m	2.43 m	1.61 m	1.62 m
26	3.78 dd(6.4, 6.1) 3.32 m	3.78 dd(9.2, 6.0) 3.31 m	3.79 dd(9.5, 6.0) 3.30 m	3.74 m 3.25 dd(9.7, 6.7)	3.75 m 3.25 dd(9.5, 6.5)
27	1.09 d(6.9)	1.10 d(6.8)	1.11 d(6.9)	0.91 d(7.5)	0.91 d(7.0)
28	4.78 br s 4.77 br s	4.78 br s 4.77 br s	4.78 br s 4.77 br s	0.93 d(7.5)	0.93 d(7.5)
1'	4.54 d(5.5)	4.54 d(5.5)	4.54 d(5.5)	4.54 d(5.5)	4.54 d(5.5)
2'	3.70 dd(6.8, 5.5)	3.70 dd(6.8, 5.5)	3.70 dd(6.8, 5.5)	3.70 dd(6.8, 5.5)	3.70 dd(6.8, 5.5)

Table 3-11-39 (continued)

H	3-11-158	3-11-159	3-11-160	3-11-161	3-11-162
3'	4.39 t(6.9)	4.39 t(6.9)	4.39 t(6.9)	4.39 t(6.9)	4.39 t(6.9)
4'	3.80 td(7.2, 4.4)	3.80 td(7.2, 4.4)	3.80 td(7.2, 4.4)	3.80 td(7.2, 4.4)	3.80 td(7.2, 4.4)
5'	3.97 dd(11.8, 4.4)	3.97 dd(11.8, 4.4)	3.97 dd(11.8, 4.4)	3.97 dd(11.8, 4.4)	3.97 dd(11.8, 4.4)
	3.34 m	3.34 m	3.34 m	3.34 m	3.34 m
1''	4.85 d(6.3)	4.85 d(6.3)	4.85 d(6.3)	4.85 d(6.3)	4.85 d(6.3)
2''	3.05 t(6.3)	3.05 t(6.3)	3.05 t(6.3)	3.05 t(6.3)	3.05 t(6.3)
3''	3.46 t(7.1)	3.46 t(7.1)	3.46 t(7.1)	3.46 t(7.1)	3.46 t(7.1)
4''	3.49 td(7.4, 4.3)	3.49 td(7.4, 4.3)	3.49 td(7.4, 4.3)	3.49 td(7.4, 4.3)	3.49 td(7.4, 4.3)
5''	4.01 dd(11.6, 4.2)	4.01 dd(11.6, 4.2)	4.01 dd(11.6, 4.2)	4.01 dd(11.6, 4.2)	4.01 dd(11.6, 4.2)
	3.24 dd(11.6, 7.5)	3.24 dd(11.6, 7.5)	3.24 dd(11.6, 7.5)	3.24 dd(11.6, 7.5)	3.24 dd(11.6, 7.5)
OMe	3.58 s(2''-OMe)	3.58 s(2''-OMe)	3.58 s(2''-OMe)	3.58 s(2''-OMe)	3.58 s(2''-OMe)

Table 3-11-40: ¹H NMR spectroscopic data of steroidal saponins 3-11-163~3-11-167.

H	3-11-163	3-11-164	3-11-165	3-11-166	3-11-167
1	1.73 br d(13.6)	1.72 br d(12.4)	1.68 dt(13.5, 3.5)	1.72 m	1.72 m
	1.02 m	1.08 m	1.03 m	0.97 m	0.98 m
2	1.83 m, 1.57 m	1.84 m, 1.58 m	1.81 m, 1.56 m	1.83 m, 1.56 m	1.76 m, 1.51 m
3	3.34 m	3.35 m	3.43 m	3.43 m	3.43 m
4	4.31 br s	4.26 br s	4.21 br s	4.31 br s	4.27 br s
5	1.16 m	1.13 m	0.91 m	1.15 m	1.14 m
6	4.91 td(11.9, 4.2)	4.59 td(11.2, 4.5)	3.90 td(11.9, 4.5)	4.92 br t(12.0)	4.60 td(11.0, 4.0)
7	2.70 dd(12.2, 4.3)	2.56 dt(11.9, 3.9)	2.35 dt(12.0, 4.0)	2.72 dd(12.0, 4.0)	2.65 dt(12.0, 4.3)
	1.50 t(12.2)	1.13 t(11.9)	0.93 m	1.54 t(12.0)	1.13 m
8		1.94 m	1.88 m		1.94 m
9	0.85 dd(12.6, 2.6)	0.73 td(11.5, 3.8)	0.67 td(11.5, 3.5)	0.84 m	0.72 td(11.5, 3.8)
11	1.80 m, 1.44 m	1.46 m, 1.32 m	1.43 m, 1.30 m	1.77 m, 1.40 m	1.56 m, 1.33 m
12	1.98 br d(12.6)	1.95 br d(12.1)	1.94 dt(13.0, 3.5)	1.93 dt(13.0, 3.0)	1.90 dt(12.0, 2.8)
	1.17 m	1.13 m	1.09 m	1.13 m	1.05 m
14	1.02 m	0.91 m	0.88 m	1.03 d(6.5)	0.90 m
15	4.42 br t(6.0)	4.17 m	4.16 br t(6.5)	4.38 t(6.0)	4.13 dd(12.0, 6.5)

Table 3-11-40 (continued)

H	3-11-163	3-11-164	3-11-165	3-11-166	3-11-167
16	2.39 dt(14.4, 8.0)	2.42 dt(14.6, 8.2)	2.42 dt(14.5, 8.0)	4.19 t(6.8)	4.21 dd(14.0, 7.5)
	1.38 m	1.34 m	1.33 m		
17	0.98 m	1.07 m	1.06 m	0.93 m	0.99 m
18	1.26 s	0.93 s	0.93 s	1.23 s	0.91 s
19	1.24 s	1.14 s	1.06 s	1.23 s	1.13 s
20	1.52 m	1.51 m	1.47 m	1.90 m	1.89 m
21	0.94 d(6.5)	0.95 d(6.5)	0.95 d(7.0)	0.94 d(6.0)	0.94 d(6.5)
22	1.58 m, 0.99 m	1.63 m, 1.03 m	1.59 m, 0.98 m	1.71 m, 1.13 m	1.70 m, 1.14 m
23	1.60 m, 1.38 m	1.59 m, 1.38 m	1.59 m, 1.38 m	1.40 m, 1.11 m	1.40 m, 1.11 m
24	3.34 m	3.36 m	3.34 m	1.23 m	1.24 m
25	1.85 m	1.86 m	1.85 m	1.74 m	1.74 m
26	0.91 d(6.8)	0.91 d(6.9)	0.90 d(7.0)	0.87 d(7.0)	0.87 d(7.0)
27	0.89 d(6.8)	0.89 d(6.7)	0.89 d(7.0)	0.84 d(6.5)	0.84 d(7.0)
28				1.68 m, 1.43 m	1.70 m, 1.45 m
29				3.85 td(9.3, 5.8)	3.85 td(9.0, 6.0)
				3.53 q(9.3)	3.53 q(8.0)
1'	5.10 br s	5.10 br s	5.10 br s	4.18 d(7.5)	4.18 d(7.5)
2'	4.12 br s	4.12 br s	4.12 br s	3.15 m	3.15 m
3'	4.20 dd(4.8, 2.0)	4.20 dd(4.8, 2.0)	4.20 dd(4.8, 2.0)	3.35 m	3.35 m
4'	4.15 q(5.4)	4.15 q(5.4)	4.15 q(5.4)	3.17 m	3.17 m
5'	3.87 dd(11.4, 5.3)	3.87 dd(11.4, 5.3)	3.87 dd(11.4, 5.3)	4.03 dd(9.0, 3.0)	4.03 dd(9.0, 3.0)
	3.77 dd(11.4, 6.2)	3.77 dd(11.4, 6.2)	3.77 dd(11.4, 6.2)	3.13 m	3.13 m
1''	4.41 d(7.6)	4.41 d(7.6)	4.41 d(7.6)		
2''	2.86 dd(9.1, 7.6)	2.86 dd(9.1, 7.6)	2.86 dd(9.1, 7.6)		
3''	3.39 t(8.9)	3.39 t(8.9)	3.39 t(8.9)		
4''	3.19 td(9.2, 5.0)	3.19 td(9.2, 5.0)	3.19 td(9.2, 5.0)		
5''	4.02 dd(11.2, 4.9)	4.02 dd(11.2, 4.9)	4.02 dd(11.2, 4.9)		
	3.13 t(11.2)	3.13 t(11.2)	3.13 t(11.2)		
OMe	3.54 s(2''-OMe)	3.54 s(2''-OMe)	3.54 s(2''-OMe)	3.46 s(2'-OMe)	3.46 s(2'-OMe)
	3.46 s(4''-OMe)	3.46 s(4''-OMe)	3.46 s(4''-OMe)		

Table 3-11-41: ¹H NMR spectroscopic data of steroidal saponins 3-11-168~3-11-172.

H	3-11-168	3-11-169	3-11-170	3-11-171	3-11-172
1	3.72 dd(11.4, 4.2)	3.98 dd(11.5, 4.2)	3.82 dd(11.5, 3.6)	3.73 dd(11.4, 4.1)	3.81 dd(11.5, 3.6)
3	3.88 m	3.93 m(23.9)	3.89 m(21.5)	3.89 m(22.3)	3.89 m(23.5)
6	—	—	5.63 br d(5.6)	—	5.62 br d(6.2)
16	4.50 m	4.51 m	4.39 m	4.38 m	4.38 m

Table 3-11-41 (continued)

H	3-11-168	3-11-169	3-11-170	3-11-171	3-11-172
18	0.97 s	0.96 s	1.00 s	0.95 s	0.98 s
19	0.98 s	1.02 s	1.28 s	1.03 s	1.30 s
21	1.14 d(7.0)	1.13 d(7.0)	1.17 d(6.9)	1.20 d(6.9)	1.19 d(6.9)
22	4.25 br d(8.6)	4.30 br d(8.9)	4.01 br d(9.2)	4.11 brt(6.8)	4.11 brt(6.7)
24	—	—	—	5.55 brt(7.1)	5.55 brt(7.1)
26	0.95 d(6.2)	0.93 d(6.2)	0.86 d(6.5)	1.70 s	1.71 s
27	0.93 d(6.2)	0.92 d(6.2)	0.86 d(6.5)	1.67 s	1.68 s
1'	5.92 br s	5.06 d(7.6)	5.66 br s	5.61 br s	5.65 br s
6'	1.68 d(6.0)	—	1.67 d(6.0)	1.69 d(5.8)	1.69 d(6.3)
1''	4.60 d(7.8)	4.75 d(7.8)	5.27 br s	5.25 br s	5.25 d(0.7)
6''	4.75 dd(9.6, 2.1) 4.73 dd(9.6, 9.2)	—	1.70 d(4.8)	1.66 d(6.0)	1.66 d(6.1)
OAc	2.05 s(6''-OAc)				
1'''	5.78 d(3.6)				
2'''	4.76 d(3.6)				
4'''	4.15 d(11.3) 4.12 d(11.3)				
5'''	4.73 d(9.2) 4.31 d(9.2)				

Table 3-11-42: ¹H NMR spectroscopic data of steroidal saponins 3-11-173~3-11-177.

H	3-11-173	3-11-174	3-11-175	3-11-176	3-11-177
3					3.71 m
4	5.73 br s	5.73 br s	5.73 br s	5.73 br s	—
11	—	—	4.01 ddd (4.5, 10.0, 10.0)	—	—
12	—	—	—	4.06 dd(2.5, 4.5)	
16	4.23 ddd (9.0, 7.5, 4.5)	4.23 ddd (9.0, 7.5, 4.5)	4.22 ddd (9.0, 7.0, 4.5)	4.15 ddd (9.0, 7.0, 4.5)	4.22 ddd (9.0, 7.0, 4.5)
18	0.98 s	0.98 s	0.99 s	0.99 s	0.97 s
19	1.25 s	1.25 s	1.38 s	1.24 s	0.87 s
21	0.94 d(6.5)	0.94 d(6.5)	0.96 d(6.5)	1.05 d(6.5)	0.94 d(6.5)
22	3.77 br d(8.5)	3.77 br d(8.5)	3.77 br d(8.0)	—	3.77 br d(8.0)
26	3.39 dd(6.0, 11.0) 3.47 dd(5.0, 11.0)	3.39 dd(6.0, 11.0) 3.47 dd(5.0, 11.0)	3.39 dd(7.0, 11.5) 3.47 dd(6.0, 11.5)	0.93 d(6.5)	3.39 dd(6.0, 11.5) 3.48 dd(5.0, 11.5)
27	0.93 d(6.5)	0.93 d(6.5)	0.94 d(6.5)	0.93 d(6.5)	0.98 d(6.5)
1'	4.22 d(7.5)	4.18 d(7.5)	4.22 d(7.5)	4.27 d(7.5)	4.37 d(7.8)
2'	3.36 dd(7.5, 9.0)	3.35 dd(7.5, 9.0)	3.36 dd(7.5, 9.0)	3.39 dd(7.5, 9.0)	3.51 dd(7.8, 8.5)

Table 3-11-42 (continued)

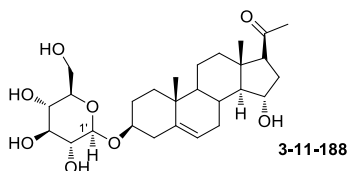
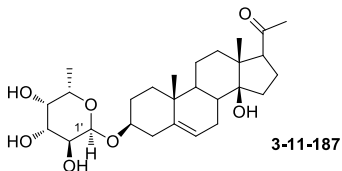
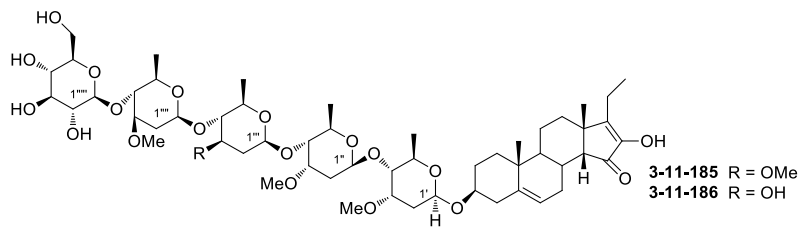
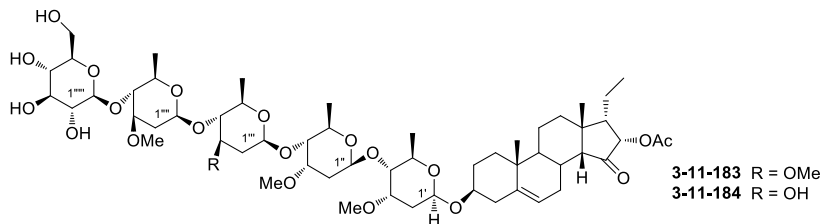
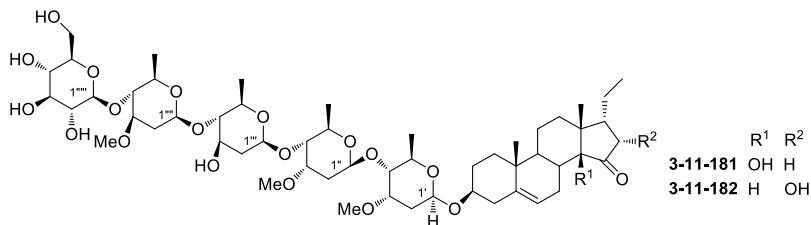
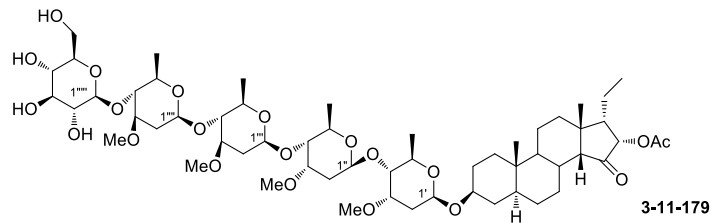
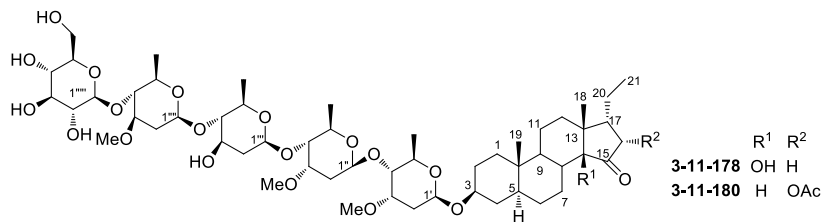
H	3-11-173	3-11-174	3-11-175	3-11-176	3-11-177
3'	3.46 dd(9.0, 9.0)	3.40 dd(9.0, 9.0)	3.46 dd(9.0, 9.0)	3.52 dd(9.0, 9.0)	3.58 dd(2.9, 8.5)
4'	3.59 m	3.56 m	3.59 m	3.43 dd(9.0, 9.0)	4.07 dd(2.9, 1.2)
5'	3.91 dd(4.5, 11.0)	3.91 dd(4.5, 11.0)	3.91 dd(4.5, 11.0)	3.28 m	3.54 m
6'	3.23 t(11.0)	3.22 t(11.0)	3.23 t(11.0)	3.88 dd(2.5, 12.0)	3.90 dd(2.0, 12.0)
				3.71 dd(4.5, 12.0)	3.70 dd(4.5, 12.0)
1''	4.58 d(7.5)	4.50 d(7.5)	4.58 d(7.5)	4.58 d(7.5)	4.54 d(7.5)
2''	3.30 dd(7.5, 9.0)	3.30 dd(7.5, 9.0)	3.30 dd(7.5, 9.0)	3.29 dd(7.5, 9.0)	3.30 dd(7.5, 9.0)
3''	3.39 dd(9.0, 9.0)	3.41 dd(9.0, 9.0)	3.39 dd(9.0, 9.0)	3.39 dd(9.0, 9.0)	3.38 dd(9.0, 9.0)
4''	3.29 dd(9.0, 9.0)	3.30 dd(9.0, 9.0)	3.29 dd(9.0, 9.0)	3.29 dd(9.0, 9.0)	3.22 dd(9.0, 9.0)
5''	3.34 m	3.58 m	3.34 m	3.34 m	3.30 m
6''	3.91 dd(2.5, 12.0)	4.48 dd(2.5, 12.0)	3.91 dd(2.5, 12.0)	3.89 dd(2.5, 12.0)	3.91 dd(2.5, 12.0)
	3.66 dd(4.5, 12.0)	4.18 dd(4.5, 12.0)	3.66 dd(4.5, 12.0)	3.65 dd(4.5, 12.0)	3.60 dd(4.5, 12.0)
OAc		2.07 s(6''-OAc)			
1'''					4.16 d(7.5)
2'''					3.16 dd(7.5, 9.0)
3'''					3.33 dd(9.0, 9.0)
4'''					3.48 m
5'''					3.86 dd(4.5, 10.5)
					3.18 t(10.5)

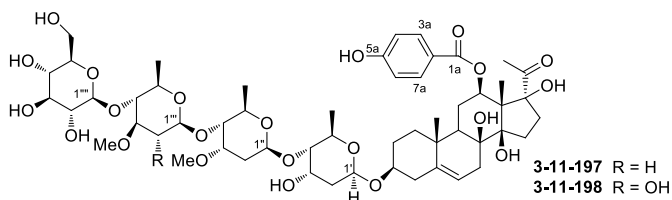
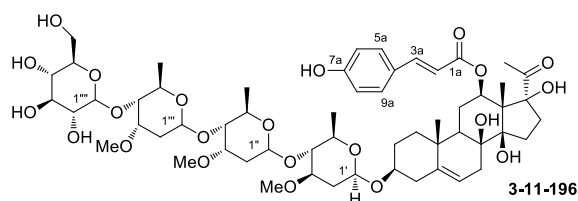
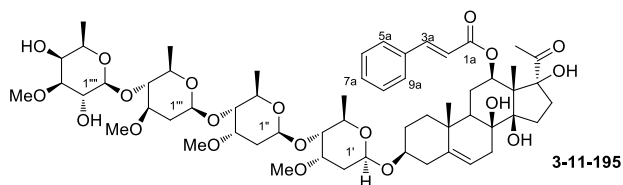
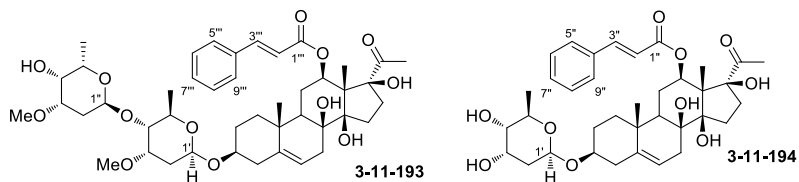
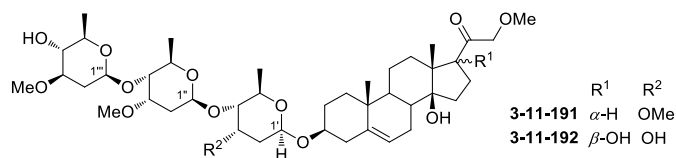
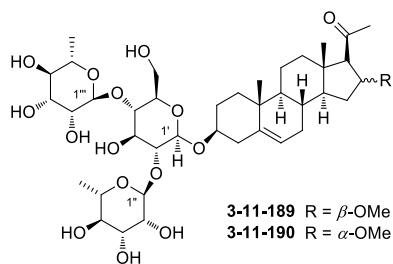
Table 3-11-43: Cos, MFs, and TSs of steroidal saponins 3-11-178~3-11-210.

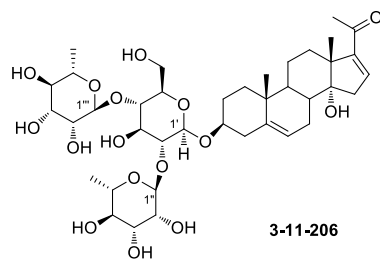
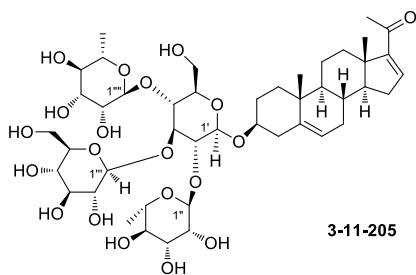
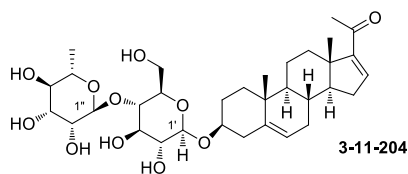
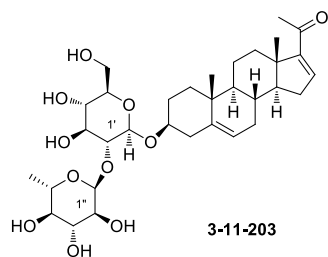
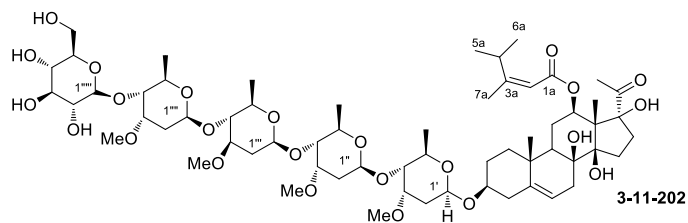
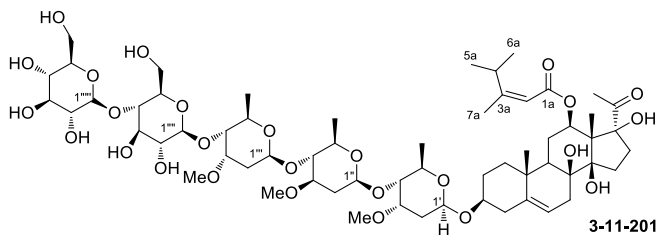
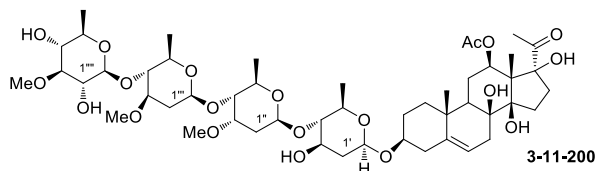
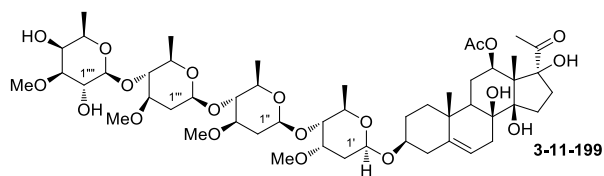
No.	Compounds	MFs	Test solvents	References
3-11-178	stemmoside K	C ₅₄ H ₉₀ O ₂₀	CD ₃ OD	[335]
3-11-179	stemmoside I	C ₅₇ H ₉₄ O ₂₁	CD ₃ OD	[335]
3-11-180	stemmoside J	C ₅₆ H ₉₂ O ₂₁	CD ₃ OD	[335]
3-11-181	stemmoside C	C ₅₄ H ₈₈ O ₂₀	CD ₃ OD	[336]
3-11-182	stemmoside G	C ₅₄ H ₈₈ O ₂₀	CD ₃ OD	[335]
3-11-183	stemmoside H	C ₅₇ H ₉₂ O ₂₁	CD ₃ OD	[335]
3-11-184	stemmoside D	C ₅₆ H ₉₀ O ₂₁	CD ₃ OD	[336]
3-11-185	stemmoside E	C ₅₅ H ₈₈ O ₂₀	CD ₃ OD	[335]
3-11-186	stemmoside F	C ₅₄ H ₈₆ O ₂₀	CD ₃ OD	[335]
3-11-187	marsin	C ₂₇ H ₄₂ O ₇	CDCl ₃	[337]

Table 3-11-43 (continued)

No.	Compounds	MFs	Test solvents	References
3-11-188	3- <i>O</i> - β -D-glucopyranosyl-3 β ,15 α -dihydroxypregn-5-en-20-one	C ₂₇ H ₄₂ O ₈	DMSO- <i>d</i> ₆	[338]
3-11-189	spongipregnoside D	C ₄₀ H ₆₄ O ₁₆	C ₅ D ₅ N	[339]
3-11-190	16 α -methoxyl-3 β -[(<i>O</i> - α -L-rhamnopyranosyl-(1 $\rightarrow$ 2)- <i>O</i> -[α -L-rhamnopyranosyl-(1 $\rightarrow$ 4)]- β -D-glucopyranosyl)oxy]pregn-5-en-20-one	C ₄₀ H ₆₄ O ₁₆	C ₅ D ₅ N	[340]
3-11-191	perisepiumoside E	C ₄₃ H ₇₀ O ₁₃	C ₅ D ₅ N	[341]
3-11-192	perisepiumoside C	C ₄₂ H ₆₈ O ₁₄	C ₅ D ₅ N	[341]
3-11-193	kidjoranin 3- <i>O</i> - α -diginopyranosyl-(1 $\rightarrow$ 4)- β -cymaropyranoside	C ₄₄ H ₆₂ O ₁₃	C ₅ D ₅ N	[342]
3-11-194	kidjoranin 3- <i>O</i> - β -digitoxopyranoside	C ₃₆ H ₄₈ O ₁₀	C ₅ D ₅ N	[342]
3-11-195	12- <i>O</i> -cinnamoyldeacetylmetaplexigenin-3- <i>O</i> - β -D-digitalopyranosyl-(1 $\rightarrow$ 4)- β -D-oleandropyranosyl-(1 $\rightarrow$ 4)- β -D-cymaropyranosyl-(1 $\rightarrow$ 4)- β -D-cymaropyranoside	C ₅₈ H ₈₆ O ₂₀	CD ₃ OD	[343]
3-11-196	kidjolanin 3- <i>O</i> - β -D-glucopyranosyl-(1 $\rightarrow$ 4)- β -D-cymaropyranosyl-(1 $\rightarrow$ 4)- β -D-cymaropyranosyl-(1 $\rightarrow$ 4)- β -D-oleandropyranoside	C ₅₇ H ₈₄ O ₂₂	CD ₃ OD	[343]
3-11-197	otophylloside I	C ₅₄ H ₈₀ O ₂₂	CD ₃ OD	[344]
3-11-198	otophylloside K	C ₅₄ H ₈₀ O ₂₃	C ₅ D ₅ N	[344]
3-11-199	metaplexigenin-3- <i>O</i> - β -D-digitalopyranosyl-(1 $\rightarrow$ 4)- β -D-oleandropyranosyl-(1 $\rightarrow$ 4)- β -D-oleandropyranosyl-(1 $\rightarrow$ 4)- β -D-cymaropyranoside	C ₅₁ H ₈₂ O ₂₀	CD ₃ OD	[343]
3-11-200	metaplexigenin-3- <i>O</i> - β -D-thevetopyranosyl-(1 $\rightarrow$ 4)- β -D-oleandropyranosyl-(1 $\rightarrow$ 4)- β -D-cymaropyranosyl-(1 $\rightarrow$ 4)- β -D-canaropyranoside	C ₅₀ H ₈₀ O ₂₀	CD ₃ OD	[343]
3-11-201	otophylloside L	C ₆₁ H ₉₈ O ₂₆	CD ₃ OD	[344]
3-11-202	otophylloside M	C ₆₂ H ₁₀₀ O ₂₄	C ₅ D ₅ N	[344]
3-11-203	spongipregnoside A	C ₃₃ H ₅₀ O ₁₁	C ₅ D ₅ N	[339]
3-11-204	spongipregnoside B	C ₃₃ H ₅₀ O ₁₁	C ₅ D ₅ N	[339]
3-11-205	spongipregnoside C	C ₄₅ H ₇₀ O ₂₀	C ₅ D ₅ N	[339]
3-11-206	dracaenoside C	C ₃₉ H ₆₀ O ₁₆	C ₅ D ₅ N	[345]
3-11-207	dracaenoside D	C ₃₉ H ₆₀ O ₁₇	C ₅ D ₅ N	[345]
3-11-208	3 β -[(<i>O</i> - α -L-rhamnopyranosyl-(1 $\rightarrow$ 2)- <i>O</i> -[<i>O</i> - β -D-glucopyranosyl-(1 $\rightarrow$ 4)- α -L-rhamnopyranosyl-(1 $\rightarrow$ 3)]- β -D-glucopyranosyl)oxy]pregna-5,16-dien-20-one	C ₄₅ H ₇₀ O ₂₀	C ₅ D ₅ N	[346]
3-11-209	tupichinin A	C ₂₇ H ₄₀ O ₈	CD ₃ OD	[347]
3-11-210	21-methoxyl-3 β -[(<i>O</i> - α -L-rhamnopyranosyl-(1 $\rightarrow$ 2)- <i>O</i> -[α -L-rhamnopyranosyl-(1 $\rightarrow$ 4)]- β -D-glucopyranosyl)oxy]pregn-5,16-en-20-one	C ₄₀ H ₆₂ O ₁₆	C ₅ D ₅ N	[340]







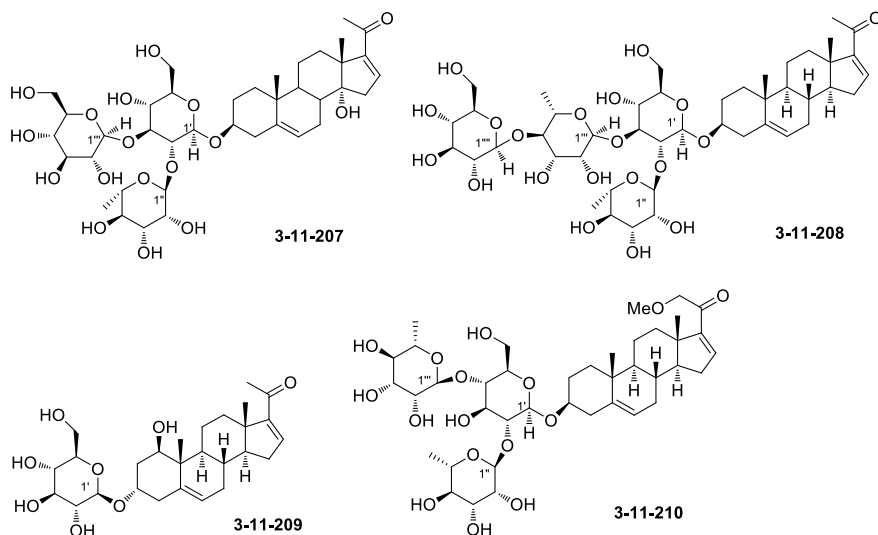


Table 3-11-44: ^1H NMR spectroscopic data of steroidal saponins **3-11-178**–**3-11-180**, **3-11-182**, and **3-11-183**.

H	3-11-178	3-11-179	3-11-180	3-11-182	3-11-183
3	—	—	—	3.55 m	—
6	—	—	—	5.42 dd(3.5, 2.4)	5.42 dd(3.2, 2.4)
7	α 2.25 m, β 1.85 m	α 2.38 m, β 1.29 m	α 2.38 m, β 1.29 m	α 3.09 ddd (13.5, 15.7, 3.5) β 1.80 dd, (15.7, 2.6)	α 2.99 ddd (13.5, 15.5, 3.2) β 1.81 dd(15.5, 2.4)
8	—	—	—	1.92 m	1.93 m
14	—	2.37 m	2.37 m	2.36 m	2.38 m
16	α 1.76 dd(18.0, 9.0) β 2.58 dd(18.0, 9.0)	5.48 d(10.1)	5.48 d(10.1)	4.05 d(9.7)	5.51 d(10.1)
17	2.15 m	2.04 dd(10.1, 1.7)	2.04 dd(10.1, 1.7)	1.87 dd(9.7, 1.6)	—
18	1.04 s	1.18 s	1.18 s	1.20 s	1.22 s
19	0.82 s	0.82 s	0.82 s	1.00 s	1.01 s
21	0.96 s	0.91 t(7.0)	0.91 t(7.0)	1.07 s	0.92 t(7.0)
OAc	—	2.14 s(16-OAc)	2.14 s(16-OAc)	—	2.14 s(16-OAc)
OMe	3.46 s(3'-OMe) 3.45 s(3''-OMe) 3.51 s(3'''-OMe)	3.46 s(3'-OMe) 3.46 s(3''-OMe) 3.46 s(3'''-OMe) 3.50 s(3''''-OMe)	3.46 s(3'-OMe) 3.45 s(3''-OMe) 3.51 s(3'''-OMe)	3.46 s(3'-OMe) 3.45 s(3''-OMe) 3.51 s(3'''-OMe)	3.46 s(3'-OMe) 3.46 s(3''-OMe) 3.46 s(3'''-OMe) 3.50 s(3''''-OMe)

Table 3-11-44 (continued)

H	3-11-178	3-11-179	3-11-180	3-11-182	3-11-183
1'	4.90 dd(9.2, 2.0)	4.89 dd(9.2, 2.0)	4.90 dd(9.2, 2.0)	4.90 dd(9.2, 2.0)	4.89 dd(9.2, 2.0)
2'	1.57 m, 2.08 m	1.59 m, 2.10 m	1.57 m, 2.08 m	1.57 m, 2.08 m	1.59 m, 2.10 m
3'	3.88 br m	3.87 br m	3.88 br m	3.88 br m	3.87 br m
4'	3.25 dd(9.5, 3.0)	3.26 dd(9.5, 3.0)	3.25 dd(9.5, 3.0)	3.25 dd(9.5, 3.0)	3.26 dd(9.5, 3.0)
5'	3.85 dq(9.5, 6.1)	3.85 dq(9.5, 6.1)	3.85 dq(9.5, 6.1)	3.85 dq(9.5, 6.1)	3.85 dq(9.5, 6.1)
6'	1.22 d(6.1)	1.22 d(6.1)	1.22 d(6.1)	1.22 d(6.1)	1.22 d(6.1)
1''	4.83 dd(9.6, 2.0)	4.82 dd(9.6, 2.0)	4.83 dd(9.6, 2.0)	4.83 dd(9.6, 2.0)	4.82 dd(9.6, 2.0)
2''	2.17 m, 1.62 m	2.17 m, 1.63 m	2.17 m, 1.62 m	2.17 m, 1.62 m	2.17 m, 1.63 m
3''	3.88 br m	3.87 br m	3.88 br m	3.88 br m	3.87 br m
4''	3.30 dd(9.5, 3.0)	3.26 dd(9.5, 3.0)	3.30 dd(9.5, 3.0)	3.30 dd(9.5, 3.0)	3.26 dd(9.5, 3.0)
5''	3.85 dq(9.5, 6.1)	3.85 dq(9.5, 6.1)	3.85 dq(9.5, 6.1)	3.85 dq(9.5, 6.1)	3.85 dq(9.5, 6.1)
6''	1.25 d(6.1)	1.25 d(6.1)	1.25 d(6.1)	1.25 d(6.1)	1.25 d(6.1)
1'''	4.67 dd(9.6, 2.0)	4.62 dd(9.6, 2.0)	4.67 dd(9.6, 2.0)	4.67 dd(9.6, 2.0)	4.62 dd(9.6, 2.0)
2'''	2.23 ddd	2.35 ddd	2.23 ddd	2.23 ddd	2.35 ddd
	(13.0, 4.0, 2.0)	(13.0, 4.0, 2.0)	(13.0, 4.0, 2.0)	(13.0, 4.0, 2.0)	(13.0, 4.0, 2.0)
	1.52 ddd	1.48 ddd	1.52 ddd	1.52 ddd	1.48 ddd
	(13.0, 9.6, 9.0)	(13.0, 9.6, 9.0)	(13.0, 9.6, 9.0)	(13.0, 9.6, 9.0)	(13.0, 9.6, 9.0)
3'''	3.63 ddd	3.43 ddd	3.63 ddd	3.63 ddd	3.43 ddd
	(9.5, 9.0, 4.0)	(9.5, 9.0, 4.0)	(9.5, 9.0, 4.0)	(9.5, 9.0, 4.0)	(9.5, 9.0, 4.0)
4'''	3.04 dd(9.5, 9.5)	3.21 dd(9.5, 9.5)	3.04 dd(9.5, 9.5)	3.04 dd(9.5, 9.5)	3.21 dd(9.5, 9.5)
5'''	3.39 dq(9.5, 6.1)	3.38 dq(9.5, 6.1)	3.39 dq(9.5, 6.1)	3.39 dq(9.5, 6.1)	3.38 dq(9.5, 6.1)
6'''	1.32 d(6.1)	1.32 d(6.1)	1.32 d(6.1)	1.32 d(6.1)	1.32 d(6.1)
1''''	4.67 dd(9.6, 2.0)	4.73 dd(9.6, 2.0)	4.67 dd(9.6, 2.0)	4.67 dd(9.6, 2.0)	4.73 dd(9.6, 2.0)
2''''	2.43 ddd	2.38 ddd	2.43 ddd	2.43 ddd	2.38 ddd
	(13.0, 4.0, 2.0)	(13.0, 4.0, 2.0)	(13.0, 4.0, 2.0)	(13.0, 4.0, 2.0)	(13.0, 4.0, 2.0)
	1.49 ddd	1.43 ddd	1.49 ddd	1.49 ddd	1.43 ddd
	(13.0, 9.6, 9.0)	(13.0, 9.6, 9.0)	(13.0, 9.6, 9.0)	(13.0, 9.6, 9.0)	(13.0, 9.6, 9.0)
3''''	3.49 ddd	3.43 ddd	3.49 ddd	3.49 ddd	3.43 ddd
	(9.5, 9.0, 4.0)	(9.5, 9.0, 4.0)	(9.5, 9.0, 4.0)	(9.5, 9.0, 4.0)	(9.5, 9.0, 4.0)
4''''	3.37 dd(9.5, 9.5)	3.31 dd(9.5, 9.5)	3.37 dd(9.5, 9.5)	3.37 dd(9.5, 9.5)	3.31 dd(9.5, 9.5)
5''''	3.55 dq(9.5, 6.1)	3.42 dq(9.5, 6.1)	3.55 dq(9.5, 6.1)	3.55 dq(9.5, 6.1)	3.42 dq(9.5, 6.1)
6''''	1.43 d(6.1)	1.44 d(6.1)	1.43 d(6.1)	1.43 d(6.1)	1.44 d(6.1)
1'''''	4.49 d(7.9)	4.48 d(7.9)	4.49 d(7.9)	4.49 d(7.9)	4.48 d(7.9)
2'''''	3.21 dd(9.0, 7.9)	3.21 dd(9.0, 7.9)	3.21 dd(9.0, 7.9)	3.21 dd(9.0, 7.9)	3.21 dd(9.0, 7.9)
3'''''	3.37 dd(9.0, 9.0)	3.38 dd(9.0, 9.0)	3.37 dd(9.0, 9.0)	3.37 dd(9.0, 9.0)	3.38 dd(9.0, 9.0)
4'''''	3.27 dd(9.0, 9.0)	3.28 dd(9.0, 9.0)	3.27 dd(9.0, 9.0)	3.27 dd(9.0, 9.0)	3.28 dd(9.0, 9.0)
5'''''	3.28 dd(9.0, 9.0)	3.28 dd(9.0, 9.0)	3.28 dd(9.0, 9.0)	3.28 dd(9.0, 9.0)	3.28 dd(9.0, 9.0)
6'''''	3.90 dd(12.0, 2.5)	3.89 dd(12.0, 2.5)	3.90 dd(12.0, 2.5)	3.90 dd(12.0, 2.5)	3.89 dd(12.0, 2.5)
	3.67 dd(12.0, 4.5)	3.68 dd(12.0, 4.5)	3.67 dd(12.0, 4.5)	3.67 dd(12.0, 4.5)	3.68 dd(12.0, 4.5)

Table 3-11-45: ^1H NMR spectroscopic data of steroidal saponins **3-11-185~3-11-187, 3-11-189, and 3-11-190.**

H	3-11-185	3-11-186	3-11-187	3-11-189	3-11-190
3	3.49 m	3.49 m	3.66 m	3.86 dddd (11.3, 11.3, 4.6, 4.6)	3.86 m
4	—	—	—	—	2.75 m
6	5.44 dd(3.2, 2.4)	5.44 dd(3.2, 2.4)	5.22 m	5.29 d(4.0)	5.30 br s
7	α 3.05 ddd (13.5, 15.8, 3.2) β 1.98 dd(15.8, 2.4)	α 3.05 ddd (13.5, 15.8, 3.2) β 1.98 dd(15.8, 2.4)	—	—	—
8	2.06 m	2.06 m	—	1.55 m	—
9	—	—	—	0.98 m	—
14	1.93 m	1.93 m	—	1.30 m	—
16	—	—	—	4.53 br s	4.51 m
17	—	—	—	2.66 d(6.4)	2.65 d(6.6)
18	1.24 s	1.24 s	1.02 s	0.91 s	0.60 s
19	1.05 s	1.05 s	1.01 s	0.94 s	1.01 s
20	2.31 m 2.28 m	2.31 m 2.28 m	—	—	—
21	1.18 t(7.0)	1.18 t(7.0)	2.25 s	2.17 s	2.15 s
OMe	3.46 s(C-3') 3.46 s(C-3'') 3.46 s(C-3''') 3.50 s(C-3''')	3.46 s(C-3') 3.45 s(C-3'') 3.51 s(C-3''')	—	3.23 s(C-16)	3.21 s(C-16)
1'	4.89 dd(9.2, 2.0)	4.90 dd(9.2, 2.0)	5.44 d(3)	4.89 d(7.4)	4.95 d(7.5)
2'	2.10 m 1.59 m	2.08 m 1.57 m	—	—	—
3'	3.87 br m	3.88 br m	—	—	—
4'	3.26 dd(9.5, 3.0)	3.25 dd(9.5, 3.0)	—	—	—
5'	3.85 dq(9.5, 6.1)	3.85 dq(9.5, 6.1)	—	—	—
6'	1.22 d(6.1)	1.22 d(6.1)	1.26 d(7)	—	—
1''	4.82 dd(9.6, 2.0)	4.83 dd(9.6, 2.0)	—	6.39 br s	6.40 br s
2''	2.17 m, 1.63 m	2.17 m, 1.62 m	—	—	—
3''	3.87 br m	3.88 br m	—	—	—
4''	3.26 dd(9.5, 3.0)	3.30 dd(9.5, 3.0)	—	—	—
5''	3.85 dq(9.5, 6.1)	3.85 dq(9.5, 6.1)	—	—	—
6''	1.25 d(6.1)	1.25 d(6.1)	—	—	1.75 d(6.0)
1'''	4.62 dd(9.6, 2.0)	4.67 dd(9.6, 2.0)	—	5.82 br s	5.85 br s
2'''	2.35 ddd (13.0, 4.0, 2.0) 1.48 ddd (13.0, 9.6, 9.0)	2.23 ddd (13.0, 4.0, 2.0) 1.52 ddd (13.0, 9.6, 9.0)	—	—	—
3'''	3.43 ddd (9.5, 9.0, 4.0)	3.63 ddd (9.5, 9.0, 4.0)	—	—	—
4'''	3.21 dd(9.5, 9.5)	3.04 dd(9.5, 9.5)	—	—	—
5'''	3.38 dq(9.5, 6.1)	3.39 dq(9.5, 6.1)	—	—	—

Table 3-11-45 (continued)

H	3-11-185	3-11-186	3-11-187	3-11-189	3-11-190
6'''	1.32 d(6.1)	1.32 d(6.1)		—	1.62 d(6.0)
1'''	4.73 dd(9.6, 2.0)	4.67 dd(9.6, 2.0)			
2'''	2.38 ddd (13.0, 4.0, 2.0)	2.43 ddd (13.0, 4.0, 2.0)			
	1.43 ddd (13.0, 9.6, 9.0)	1.49 ddd (13.0, 9.6, 9.0)			
3'''	3.43 ddd (9.5, 9.0, 4.0)	3.49 ddd (9.5, 9.0, 4.0)			
4'''	3.31 dd(9.5, 9.5)	3.37 dd(9.5, 9.5)			
5'''	3.42 dq(9.5, 6.1)	3.55 dq(9.5, 6.1)			
6'''	1.44 d(6.1)	1.43 d(6.1)			
1''''	4.48 d(7.9)	4.49 d(7.9)			
2''''	3.21 dd(9.0, 7.9)	3.21 dd(9.0, 7.9)			
3''''	3.38 dd(9.0, 9.0)	3.37 dd(9.0, 9.0)			
4''''	3.28 dd(9.0, 9.0)	3.27 dd(9.0, 9.0)			
5''''	3.28 dd(9.0, 9.0)	3.28 dd(9.0, 9.0)			
6''''	3.89 dd(12.0, 2.5)	3.90 dd(12.0, 2.5)			
	3.68 dd(12.0, 4.5)	3.67 dd(12.0, 4.5)			

Table 3-11-46: ¹H NMR spectroscopic data of steroidal saponins 3-11-181, 3-11-184, 3-11-188, 3-11-191, and 3-11-192.

H	3-11-181	3-11-184	3-11-188	3-11-191	3-11-192
1	α 1.05 m β 1.88 m	α 1.08 m β 1.88 m	1.00 m 1.81 br d(11.0)	α 1.02~1.07 m β 1.81~1.86 m	α 1.01~1.06 m β 1.80~1.85 m
2	α 1.32 m β 1.53 m	α 1.32 m β 1.55 m	1.81 br d(11.0) 1.46 m	α 1.89~1.93 m β 1.54~1.57 m	α 1.86~1.90 m β 1.52~1.55 m
3	3.53 m	3.53 m	3.46 m	3.49~3.54 m	3.45~3.52 m
4	α 2.37 m β 2.20 m	α 2.37 m β 2.21 m	2.38 dd(12.5, 4.0) 2.12 br t(12.4)	α 2.30~2.36 m β 2.16~2.19 m	α 2.30~2.34 m β 2.13~2.16 m
6	5.45 dd(3.3, 2.7)	5.42 dd(3.2, 2.4)	5.40 d(2.0)	5.40 d(4.9)	5.35 br s
7	α 3.03 m β 2.04 m	α 2.99 ddd (13.5, 15.5, 3.2) β 1.81 dd(15.5, 2.4)	2.23 br d(18.9) 1.51 m	2.16~2.20 m(2H)	2.16~2.20 m(2H)
8	1.88 m	1.93 m	1.72 m	1.72~1.76 m	1.72~1.76 m
9	1.21 m	1.30 m	0.95 m	1.01~1.05 m	1.01~1.05 m
11	α 1.63 m β 1.45 m	α 1.61 m β 1.37 m	1.55 m 1.40 m	1.46~1.50 m(2H)	1.49~1.52 m(2H)
12	α 0.97 m β 1.50 m	α 1.44 m β 1.15 m	1.38 m 1.93 br d(6.2)	α 1.48~1.52 m β 1.34~1.38 m	α 1.12~1.16 m β 1.26~1.30 m

Table 3-11-46 (continued)

H	3-11-181	3-11-184	3-11-188	3-11-191	3-11-192
14		2.38 m	0.91 dd(11.0, 5.4)		
15			4.04 br	α 2.08~2.13 m β 1.73~1.78 m	α 2.02~2.07 m β 1.73~1.78 m
16	α 1.77 dd(18.0, 9.0) β 2.62 dd(18.0, 9.0)	5.51 d(10.1)	1.98 m, 2.00 m	α 1.90~1.96 m β 1.83~1.87 m	α 2.64~2.68 m β 2.63~2.69 m
17	2.17 m	2.08 dd(10.1, 1.7)	2.46 t(9.3)	2.89 dd(3.6, 9.1)	
18	1.08 s	1.22 s	0.73 s	0.96 s	1.14 s
19	1.01 s	1.01 s	0.96 s	0.95 s	0.95 s
20	1.12 m 1.55 m	1.44 m 1.51 m			
21	0.97 t(7.0)	0.92 t(7.0)	2.04 s	4.12 d(19.0) 4.08 d(19.0)	4.50 d(18.8) 4.30 d(18.8)
OAc		2.14 s(16-OAc)			
OMe	3.46 s(3'-OMe) 3.45 s(3''-OMe) 3.51 s(3'''-OMe)	3.46 s(3'-OMe) 3.45 s(3''-OMe) 3.51 s(3'''-OMe)		3.34 s(21-OMe) 3.41 s(3'-OMe) 3.40 s(3''-OMe) 3.35 s(3'''-OMe)	3.34 s(21-OMe) 3.40 s(3''-OMe) 3.34 s(3'''-OMe)
1'	4.90 dd(9.2, 2.0)	4.90 dd(9.2, 2.0)	4.21 d(7.6)	4.86 br d(9.6)	4.85 br d(9.6)
2'	2.08 m 1.57 m	2.08 m 1.57 m	2.88 br t(7.9)	2.07~2.14 m 1.58~1.62 m	2.00~2.07 m 1.63~1.67 m
3'	3.88 br m	3.88 br m	3.11 br t(8.2)	3.80 br s	4.18 br s
4'	3.25 dd(9.5, 3.0)	3.25 dd(9.5, 3.0)	3.00 br t(8.5)	3.20 br d(9.6)	3.13 br d(9.5)
5'	3.85 dq(9.5, 6.1)	3.85 dq(9.5, 6.1)	3.05 m	3.85 dq(9.6, 6.0)	3.70 dq(9.5, 6.0)
6'	1.22 d(6.1)	1.22 d(6.1)	3.40 dd(11.4, 5.5) 3.64 br d(11.4)	1.19 d(6.0)	1.18 d(6.0)
1''	4.83 dd(9.6, 2.0)	4.83 dd(9.6, 2.0)		4.75 br d(9.6)	4.75 br d(9.6)
2''	2.17 m 1.62 m	2.17 m 1.62 m		2.02~2.08 m 1.52~1.56 m	2.02~2.08 m 1.52~1.56 m
3''	3.88 br m	3.88 br m		3.80 br s	3.75 br s
4''	3.30 dd(9.5, 3.0)	3.30 dd(9.5, 3.0)		3.20 br d(9.5)	3.17 br d(9.5)
5''	3.85 dq(9.5, 6.1)	3.85 dq(9.5, 6.1)		3.84 dq(9.5, 6.0)	3.85 dq(9.5, 6.0)
6''	1.25 d(6.1)	1.25 d(6.1)		1.18 d(6.0)	1.18 d(6.0)
1'''	4.67 dd(9.6, 2.0)	4.67 dd(9.6, 2.0)		4.45 br d(9.6)	4.44 br d(9.6)
2'''	2.23 ddd (13.0, 4.0, 2.0) 1.52 ddd (13.0, 9.6, 9.0)	2.23 ddd (13.0, 4.0, 2.0) 1.52 ddd (13.0, 9.6, 9.0)		2.26~2.30 m 1.40~1.44 m	2.24~2.30 m 1.38~1.42 m
3'''	3.63 ddd (9.5, 9.0, 4.0)	3.63 ddd (9.5, 9.0, 4.0)		3.13 dd(9.5, 9.0)	3.12 dd(9.6, 9.0)
4'''	3.04 dd(9.5, 9.5)	3.04 dd(9.5, 9.5)		3.04 dd(9.0, 9.0)	3.06 dd(9.0, 9.0)

Table 3-11-46 (continued)

H	3-11-181	3-11-184	3-11-188	3-11-191	3-11-192
5'''	3.39 dq(9.5, 6.1)	3.39 dq(9.5, 6.1)		3.24 dq(9.0, 6.0)	3.25 dq(9.0, 6.0)
6'''	1.32 d(6.1)	1.32 d(6.1)		1.25 d(6.0)	1.25 d(6.0)
1''''	4.67 dd(9.6, 2.0)	4.67 dd(9.6, 2.0)			
2''''	2.43 ddd (13.0, 4.0, 2.0)	2.43 ddd (13.0, 4.0, 2.0)			
	1.49 ddd (13.0, 9.6, 9.0)	1.49 ddd (13.0, 9.6, 9.0)			
3''''	3.49 ddd (9.5, 9.0, 4.0)	3.49 ddd (9.5, 9.0, 4.0)			
4''''	3.37 dd(9.5, 9.5)	3.37 dd(9.5, 9.5)			
5''''	3.55 dq(9.5, 6.1)	3.55 dq(9.5, 6.1)			
6''''	1.43 d(6.1)	1.43 d(6.1)			
1'''''	4.49 d(7.5)	4.49 d(7.5)			
2'''''	3.21 dd(9.0, 7.5)	3.21 dd(9.0, 7.5)			
3'''''	3.37 dd(9.0, 9.0)	3.37 dd(9.0, 9.0)			
4'''''	3.27 dd(9.0, 9.0)	3.27 dd(9.0, 9.0)			
5'''''	3.28 dd(9.0, 9.0)	3.28 dd(9.0, 9.0)			
6'''''	3.90 dd(12.0, 2.5)	3.90 dd(12.0, 2.5)			
	3.67 dd(12.0, 4.5)	3.67 dd(12.0, 4.5)			

Table 3-11-47: ¹H NMR spectroscopic data of steroidal saponins 3-11-193~3-11-197.

H	3-11-193	3-11-194	3-11-195	3-11-196	3-11-197
1	1.13 m, 1.82 m	1.11 m, 1.80 m	—	—	—
2	1.81 m, 2.10 m	1.81 m, 2.11 m	—	—	—
3	3.85 m	3.88 m	3.50 br m	3.49 br m	3.57 m
4	2.43 m, 2.50 m	2.42 m, 2.51 m	—	—	—
6	5.30 br s	5.27 br s	5.38 m	5.37 m	5.38 d(4.8)
7	2.03 m, 2.09 m	2.03 m, 2.11 m	—	—	—
9	1.75 d(12.9)	1.75 d(13.2)	—	—	—
11	2.18 m, 2.31 m	2.17 m, 2.30 m	—	—	—
12	5.18 m	5.18 m	4.70 dd(10.5, 4.0)	4.72 dd(11.0, 4.0)	4.74 dd(11.6, 4.1)
15	2.33 m, 2.43 m	2.33 m, 2.45 m	—	—	—
16	2.04 m, 3.26 m	2.02 m, 3.24 m	—	—	—
18	1.97 s	1.99 s	1.63 s	1.66 s	1.66 s
19	1.33 s	1.33 s	1.18 s	1.18 s	1.18 s
21	2.49 s	2.47 s	2.24 s	2.23 s	2.11 s
OH	5.0 s(8-OH)	5.0 s(8-OH)			
	6.1 s(14-OH)	6.1 s(14-OH)			
	6.49 s(17-OH)	6.45 s(17-OH)			

Table 3-11-47 (continued)

H	3-11-193	3-11-194	3-11-195	3-11-196	3-11-197
1'	5.25 d(7.9)	5.50 d(7.6)	4.90 dd(9.5, 2.0)	4.72 dd(9.3, 2.0)	4.98 dd(9.7, 1.7)
2'	1.81 m 2.40 m	1.79 m 2.37 m	1.57 m 2.12 m	1.41 ddd (13.0, 9.3, 9.0) 2.27 ddd (13.0, 3.5, 2.0)	1.65 m 1.93 m
3'	3.96 q(3.0)	4.32 q(3.0)	3.85 q(3.0)	3.39 ddd (3.5, 9.3, 9.0)	4.25 m
4'	3.50 dd(9.5, 3.0)	3.61 dd(9.5, 3.0)	3.30 dd(9.5, 3.0)	3.16 dd(9.3, 9.3)	3.20 m
5'	4.24 dq(9.5, 6.5)	4.26 dq(9.5, 6.5)	3.88 dq(9.5, 6.0)	3.35 dq(9.3, 6.0)	3.79 m
6'	1.38 d(6.2)	1.58 d(6.2)	1.28 d(6.0)	1.30 d(6.0)	1.23 d(5.8)
OMe	3.50 s(3'-OMe) 3.29 s(3''-OMe)		3.48 s(3'-OMe) 3.46 s(3''-OMe) 3.50 s(3'''-OMe) 3.44 s(3''''-OMe)	3.44 s(3'-OMe) 3.46 s(3''-OMe) 3.52 s(3'''-OMe)	3.46 s(3''-OMe) 3.50 s(3'''-OMe)
1''	5.21 d(3.4)		4.82 dd(9.0, 2.0)	4.94 dd(9.2, 2.0)	4.86 dd(9.6, 1.6)
2''	2.08 m, 2.37 m	6.80 d(15.5)	1.60 m, 2.18 m	1.58 m, 2.20 m	1.59 m, 2.11 m
3''	3.85 q(2.8)	7.98 d(15.5)	3.85 q(3.0)	3.90 q(3.0)	3.87 m
4''	4.04 m		3.32 t(9.0, 3.0)	3.29 t(9.3, 3.0)	3.27 m
5''	4.32 dq(6.7, 0.5)	7.61 m	3.83 dq(9.5, 6.2)	3.85 dq(9.3, 6.2)	3.86 m
6''	1.57 d(6.7)	7.33 m	1.26 d(6.2)	1.26 d(6.2)	1.24 d(5.8)
7''		7.33 m			
8''		7.33 m			
9''		7.61 m			
1'''			4.56 dd(9.0, 2.0)	4.88 dd(9.5, 2.0)	4.64 dd(9.6, 1.6)
2'''	6.80 d(16.0)		1.46 ddd (13.0, 9.0, 9.0) 2.37 ddd (13.0, 4.0, 2.0)	1.66 m 2.15 m	1.44 m 2.33 m
3'''	8.00 d(16.0)		3.31 ddd (9.5, 9.0, 4.0)	3.85 q(3.0)	3.43 m
4'''			3.16 dd(9.5, 9.5)	3.25 (9.5, 3.0)	3.41 m
5'''	7.62 m		3.43 dq(9.5, 6.4)	3.84 (9.5, 6.0)	3.44 m
6'''	7.34 m		1.42 d(6.4)	1.25 d(6.0)	1.41 d(6.1)
7'''	7.34 m				
8'''	7.34 m				
9'''	7.62 m				
1''''			4.54 d(8.0)	4.44 d(8.0)	4.48 d(7.8)
2''''			3.88 dd(9.2, 8.0)	3.23 dd(9.5, 8.0)	3.22 m

Table 3-11-47 (continued)

H	3-11-193	3-11-194	3-11-195	3-11-196	3-11-197
3 ^{'''}			3.39 dd(9.3, 3.5)	3.35 dd(9.5, 9.5)	3.26 m
4 ^{'''}			3.85 dd(3.5, 2.0)	3.47 dd(9.5, 9.5)	3.25 m
5 ^{'''}			3.61 m	3.48 m	3.37 m
6 ^{'''}			1.36 d(6.5)	3.71 dd(12.0, 5.0)	3.67 dd(12.0, 5.8)
				3.89 dd(12.0, 3.0)	3.88 dd(12.0, 2.2)
2a			6.43 d(16.0)	6.40 d(16.0)	
3a			7.62 d(16.0)	7.68 d(16.0)	7.73 d(8.8)
4a					6.69 d(8.8)
5a			7.65 (ov)	6.90 d(8.0)	
6a			7.44 (ov)	7.50 d(8.0)	6.69 d(8.8)
7a			7.44 (ov)		7.73 d(8.8)
8a			7.44 (ov)	7.50 d(8.0)	
9a			7.65 (ov)	6.90 d(8.0)	

Table 3-11-48: ¹H NMR spectroscopic data of steroidal saponins 3-11-198~3-11-202.

H	3-11-198	3-11-199	3-11-200	3-11-201	3-11-202
3	3.68 m	3.50 br m	3.50 br m	3.57 m	3.83 m
6	5.25 d(3.2)	5.34 m	5.34 m	5.34 d(4.1)	5.28 br s
12	5.33 dd(11.4, 4.1)	4.68 dd(11.0, 4.0)	4.68 dd(11.0, 4.0)	4.48 dd(11.6, 4.1)	5.04
18	2.09 s	1.62 s	1.62 s	1.50 s	1.97 s
19	1.29 s	1.18 s	1.18 s	1.14 s	1.31 s
21	2.41 s	2.21 s	2.21 s	2.17 s	2.50 s
OAc		1.90 s(12-OAc)	1.90 s(12-OAc)		
1'	5.47 br d(8.9)	4.92 dd(9.2, 2.0)	4.76 dd(9.5, 1.6)	4.86 dd(9.6, 1.6)	5.26 br d(9.4)
2'	1.77 m, 2.03 m	1.57 m, 2.16 m	1.44 ddd (13.5, 1.6, 3.5) 2.12 ddd (13.0, 9.5, 2.0)	2.06 m, 2.17 m	1.89 m, 2.30 m
3'	4.61 m	3.86 q(3.0)	3.40 ddd (3.5, 9.3, 9.0)	3.86 m	4.07 m
4'	3.47 m	3.29 dd(9.5, 3.0)	2.95 dd(9.5, 9.5)	3.26 m	3.66 dd(8.7, 2.4)
5'	4.20 m	3.85 dq(9.5, 6.0)	3.60 dq(9.5, 6.0)	3.82 m	4.21 m
6'	1.49 d(6.2)	1.25 d(6.0)	1.27 d(6.0)	1.18 d(6.3)	1.38 d(6.0)
OMe	3.55 s(3''-OMe) 3.93 s(3'''-OMe)	3.46 s(3'-OMe) 3.43 s(3'''-OMe) 3.46 s(3'''-OMe) 3.48 s(3'''-OMe)	3.48 s(3''-OMe) 3.45 s(3'''-OMe) 3.66 s(3'''-OMe)	3.42 s(3'-OMe) 3.45 s(3''-OMe) 3.42 s(3'''-OMe)	3.51 s(3'-OMe) 3.55 s(3''-OMe) 3.50 s(3'''-OMe) 3.60 s(3'''-OMe)

Table 3-11-48 (continued)

H	3-11-198	3-11-199	3-11-200	3-11-201	3-11-202
1''	5.15 br d(8.7)	4.68 dd(9.6, 1.8)	4.78 dd(9.5, 1.5)	4.61 dd(9.6, 1.6)	5.10 br d(9.5)
2''	1.75 m, 2.31 m	1.39 ddd (13.0, 9.6, 9.0) 2.33 ddd (13.0, 4.0, 1.8)	1.68 m, 2.22 m	1.94 m, 2.33 m	1.77 m, 2.28 m
3''	3.97 m	3.37 ddd (9.6, 9.0, 4.0)	3.90 br m	3.42 m	4.00 m
4''	3.48 m	3.15 dd(9.5, 9.5)	3.38 dd(9.5, 3.0)	3.23 m	3.50 m
5''	4.29 m	3.33 dq(9.5, 6.1)	3.96 dq(9.5, 6.5)	3.41 m	4.16 m
6''	1.42 d(6.2)	1.37 d(6.1)	1.25 d(6.5)	1.38 d(6.1)	1.37 d(5.9)
1'''	4.68 d(7.7)	4.61 dd(9.6, 1.8)	4.60 dd(9.5, 2.0)	4.78 dd (9.6, 1.6)	4.67 br d(9.6)
2'''	3.88 m	1.44 ddd (13.0, 9.6, 9.0) 2.35 ddd (13.0, 4.0, 1.8)	1.45 ddd (13.5, 9.5, 9.2) 2.34 ddd (13.5, 4.0, 2.0)	1.58 m 2.14 m	1.81 m 2.29 m
3'''	3.70 t(9.0)	3.40 ddd (9.6, 9.0, 4.0)	3.40 ddd (9.5, 9.2, 4.0)	3.87 m	3.51 m
4'''	3.85 m	3.21 dd(9.5, 9.5)	3.23 dd(9.5, 9.5)	3.20 m	3.46 m
5'''	4.00 m	3.43 dd(9.5, 6.1)	3.41 dq(9.5, 6.5)	3.85 m	3.49 m
6'''	1.73 d(6.1)	1.39 d(6.1)	1.37 d(6.0)	1.21 d(6.3)	1.40 d(5.8)
1''''	5.13 d(7.6)	4.50 d(8.0)	4.44 d(7.9)	4.47 d(8.0)	5.24 br d(8.2)
2''''	4.03 m	3.85 dd(9.5, 8.0)	3.31 dd(9.5, 7.9)	3.22 m	2.32 m, 2.45 m
3''''	4.23 m	3.42 dd(9.5, 3.5)	3.25 dd(9.5, 9.5)	3.40 m	4.14 m
4''''	3.74 m	3.83 dd(3.5, 2.2)	3.49 dd(9.5, 9.5)	3.55 m	3.40 m
5''''	4.00 m	3.65 m	3.54 m	3.54 m	4.26 m
6''''	4.35 dd(11.4, 5.4) 4.53 dd(11.4, 2.2)	1.40 d(6.5)	1.40 d(6.5)	3.85 m 3.94 dd(12.0, 2.2)	1.61 d(6.2)
1'''''				4.38 d(7.8)	4.92 d(7.7)
2'''''				3.19 m	3.98 m
3'''''				3.36 m	3.96 m
4'''''				3.31 m	4.17 m
5'''''				3.34 m	4.23 m
6'''''				3.69 dd(5.8, 12.0) 3.90 dd(2.2, 12.0)	4.37 dd(5.3, 11.5)
2a				5.54 s	5.85 s
3a	8.30 d(8.6)				
4a	7.23 d(8.6)			2.40 m	2.44 m
5a				1.07 d(6.8)	0.94 d(7.3)
6a	7.23 d(8.6)			1.07 d(6.8)	0.95 d(7.4)
7a	8.30 d(8.6)			2.11 s	2.26 s

Table 3-11-49: ^1H NMR spectroscopic data of steroidal saponins **3-11-203**~**3-11-205**, **3-11-208**, and **3-11-210**.

H	3-11-203	3-11-204	3-11-205	3-11-208	3-11-210
3	3.88 dddd (11.4, 11.4, 4.3, 4.3)	3.86 dddd (11.4, 11.4, 4.3, 4.3)	3.92 m	3.89 m(22.5)	3.85 m
6	5.37 d(4.1)	5.33 br s	5.35 d(4.6)	5.34 br d(5.0)	5.32 d(5.0)
8	1.53 m	1.57 m	1.57 m	—	—
9	0.99 m	0.85 m	0.96 m	—	—
12	—	—	—	—	2.56 m(2H)
14	1.36 m	1.25 m	1.36 m	—	—
16	6.59 br s	6.58 br s	6.62 br s	6.62 dd(3.1, 2.0)	6.74 m
18	0.93 s	0.91 s	0.94 s	0.93 s	0.95 s
19	1.04 s	0.92 s	1.08 s	1.04 s	1.04 s
21	2.22 s	2.23 s	2.25 s	2.25 s	4.37 d(18.0) 4.45 d(18.0) 3.41 s(21-OMe)
OMe					
1'	4.89 d(7.5)	4.94 d(7.5)	4.96 d(7.6)	4.88 d(7.8)	4.92 d(7.2)
1''	6.31 br s	5.89 br s	6.40 br s	5.80 br s	6.39 br s
6''	—	—	—	1.75 d(6.2)	1.75 d(6.0)
1'''			5.12 d(7.6)	5.74 br s	5.84 br s
6'''			—	1.68 d(6.2)	1.62 d(6.0)
1''''			5.85 br s	5.24 d(7.8)	
1''''				5.24 d(7.8)	

Table 3-11-50: ^1H NMR spectroscopic data of steroidal saponins **3-11-206**, **3-11-207**, and **3-11-209**.

H	3-11-206	3-11-207	3-11-209
1	ax 1.00 m, eq 1.70 m	ax 0.98 m, eq 1.66 m	3.78 dd(12.0, 4.0)
2	ax 1.82 m eq 2.03 m	ax 1.76 m eq 2.03 br d	α 2.00 m β 1.71 m
3	3.83 m	3.90 m	4.05 br s
4	ax 2.74 dd(11.0, 11.8) eq 2.80 dd(3.6, 9.6)	ax 2.76 m, eq 2.80 m	α 2.28 m, β 2.51 d(14.4)
6	5.27 br d(4.0)	5.45 br d(2.8)	5.49 d(5.6)
7	1.89 m, 2.55 m	1.85 m, 2.55 m	α 1.78 m, β 1.95 m
8	1.98 m	1.91 m	β 1.65 m
9	2.00 m	1.93 m	α 1.35 td(12.0, 8.0)
11	1.62 m	1.62 m	α 2.38 m, β 1.62 m
12	ax 2.59 m, eq 2.45 m	ax 2.59 m, eq 2.45 m	α 1.35 m, β 2.28 m
14			α 1.47 m
15	ax 2.54 br d(14.8) eq 2.51 br d(14.8)	ax 2.54 br d(15.0) eq 2.51 br d(15.0)	2.30 m
16	6.72 br s	6.71 br s	6.90 dd(3.2, 1.6)
18	1.14 s	1.14 s	0.93 s

Table 3-11-50 (continued)

H	3-11-206	3-11-207	3-11-209
19	1.12 s	1.13 s	1.06 s
21	2.15 s	2.15 s	2.26 s
1'	4.96 d(6.4)	4.90 d(6.4)	4.33 d(8.0)
2'	4.38 m	—	3.16 t(8.0)
3'	4.19 m	—	3.35 m
4'	4.20 m	—	3.30 m
5'	3.62 br s	—	3.27 m
6'	4.06 dd(12.4, 3)	—	3.66 dd(11.6, 5.2) 3.86 dd(11.6, 2.0)
1''	6.38 br s	6.38 br s	
2''	4.83 br s	4.82 br s	
3''	4.63 dd(9.3, 3.2)	4.57 dd(9.3, 3)	
4''	4.35 m	4.32 m	
5''	4.91 m	4.82 m	
6''	1.76 d(6.2)	1.76 d(6.2)	
1'''	5.84 br s	5.08 d(7.5)	
2'''	4.67 br s	—	
3'''	4.53 dd(9.3, 3)	—	
4'''	4.32 m	—	
5'''	4.90 m	—	
6'''	1.61 d(6.0)	—	

Table 3-11-51: Cos, MFs, and TSs of steroidal saponins 3-11-211~3-11-257.

No.	Compounds	MFs	Test solvents	References
3-11-211	denin	C ₃₃ H ₅₆ O ₁₄	CDCl ₃	[337]
3-11-212	biondianoside E	C ₃₄ H ₅₈ O ₁₃	C ₅ D ₅ N	[348]
3-11-213	(3 β ,5 α ,12 β ,14 β ,17 α)-3-(β -cymaropyranosyloxy)-8,14,17,20-tetrahydroxypregnan-12-yl benzoate	C ₃₅ H ₅₂ O ₁₀	CD ₃ OD	[349]
3-11-214	(3 β ,5 α ,12 β ,14 β ,17 α)-3-(β -cymaropyranosyloxy)-8,14,17,20-tetrahydroxypregnan-12-yl cinnamate	C ₃₇ H ₅₄ O ₁₀	CD ₃ OD	[349]
3-11-215	penicilloside A	C ₄₁ H ₆₂ O ₁₄	C ₅ D ₅ N	[350]
3-11-216	penicilloside B	C ₄₇ H ₇₂ O ₁₉	(C _{1~21})C ₅ D ₅ NCD ₃ OD	[350]
3-11-217	penicilloside C	C ₅₂ H ₈₀ O ₂₀	C ₅ D ₅ N	[350]
3-11-218	marstenacisside A	C ₅₄ H ₉₂ O ₂₃	C ₅ D ₅ N	[351]
3-11-219	marstenacisside B	C ₄₈ H ₈₂ O ₂₀	C ₅ D ₅ N	[351]

Table 3-11-51 (continued)

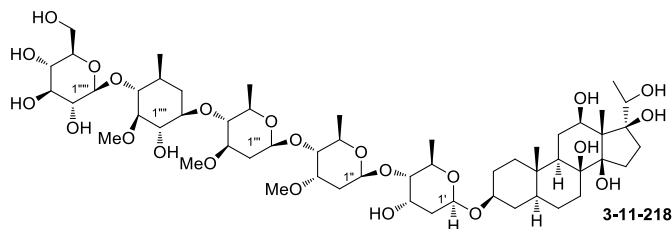
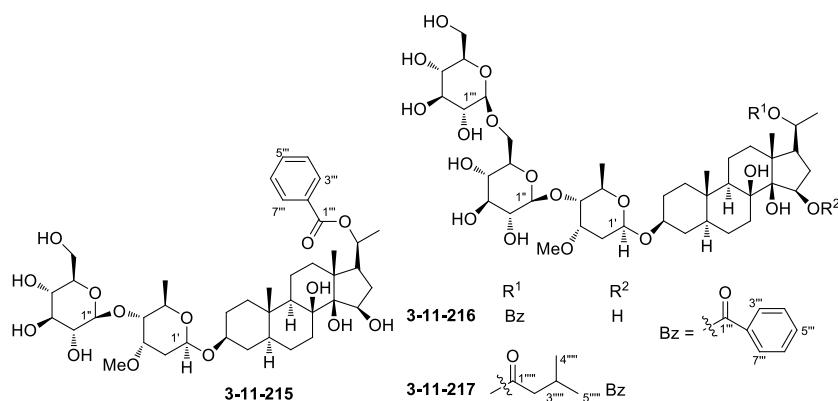
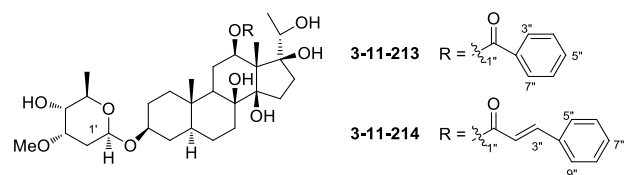
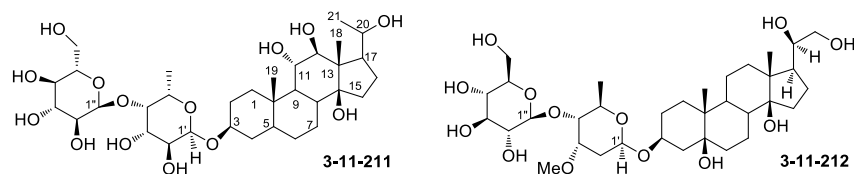
No.	Compounds	MFs	Test solvents	References
3-11-220	12- <i>O</i> -acetyl-20- <i>O</i> -(<i>N</i> -methyl)anthraniloyl-5,6-dihydrosarcostin 3- <i>O</i> -β-D-glucopyranosyl-(1→4)-6-deoxy-3- <i>O</i> -methyl-β-D-allopyranosyl-(1→4)-β-D-cymaropyranosyl-(1→4)-β-D-cymaropyranoside	C ₅₈ H ₉₁ NO ₂₂	C ₅ D ₅ N	[352]
3-11-221	caradalzieloside A	C ₄₄ H ₆₆ O ₁₄	CDCl ₃	[353]
3-11-222	caradalzieloside B	C ₅₁ H ₇₈ O ₁₇	CDCl ₃	[353]
3-11-223	caradalzieloside D	C ₅₁ H ₇₈ O ₁₈	CDCl ₃	[353]
3-11-224	caradalzieloside C	C ₅₆ H ₈₀ O ₁₇	CDCl ₃	[353]
3-11-225	caradalzieloside E	C ₆₃ H ₉₂ O ₂₁	CDCl ₃	[353]
3-11-226	russelioside C	C ₃₄ H ₅₆ O ₁₂	CD ₃ OD	[354]
3-11-227	russelioside D	C ₄₀ H ₆₆ O ₁₇	CD ₃ OD	[354]
3-11-228	20- <i>O</i> -acetyl russelioside C	C ₃₆ H ₅₈ O ₁₃	CD ₃ OD	[355]
3-11-229	12β- <i>O</i> -tigloyl-20- <i>O</i> -acetylbourcerin-3- <i>O</i> -β-D-glucopyranosyl-(1→4)-β-D-quinovopyranosyl-(1→4)-β-D-cymaropyranosyl-(1→4)-β-D-cymaropyranoside	C ₅₄ H ₈₆ O ₂₁	CD ₃ OD	[355]
3-11-230	12β- <i>O</i> -tigloyl-20- <i>O</i> -acetylbourcerin-3- <i>O</i> -β-D-glucopyranosyl-(1→4)-6-deoxy-3- <i>O</i> -methyl-β-D-allopyranosyl-(1→4)-β-D-cymaropyranosyl-(1→4)-β-D-cymaropyranoside	C ₅₅ H ₈₈ O ₂₁	CD ₃ OD	[355]
3-11-231	12β- <i>O</i> - <i>o</i> -hydroxybenzoylboucerin-3- <i>O</i> -β-D-glucopyranosyl-(1→4)-6-deoxy-3- <i>O</i> -methyl-β-D-allopyranosyl-(1→4)-β-D-cymaropyranosyl-(1→4)-β-D-cymaropyranoside	C ₅₅ H ₈₄ O ₂₁	CD ₃ OD	[355]
3-11-232	12β- <i>O</i> -tigloylboucerin-3- <i>O</i> -β-D-glucopyranosyl-(1→4)-6-deoxy-3- <i>O</i> -methyl-β-D-allopyranosyl-(1→4)-β-D-cymaropyranosyl-(1→4)-β-D-cymaropyranoside	C ₅₃ H ₈₆ O ₂₀	CD ₃ OD	[355]
3-11-233	12β- <i>O</i> -tigloylboucerin-3- <i>O</i> -β-D-glucopyranosyl-(1→4)-β-D-thevetopyranosyl-(1→4)-β-D-cymaropyranosyl-(1→4)-β-D-cymaropyranoside	C ₅₃ H ₈₆ O ₂₀	CD ₃ OD	[355]
3-11-234	12β- <i>O</i> - <i>o</i> -hydroxybenzoylboucerin-3- <i>O</i> -β-D-glucopyranosyl-(1→4)-β-D-thevetopyranosyl-(1→4)-β-D-cymaropyranosyl-(1→4)-β-D-cymaropyranoside	C ₅₅ H ₈₄ O ₂₁	CD ₃ OD	[355]

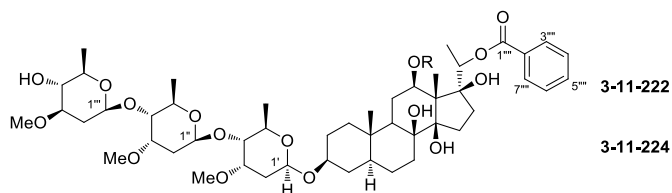
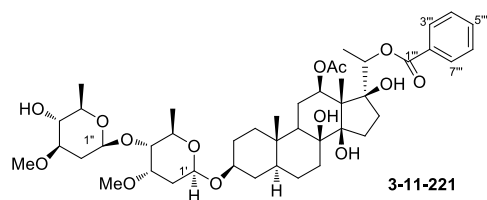
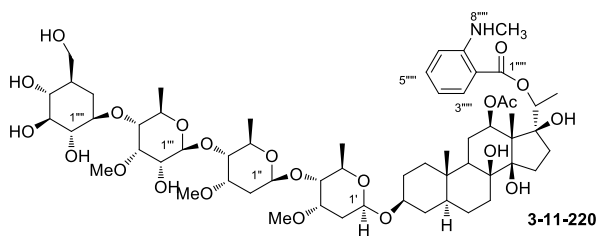
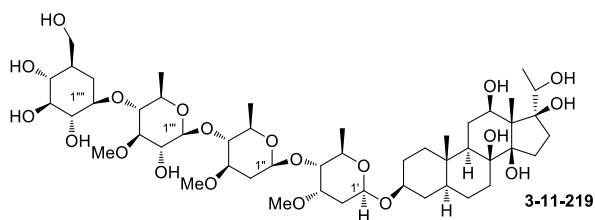
Table 3-11-51 (continued)

No.	Compounds	MFs	Test solvents	References
3-11-235	12- <i>O</i> -acetylboucerin-3- <i>O</i> - β -D-glucopyranosyl-(1 $\rightarrow$ 4)- β -D-thevetopyranosyl-(1 $\rightarrow$ 4)- β -D-cymaropyranosyl-(1 $\rightarrow$ 4)- β -D-cymaropyranoside	C ₅₀ H ₈₂ O ₂₀	CD ₃ OD	[355]
3-11-236	volubiloside A	C ₄₈ H ₈₀ O ₂₀	C ₅ D ₅ N	[356]
3-11-237	volubiloside B	C ₄₇ H ₇₈ O ₂₀	C ₅ D ₅ N	[356]
3-11-238	perisepiumoside A	C ₃₅ H ₅₈ O ₁₁	CDCl ₃	[341]
3-11-239	perisepiumoside B	C ₄₂ H ₇₀ O ₁₄	CDCl ₃	[341]
3-11-240	marstomentoside S	C ₅₇ H ₈₆ O ₂₂	C ₅ D ₅ N	[357]
3-11-241	12- β - <i>O</i> -cinnamoylsarcostin-3- <i>O</i> - β -D-digitalopyranosyl-(1 $\rightarrow$ 4)- β -D-oleandropyranosyl-(1 $\rightarrow$ 4)- β -D-cymaropyranosyl-(1 $\rightarrow$ 4)- β -D-cymaropyranoside	C ₅₈ H ₈₈ O ₂₀	CD ₃ OD	[343]
3-11-242	12- β - <i>O</i> -cinnamoyl-20- <i>O</i> -benzoylsarcostin-3- <i>O</i> - β -D-digitalopyranosyl-(1 $\rightarrow$ 4)- β -D-oleandropyranosyl-(1 $\rightarrow$ 4)- β -D-cymaropyranosyl-(1 $\rightarrow$ 4)- β -D-cymaropyranoside	C ₆₅ H ₉₂ O ₂₁	CD ₃ OD	[343]
3-11-243	12,20- β - <i>O</i> -dibenzoylbenzoylsarcostin-3- <i>O</i> - β -D-digitalopyranosyl-(1 $\rightarrow$ 4)- β -D-oleandropyranosyl-(1 $\rightarrow$ 4)- β -D-cymaropyranosyl-(1 $\rightarrow$ 4)- β -D-cymaropyranoside	C ₆₃ H ₉₀ O ₂₁	CD ₃ OD	[343]
3-11-244	12,20- β - <i>O</i> -dibenzoylsarcostin-3- <i>O</i> - β -D-digitalopyranosyl-(1 $\rightarrow$ 4)- β -D-cymaropyranosyl-(1 $\rightarrow$ 4)- β -D-cymaropyranosyl-(1 $\rightarrow$ 4)- β -D-oleandropyranoside	C ₆₃ H ₉₀ O ₂₁	CD ₃ OD	[343]
3-11-245	russelioside A	C ₃₄ H ₅₆ O ₁₂	CD ₃ OD	[354]
3-11-246	russelioside B	C ₄₀ H ₆₆ O ₁₇	CD ₃ OD	[354]
3-11-247	calogenin 3- <i>O</i> - β -D-digitalopyranoside-20- <i>O</i> - β -D-canaropyranoside	C ₃₄ H ₅₆ O ₁₀	CD ₃ OD	[358]
3-11-248	hoodigoside N	C ₃₅ H ₅₈ O ₁₀	CDCl ₃	[359]
3-11-249	hoodigoside O	C ₅₂ H ₈₄ O ₂₁	C ₅ D ₅ N	[359]
3-11-250	calogenin 3- <i>O</i> - β -D-glucopyranosyl-(1 $\rightarrow$ 6)- β -D-glucopyranosyl-(1 $\rightarrow$ 4)- β -D-3- <i>O</i> -methylfucopyranoside-20- <i>O</i> - β -D-glucopyranoside	C ₄₆ H ₇₆ O ₂₂	CD ₃ OD	[355]
3-11-251	hoodigoside L	C ₅₈ H ₉₄ O ₂₆	C ₅ D ₅ N	[359]
3-11-252	hoodigoside M	C ₅₃ H ₈₈ O ₂₅	C ₅ D ₅ N	[359]
3-11-253	hoodigoside P	C ₅₈ H ₉₄ O ₂₅	C ₅ D ₅ N	[359]

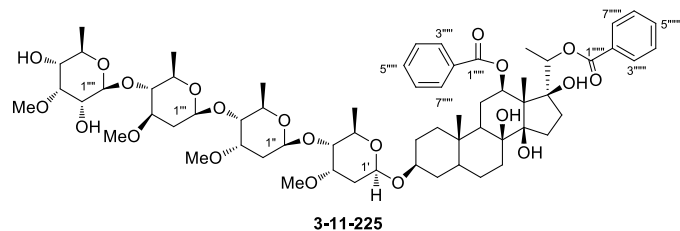
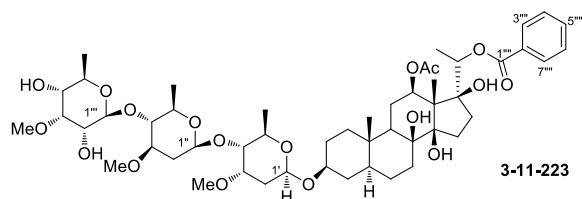
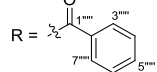
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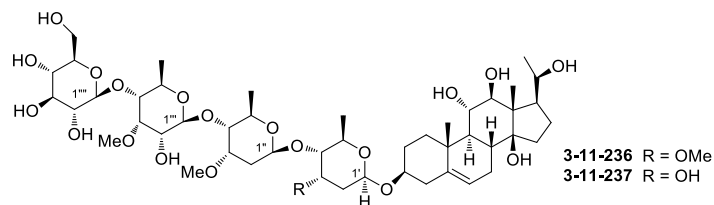
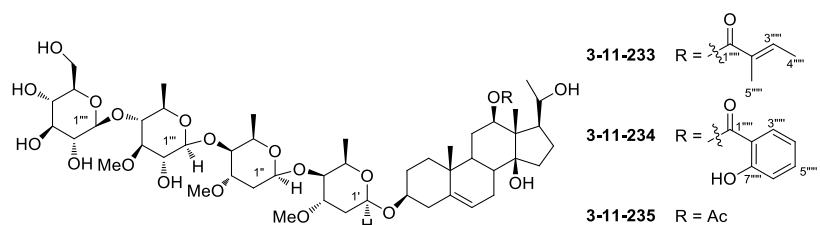
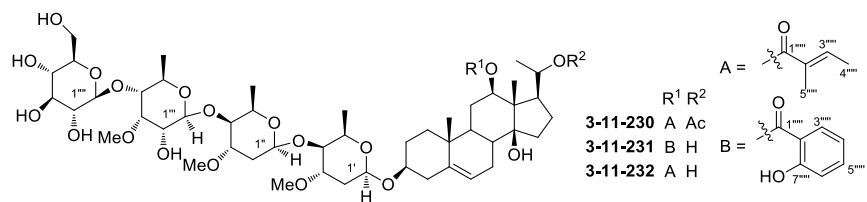
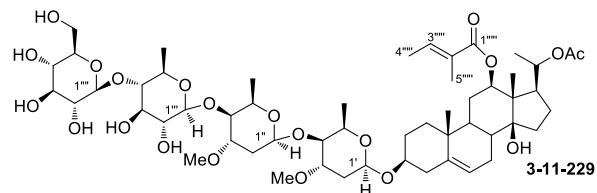
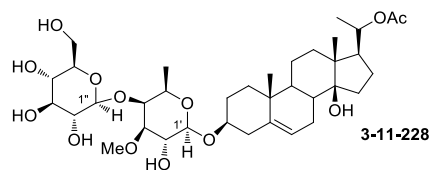
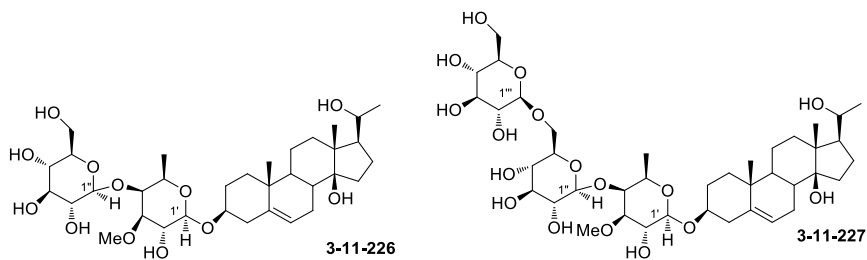
No.	Compounds	MFs	Test solvents	References
3-11-254	pregna-20-en-3- <i>O</i> - α -fucopyranoside	$C_{27}H_{44}O_5$	DMSO- d_6	[360]
3-11-255	ptilosaponoside A	$C_{27}H_{44}O_{14}S_2$	CD ₃ OD	[361]
3-11-256	ptilosaponoside B	$C_{27}H_{44}O_{11}S$	CD ₃ OD	[361]
3-11-257	pregna-5,20-dien-3- <i>O</i> - α -fucopyranoside	$C_{27}H_{42}O_5$	DMSO- d_6	[360]

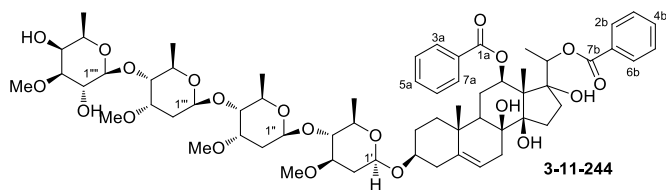
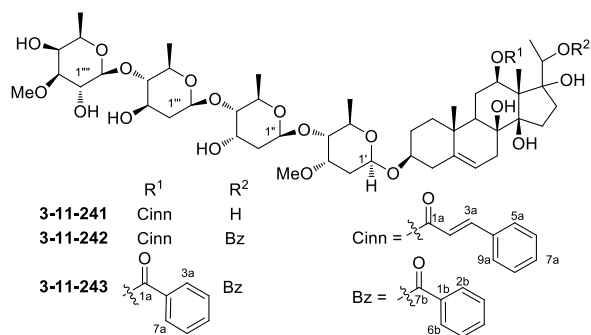
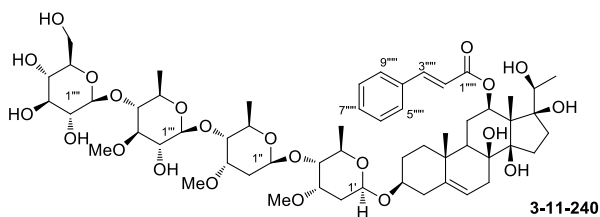
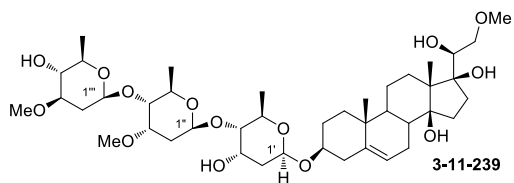
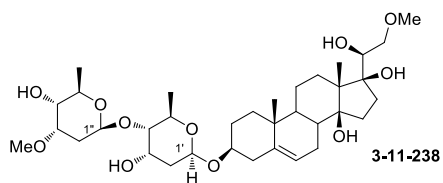


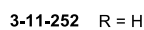
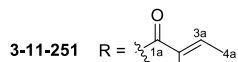
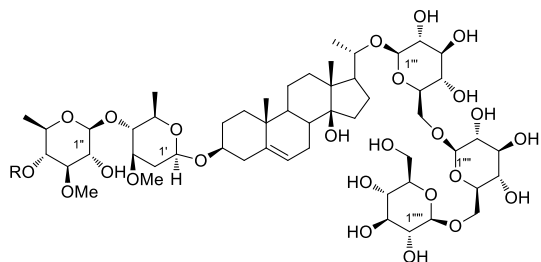
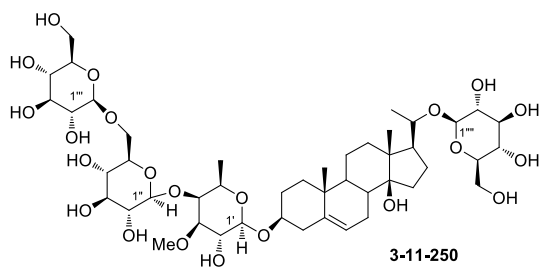
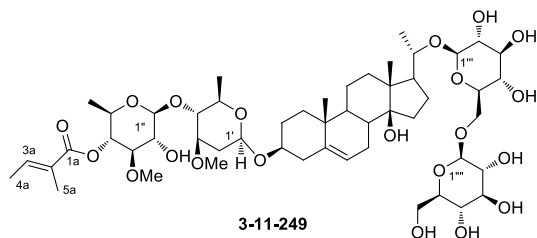
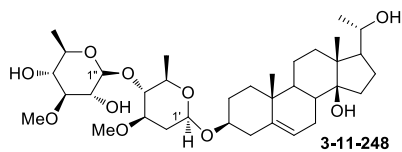
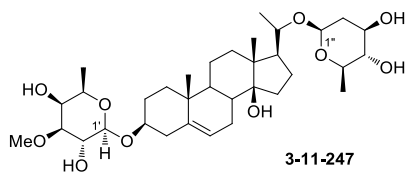
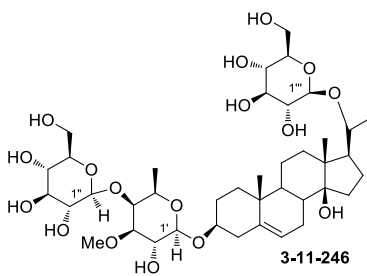
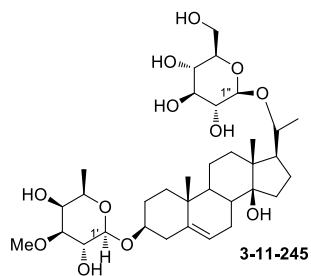


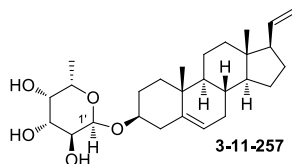
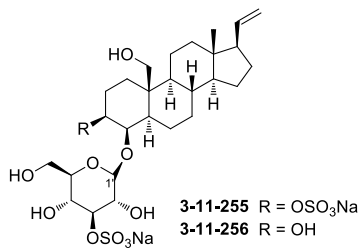
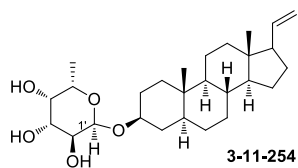
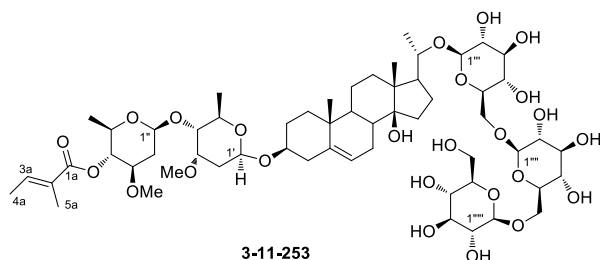
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3-11-224







**Table 3-11-52:** ¹H NMR spectroscopic data of steroidal saponins 3-11-211~3-11-215.

H	3-11-211	3-11-212	3-11-213	3-11-214	3-11-215
1	—	1.39 m, 1.5 m	α 1.01~1.05 m β 1.67~1.69 m	α 1.66~1.72 m β 0.98~1.07 m	—
2	—	1.88 m, 2.05 m	α 1.80~1.84 m β 1.80~1.84 m	α 2.00~2.18 m β 1.78~1.84 m	—
3	4.28 m	4.29 br s	α 3.61~3.69 m	α 3.60~3.67 m	—
4	—	1.52 m, 2.17 m	α 1.64~1.66 m β 1.15~1.17 m	α 1.60~1.66 m β 1.12~1.18 m	—
5	—	—	α 1.10~1.13 m	α 1.08~1.13 m	—
6	—	1.96 m 1.70 m	α 1.37~1.38 m β 1.80~1.84 m	α 1.78~1.84 m β 1.31~1.39 m	—
7	—	2.35 m 1.32 m	α 1.80~1.84 m β 2.06~2.07 m	α 1.78~1.84 m β 1.78~1.84 m	—

Table 3-11-52 (continued)

H	3-11-211	3-11-212	3-11-213	3-11-214	3-11-215
8	—	1.97 m	—	—	
9	—	1.63 m	α 1.26~1.31 m	α 1.20~1.26 m	α 1.16 m
11	4.08 t(7)	1.56 m, 1.30 m	α 1.76~1.79 m β 1.99~2.02 m	α 1.93~2.00 m β 1.68~1.75 m	—
12	4.12 d(7)	1.42 m, 1.30 m	α 4.84~4.86 m	α 4.70 dd(11.4, 4.4)	—
15	—	2.03 dd(8.8, 3.6) 1.80 br s	α 1.80~1.84 m β 1.47~1.51 m	α 1.78~1.84 m β 1.48~1.53 m	α 4.61 brt(8)
16	—	2.23 m 1.82 m	α 1.25~1.28 m β 1.60~1.64 m	α 1.58~1.67 m β 1.24~1.28 m	α 2.50 m β 1.80 m
17		2.20 m			α 1.98 (13, 6)
18	0.97 s	1.26 s	1.66 s	1.58 s	1.55 s
19	1.07 s	1.11 s	0.98 s	0.98 s	1.07 s
20	3.82 m	4.33 m	3.57 q(6.3)	3.55 q(6.3)	5.76 m
21	1.27 d(6.9)	4.06 dd(10.5, 7.1) 3.87 dd(10.5, 6.1)	1.03 d(6.3)	1.07 d(6.3)	1.36 d(6)
1'	5.46 d(3)	5.13 br d(8.8)	4.87 dd(8.3, 4.7)	4.86 dd(9.7, 2.0)	4.75 d(7.7)
2'	—	2.11 br d(8.8) 1.66 br s	α 2.10~2.15 m β 1.47~1.53 m	α 2.12~2.16 m β 1.48~1.55 m	3.42 dd(8.5, 9.3)
3'	—	4.03 br s	β 3.57~3.61 m	β 3.53~3.57 m	3.57 dd(2.3, 9.4)
4'	—	3.62 dd(9.6, 2.4)	β 3.16 dd (9.5, 3.3)	β 3.16 dd (9.5, 3.3)	4.35 br s
5'	—	4.24 m	α 3.71~3.76 m	α 3.70~3.74 m	3.75 m
6'	1.14 d(6.3)	1.60 d(6.4)	1.23 d(6.3)	1.23 d(6.3)	1.60 d(6.5)
3'-OMe		3.42 s	3.43 s	3.42 s	3.67 s
1''	4.98 d(3)	4.93 d(7.8)			5.16 d(7.7)
2''	—	4.00 m		6.61 d(16.0)	3.99 t(8)
3''	—	4.06 m	8.11~8.13 m	7.77 d(16.0)	4.24 t(9)
4''	—	4.19 m	7.46~7.49 m		4.18 t(9)
5''	—	4.26 m	7.59~7.61 m	7.61~7.63 m	3.94 m
6''	—	4.57 dd(11.6, 2.0) 4.39 dd(11.6, 5.2)	7.46~7.49 m	7.39~7.41 m	4.55 br d(12) 4.33 dd(6, 12)
7''			8.11~8.13 m	7.39~7.41 m	
8''				7.39~7.41 m	
9''				7.61~7.63 m	
3'''					8.20 m
4'''					7.45 m
5'''					7.52 m
6'''					7.45 m
7'''					8.20 m

Table 3-11-53: ¹H NMR spectroscopic data of steroidal saponins **3-11-216~3-11-220**.

H	3-11-216	3-11-217	3-11-218	3-11-219	3-11-220
3	—	—	3.92 m	3.90 m	3.88 m
9	α 1.07 m	α 1.23 m	—	—	—
12	—	—	3.88 m	3.89 m	5.16 dd(11.5, 4.5)
15	α 4.28 t(8)	α 5.90 m	—	—	—
16	α 2.32 m β 1.55 m	α 2.50 m β 1.80 m	—	—	—
17	α 1.86 m	α 1.90 (11, 6)			
18	1.18 s	1.58 s	1.93 s	1.95 s	2.05 s
19	0.97 s	1.07 s	1.20 s	1.21 s	1.14 s
20	5.30 m	5.48 m	4.44 q(5.7)	4.45 q(5.7)	5.21 q(6.0)
21	1.26 d(6)	1.23 d(6)	1.50 d(5.7)	1.50 d(5.7)	1.55 d(5.5)
12-OAc					2.11 s
1'	4.36 d(7.7)	4.72 d(7.5)	5.54 dd(9.8, 2.1)	5.34 dd(9.2, 2.1)	5.32 d(9.0)
2'	3.58 t(8)	3.39 dd(8.5, 9.5)	2.45, 2.06	2.33, 1.89	2.23 m, 1.73 m
3'	3.22 dd(1.3, 9)	3.51 dd(3, 9.4)	4.65 q(2.5)	4.07 q(3.0)	4.10 m
4'	4.17 br s	4.51 br s	3.51 dd(9.0, 2.5)	3.51 dd(9.1, 3.0)	3.53 d(8.5)
5'	3.63 m (ov)	3.84 m	4.35	4.30	4.28 m
6'	1.28 d(6.5)	1.73 d(6.5)	1.33 d(6.1)	1.48 d(6.1)	1.45 d(6.0)
3'-OMe	3.49 s	3.62 s		3.51 s	3.65 s
3''-OMe			3.52 s	3.61 s	3.58 s
3'''-OMe			3.60 s	3.91 s	3.97 s
3''''-OMe			3.91 s		
1''	4.60 d(7.6)	5.14 d(7.7)	5.18 dd(9.8, 2.0)	4.80 dd(9.9, 2.0)	5.14 d(9.5)
2''	3.2 t(8)	3.94 t(8.5)	2.34, 1.80	2.50, 1.76	2.23 m, 1.80 m
3''	3.64 m (ov)	4.16 dd(8.5, 9)	3.93 q(3.0)	3.58	4.06 m
4''	3.30 m (ov)	4.02 t(9)	3.40 dd(9.1, 3.0)	3.61 t(9.1)	3.92 d(9.0)
5''	3.44 m	4.10 t(8, 8.5)	4.17	3.56	4.20 m
6''	4.14 br d(11.7) 3.76 dd(6, 11.7)	4.82 br d(11) 4.29 dd(6, 11)	1.45 d(5.5)	1.67 d(6.1)	1.59 d(6.0)
1'''	4.40 d(7.7)	5.17 d(7.5)	4.79 dd(9.8, 2.0)	4.89 d(8.6)	5.17 d(7.5)
2'''	3.18 t(9)	4.03 t(8.5)	2.46, 1.75	3.91	3.97 m
3'''	3.36 t(9)	4.22 m	3.57	3.70 t(9.2)	3.74 t(8.5)
4'''	3.32 m (ov)	4.24 m	3.62 t(9.1)	3.89 t(9.2)	3.55 d(10.5)
5'''	3.26 m (ov)	3.95 m	3.54	3.75	3.80 m
6'''	3.86 dd(2, 11.7) 3.65 dd(5, 11.7)	4.52 br d(12) 4.37 dd(5, 12)	1.67 d(6.0)	1.78 d(6.0)	1.77 d(6.0)
1''''			4.89 d(8.8)	5.13 d(8.0)	4.73 d(7.5)
2''''			3.88	4.11	4.08 m
3''''	7.97 m	8.32 m	3.70 t(9.2)	4.24	4.26 m
4''''	7.46 m	7.38 m	3.87 t(9.2)	4.21	4.24 m
5''''	7.58 m	7.52 m	3.75	4.04	4.05 m

Table 3-11-53 (continued)

H	3-11-216	3-11-217	3-11-218	3-11-219	3-11-220
6''''	7.46 m	7.38 m	1.76 d(5.8)	4.29, 4.56	4.56 d(10.5) 4.38 dd(11.0, 5.0)
7''''	7.97 m	8.32 m			
1''''			5.12 d(7.8)		
2''''		2.18 m	4.03		
3''''		2.14 m	4.25		6.74 d(8.5)
4''''		0.90 d(6)	4.20		7.43 ddd (8.5, 8.0, 1.5)
5''''		0.90 d(6)	3.97		6.57 t(7.5)
6''''			4.55, 4.35		8.33 d(7.5)
8''''					2.81 d(5.0) NCH ₃

Table 3-11-54: ¹H NMR spectroscopic data of steroidal saponins 3-11-221~3-11-225.

H	3-11-221	3-11-222	3-11-223	3-11-224	3-11-225
1 α	0.95~1.01 m	0.95~1.02 m	0.95~1.01 m	0.97~1.03 m	0.95~1.02 m
1 β	1.66~1.70 m	1.66~1.70 m	1.67~1.72 m	1.63~1.68 m	1.67~1.71 m
2 α	1.81~1.85 m	1.80~1.85 m	1.80~1.85 m	1.79~1.85 m	1.79~1.85 m
2 β	1.51~1.55 m	1.51~1.54 m	1.50~1.56 m	1.42~1.47 m	1.42~1.48 m
3	α 3.57~3.66 m	3.57~3.66 m	3.59~3.64 m	3.58~3.66 m	3.58~3.66 m
4 α	1.82~1.86 m	1.83~1.87 m	1.83~1.89 m	1.85~1.90 m	1.85~1.91 m
4 β	1.27~1.33 m	1.28~1.36 m	1.30~1.36 m	1.29~1.35 m	1.28~1.35 m
5	1.01~1.06 m	1.01~1.06 m	1.01~1.06 m	1.04~1.08 m	1.03~1.08 m
6 α	1.18~1.22 m	1.17~1.23 m	1.17~1.23 m	1.26~1.32 m	1.28~1.35 m
6 β	1.54~1.59 m	1.56~1.60 m	1.57~1.62 m	1.53~1.58 m	1.53~1.58 m
7 α	1.26~1.30 m	1.24~1.32 m	1.26~1.31 m	1.27~1.33 m	1.28~1.35 m
7 β	1.59~1.66 m	1.60~1.66 m	1.62~1.68 m	1.62~1.67 m	1.63~1.69 m
9	1.14 br d(12.7)	1.14 br d(12.1)	1.11~1.17 m	1.18~1.26 m	1.18~1.26 m
11 α	1.59~1.66 m	1.60~1.66 m	1.62~1.68 m	1.68~1.74 m	1.68~1.74 m
11 β	1.75~1.79 m	1.75~1.79 m	1.75~1.79 m	1.90~1.96 m	1.90~1.96 m
12	4.61 dd (11.1, 4.3)	4.61 dd (11.1, 4.3)	4.61 dd (11.1, 4.3)	4.95 dd (11.1, 4.3)	4.93 dd (11.6, 4.3)
15	1.92~1.98 m	1.91~1.95 m 2.00~2.04 m	1.91~1.95 m 2.00~2.04 m	1.97~2.03 m	1.95~2.05 m
16	1.88~1.92 m 1.98~2.02 m	1.94~2.00 m	1.94~2.00 m	1.97~2.03 m	1.95~2.05 m
18	1.47 s	1.47 s	1.47 s	1.65 s	1.65 s
19	0.92 s	0.92 s	0.92 s	0.92 s	0.92 s
20	4.83 q(6.2)	4.83 q(6.2)	4.83 q(6.3)	4.90 q(6.3)	4.90 q(6.3)
21	1.33 d(6.2)	1.33 d(6.2)	1.33 d(6.3)	1.28 d(6.3)	1.26 d(6.3)

Table 3-11-54 (continued)

H	3-11-221	3-11-222	3-11-223	3-11-224	3-11-225
8-OH	2.43 s	2.44 s	2.43 s	2.47 s	2.46 s
14-OH	4.66 s	4.67 s	4.66 s	4.65 s	4.64 s
17-OH	3.17 s	3.21 s	3.17 s	3.18 s	3.14 s
12-OAc	1.88 s	1.88 s	1.88 s		
1'	4.86 dd(9.7, 1.9)	4.85 dd(9.5, 1.8)	4.86 dd(9.7, 1.9)	4.85 dd(9.5, 1.8)	4.85 dd(9.7, 1.9)
2' α	1.57~1.62 m	1.55~1.59 m	1.58~1.62 m	1.54~1.60 m	1.56~1.60 m
2' β	2.08 ddd (14.0, 3.9, 1.9)	2.04~2.10 m	2.05~2.09 m	2.04~2.08 m	2.04~2.08 m
3'	3.79~3.82 m	3.78~3.82 m	3.78~3.80 m	3.78~3.82 m	3.78~3.80 m
4'	3.23 dd(9.6, 2.8)	3.20 dd(9.6, 2.9)	3.20 dd(9.7, 2.9)	3.20 dd(10.1, 2.9)	3.20 dd(9.7, 2.9)
5'	3.87 dq(9.6, 6.3)	3.86 dq(9.6, 6.3)	3.86 dq(9.7, 6.3)	3.86 dq(10.1, 6.3)	3.86 dq(9.7, 6.3)
6'	1.24 d(6.3)	1.22 d(6.3)	1.23 d(6.3)	1.22 d(6.3)	1.21 d(6.3)
3'-OMe	3.45 s	3.44 s	3.44 s	3.43 s	3.43 s
3''-OMe	3.39 s	3.45 s	3.39 s	3.44 s	3.44 s
3'''-OMe		3.39 s	3.66 s	3.39 s	3.38 s
3''''-OMe					3.66 s
1''	4.50 dd(9.9, 2.2)	4.75 dd(9.7, 1.9)	4.48 dd(9.7, 1.9)	4.75 dd(9.7, 1.5)	4.75 dd(9.7, 1.9)
2'' α	1.49~1.53 m	1.65~1.69 m	1.50~1.56 m	1.60~1.64 m	1.60~1.64 m
2'' β	2.33 ddd (12.5, 4.5, 2.2)	2.11~2.17 m	2.37 ddd (12.6, 4.8, 1.9)	2.11~2.16 m	2.10~2.16 m
3''	3.15~3.19 m	3.78~3.82 m	3.39~3.41 m	3.78~3.82 m	3.78~3.80 m
4''	3.13 t(8.8)	3.23 dd(9.6, 2.9)	3.34 t(7.5)	3.23 dd(10.1, 2.9)	3.22 dd(9.7, 2.9)
5''	3.29 dq(8.8, 6.1)	3.84 dq(9.6, 6.3)	3.31~3.35 m	3.84 dq(10.1, 6.3)	3.83 dq(9.7, 6.3)
6''	1.32 d(6.1)	1.22 d(6.3)	1.35 d(5.8)	1.22 d(6.3)	1.21 d(6.3)
1'''		4.50 dd(9.7, 1.9)	4.79 d(8.2)	4.50 dd(9.7, 1.5)	4.48 dd(9.7, 1.9)
2'''	8.01 d(7.4)	α 1.48~1.52 m β 2.30~2.36 m	3.49 dd(8.2, 3.4)	α 1.48~1.52 m β 2.30~2.36 m	α 1.52 dd (12.6, 9.7) β 2.37 ddd (12.6, 4.8, 1.9)
3'''	7.47 t(7.4)	3.14~3.20 m	3.80 dd(3.4, 2.9)	3.17~3.19 m	3.39~3.41 m
4'''	7.60 t(7.4)	3.13 t(8.7)	3.19 dd(9.7, 2.9)	3.13 t(8.7)	3.34 t(7.5)
5'''	7.47 t(7.4)	3.29 dq(8.7, 6.3)	3.56 dq(9.7, 6.3)	3.29 dq(8.7, 6.3)	3.31~3.35 m
6'''	8.01 d(7.4)	1.33 d(6.3)	1.26 d(6.3)	1.32 d(6.3)	1.35 d(5.8)
1''''					4.79 d(8.7)

Table 3-11-54 (continued)

H	3-11-221	3-11-222	3-11-223	3-11-224	3-11-225
2 ^{''''}		8.02 d(7.7)	8.02 d(7.7)	7.53 d(7.7)	3.46~3.50 m
3 ^{''''}		7.47 t(7.7)	7.47 t(7.7)	7.32 t(7.7)	3.80 br t(2.9)
4 ^{''''}		7.60 t(7.7)	7.59 t(7.7)	7.52 t(7.7)	3.18 dd(9.7, 2.9)
5 ^{''''}		7.47 t(7.7)	7.47 t(7.7)	7.32 t(7.7)	3.55 dq(9.7, 6.3)
6 ^{''''}		8.02 d(7.7)	8.02 d(7.7)	7.53 d(7.7)	1.26 d(6.3)
2 ^{''''} , 6 ^{''''}				7.69 d(7.7)	7.69 d(7.7)
3 ^{''''} , 5 ^{''''}				7.10 t(7.7)	7.10 t(7.7)
4 ^{''''}				7.41 t(7.7)	7.41 t(7.7)
2 ^{''''} , 6 ^{''''}					7.53 d(7.7)
3 ^{''''} , 5 ^{''''}					7.32 t(7.7)
4 ^{''''}					7.52 t(7.7)

Table 3-11-55: ¹H NMR spectroscopic data of steroidal saponins 3-11-226~3-11-230.

H	3-11-226	3-11-227	3-11-228	3-11-229	3-11-230
3	3.59 m	3.52 m	3.53 m	3.52 m	3.52 m
4	α 2.50 dd (13.1, 3)	α 2.43 dd (13.5, 3)	2.31 dd (10.0, 2.5)	2.18 dd (10.0, 2.5)	2.18 dd (10.0, 2.5)
	β 2.35 br t (13.1)	β 2.27 br t (13.5)	2.47 br t(9.5)	2.38 br t(9.0)	2.38 br t(9.0)
6	5.48 br m	5.42 br m	5.45 m	5.47 br d(4.3)	5.47 br d(4.3)
7	α 2.28 m	α 2.21 m	1.90 m, 2.25 m	1.90 m, 2.26 m	1.90 m, 2.26 m
12	—	—		4.64 dd(12.0, 4.0)	4.64 dd(12.0, 4.0)
17	—	—	1.70 m	2.08 m	2.08 m
18	1.12 s	1.06 s	1.14 s	1.08 s	1.08 s
19	1.10 s	1.03 s	1.06 s	1.05 s	1.05 s
20	4.07 br q(6.4)	4.0 br q(6.4)	4.42 m	4.95 m	4.95 m
21	1.16 d(6.4)	1.10 d(6.5)	1.32 d(6.4)	1.14 d(6.5)	1.14 d(6.5)
20-OAc			1.93 s	2.00 s	2.00 s
1'	4.42 d(7.7)	4.34 d(7.9)	4.38 d(8.0)	4.87 dd(9.5, 2.0)	4.89 dd(9.5, 2.0)
2'	—	—	3.62 dd(9.5, 8.0)	2.09 br dd (16.0, 3.0)	1.56 br dd (16.0, 12.0)
				1.53 br dd (16.0, 12.0)	2.09 br dd (16.0, 3.0)
3'	3.37 d(8.6)	—	3.27 dd(9.5, 4.0)	3.87 q(3.0)	3.87 q(3.0)
4'	4.23 br d(2.8)	4.16 br m	4.20 dd(4.0, 2.5)	3.25 dd(9.5, 3.0)	3.35 dd(9.5, 3.0)
5'	—	—	3.67 m	3.85 dq(9.5, 6.4)	3.83 dq(9.5, 6.0)
6'	1.35 d(6.2)	1.30 d(6.5)	1.32 d(6.0)	1.20 d(6.4)	1.21 d(6.0)
3'-OMe	3.57 s	3.51 s	3.53 s	3.51 s	3.46 s
3''-OMe				3.53 s	3.45 s

Table 3-11-55 (continued)

H	3-11-226	3-11-227	3-11-228	3-11-229	3-11-230
3 ^{'''} -OMe					3.62 s
1 ^{''}	4.67 d(7.6)	4.59 d(7.9)	4.41 d(8.0)	4.81 dd(9.0, 2.0)	4.83 dd(9.5, 2.0)
2 ^{''}	—	—	3.17 dd(9.5, 8.0)	2.15 br dd (16.0, 3.0) 1.63 br dd (16.0, 12.0)	1.60 br dd (16.0, 12.0) 2.15 br dd (16.0, 3.0)
3 ^{''}	—	—	3.39 d(9.5)	—	3.86 q(3.0)
4 ^{''}	—	—	3.27 d(9.5)	3.30 dd(9.5, 3.0)	3.26 dd(9.5, 3.0)
5 ^{''}	—	—	3.28 m	3.82 dq(9.5, 6.0)	3.82 dq(9.5, 6.0)
6 ^{''}	3.94 dd(12, 2.3) 3.69 dd(12, 5.5)	4.15 dd(12.2, 1.7) 3.78 dd(12.2, 6.4)	3.70 dd(12.0, 5.0) 3.89 dd(12.0, 3.5)	1.25 d(6.0)	1.22 d(6.0)
1 ^{'''}		4.38 d(7.9)		4.47 d(7.5)	4.61 d(8.0)
2 ^{'''}		—		3.14 dd(10.0, 7.0)	3.38 dd(8.0, 2.5)
3 ^{'''}		—		3.54 t(10.0)	3.98 dd(3.5, 2.5)
4 ^{'''}		—		3.47 t(10.0)	3.35 (9.0, 3.5)
5 ^{'''}		—		3.45 m	3.39 m
6 ^{'''}		3.87 dd(12, 2.3) 3.65 dd(12, 5.6)		1.45 d(6.0)	1.28 d(6.0)
1 ^{''''}				4.64 d(7.5)	4.37 d(8.0)
2 ^{''''}				3.20 dd(9.5, 7.5)	3.21 dd(9.5, 8.0)
3 ^{''''}				3.37 d(9.5)	3.37 d(9.5)
4 ^{''''}				3.23 d(9.5)	3.26 d(9.5)
5 ^{''''}				3.26 m	3.32 m
6 ^{''''}				3.94 dd(12.0, 5.0) 3.64 dd(12.0, 3.5)	3.68 dd(12.0, 5.0) 3.94 dd(12.0, 3.0)
3 ^{'''''}				7.05 br q(6.5)	7.05 br q(6.5)
4 ^{'''''}				1.82 d(6.5)	1.82 d(6.5)
5 ^{'''''}				1.91 s	1.91 s

Table 3-11-56: ¹H NMR spectroscopic data of steroidal saponins 3-11-231~3-11-235.

H	3-11-231	3-11-232	3-11-233	3-11-234	3-11-235
3	3.53 m	3.53 m	3.53 m	3.53 m	3.53 m
4	2.19 dd(9.5, 2.5) 2.40 br t(9.5)	2.19 dd(9.5, 2.0) 2.40 br t(9.5)	2.19 dd(9.5, 2.0) 2.40 br t(9.5)	2.19 dd(9.5, 2.5) 2.40 br t(9.5)	2.19 dd(10.0, 2.5) 2.40 br t(10.0)
6	5.48 br d(4.5)	5.48 br d(4.0)	5.48 br d(4.0)	5.48 br d(4.5)	5.48 br d(4.5)

Table 3-11-56 (continued)

H	3-11-231	3-11-232	3-11-233	3-11-234	3-11-235
7	1.88 m, 2.26 m	1.88 m, 2.26 m	1.88 m, 2.26 m	1.88 m, 2.26 m	1.88 m, 2.26 m
12	4.63 dd(12.0, 4.0)	4.63 dd(12.0, 4.0)	4.63 dd(12.0, 4.0)	4.63 dd(12.0, 4.0)	4.63 dd(12.0, 4.2)
17	1.85 m	1.85 m	1.85 m	1.85 m	1.85 m
18	1.29 s	1.29 s	1.29 s	1.29 s	1.29 s
19	1.05 s	1.05 s	1.05 s	1.05 s	1.05 s
20	3.83 m	3.83 m	3.83 m	3.83 m	3.83 m
21	1.23 d(6.5)	1.23 d(6.5)	1.23 d(6.5)	1.23 d(6.5)	1.23 d(6.5)
12-OAc					2.05 s
1'	4.89 dd(9.5, 2.0)	4.89 dd(9.5, 2.0)	4.89 dd(9.5, 2.0)	4.89 dd(9.5, 2.0)	4.89 dd(9.5, 2.0)
2'	1.56 br dd (16.0, 12.0)	1.56 br dd (16.0, 12.0)	1.56 br dd (16.0, 12.0)	1.56 br dd (16.0, 12.0)	1.56 br dd (16.0, 12.0)
	2.09 br dd (16.0, 3.0)	2.09 br dd (16.0, 3.0)	2.09 br dd (16.0, 3.5)	2.09 br dd (16.0, 3.5)	2.09 br dd (16.0, 3.5)
3'	3.87 q(3.0)	3.87 q(3.0)	3.87 q(3.5)	3.87 q(3.5)	3.87 q(3.5)
4'	3.35 dd(9.5, 3.0)	3.35 dd(9.5, 3.0)	3.30 dd(9.5, 3.5)	3.30 dd(9.5, 3.5)	3.30 dd(9.5, 3.5)
5'	3.83 dq(9.5, 6.0)	3.83 dq(9.5, 6.0)	3.90 dq(9.5, 6.0)	3.90 dq(9.5, 6.0)	3.90 dq(9.5, 6.0)
6'	1.21 d(6.0)	1.21 d(6.0)	1.22 d(6.0)	1.22 d(6.0)	1.22 d(6.0)
OMe	3.46 s(3'-OMe)	3.46 s(3'-OMe)	3.46 s(3'-OMe)	3.46 s(3'-OMe)	3.46 s(3'-OMe)
	3.45 s(3''-OMe)	3.45 s(3''-OMe)	3.45 s(3''-OMe)	3.45 s(3''-OMe)	3.45 s(3''-OMe)
	3.62 s(3'''-OMe)	3.62 s(3'''-OMe)	3.65 s(3'''-OMe)	3.65 s(3'''-OMe)	3.65 s(3'''-OMe)
1''	4.83 dd(9.5, 2.0)	4.83 dd(9.5, 2.0)	4.83 dd(9.2, 2.0)	4.83 dd(9.2, 2.0)	4.83 dd(9.2, 2.0)
2''	1.60 br dd (16.0, 12.0)	1.60 br dd (16.0, 12.0)	1.63 br dd (16.0, 12.0)	1.63 br dd (16.0, 12.0)	1.63 br dd (16.0, 12.0)
	2.15 br dd (16.0, 3.0)	2.15 br dd (16.0, 3.0)	2.17 br dd (16.0, 3.5)	2.17 br dd (16.0, 3.5)	2.17 br dd (16.0, 3.5)
3''	3.86 q(3.0)	3.86 q(3.0)	3.88 q(3.0)	3.88 q(3.0)	3.88 q(3.0)
4''	3.26 dd(9.5, 3.0)	3.26 dd(9.5, 3.0)	3.31 dd(9.5, 3.0)	3.31 dd(9.5, 3.0)	3.31 dd(9.5, 3.0)
5''	3.82 dq(9.5, 6.0)	3.82 dq(9.5, 6.0)	3.84 dq(9.5, 6.0)	3.84 dq(9.5, 6.0)	3.84 dq(9.5, 6.0)
6''	1.22 d(6.0)	1.22 d(6.0)	1.32 d(6.0)	1.32 d(6.0)	1.32 d(6.0)
1'''	4.61 d(8.0)	4.61 d(8.0)	4.37 d(8.5)	4.37 d(8.5)	4.37 d(8.5)
2'''	3.38 dd(8.0, 2.5)	3.38 dd(8.0, 2.5)	3.32 t(8.7)	3.32 t(8.7)	3.32 t(8.7)
3'''	3.98 dd(3.5, 2.5)	3.98 dd(3.5, 2.5)	3.21 t(8.7)	3.21 t(8.7)	3.21 t(8.7)
4'''	3.35 (9.0, 3.5)	3.35 (9.0, 3.5)	3.40 t(8.7)	3.40 t(8.7)	3.40 t(8.7)
5'''	3.39 m	3.39 m	3.49 m	3.49 m	3.49 m
6'''	1.28 d(6.0)	1.28 d(6.0)	1.40 d(6.0)	1.40 d(6.0)	1.40 d(6.0)

Table 3-11-56 (continued)

H	3-11-231	3-11-232	3-11-233	3-11-234	3-11-235
1 ^{''''}	4.37 d(8.0)	4.37 d(8.0)	4.45 d(8.0)	4.45 d(8.0)	4.45 d(8.0)
2 ^{''''}	3.21 dd(9.5, 8.0)	3.21 dd(9.5, 8.0)	3.20 dd(9.5, 8.0)	3.20 dd(9.5, 8.0)	3.20 dd(9.5, 8.0)
3 ^{''''}	3.37 d(9.5)	3.37 d(9.5)	3.38 d(9.5)	3.38 d(9.5)	3.38 d(9.5)
4 ^{''''}	3.26 d(9.5)	3.26 d(9.5)	3.24 d(9.5)	3.24 d(9.5)	3.24 d(9.5)
5 ^{''''}	3.32 m	3.32 m	3.29 m	3.29 m	3.29 m
6 ^{''''}	3.68 dd(12.0, 5.0)	3.68 dd(12.0, 5.0)	3.63 dd(12.0, 5.0)	3.63 dd(12.0, 5.0)	3.63 dd(12.0, 5.0)
	3.94 dd(12.0, 3.0)	3.94 dd(12.0, 3.0)	3.90 dd(12.0, 3.5)	3.90 dd(12.0, 3.5)	3.90 dd(12.0, 3.5)
3 ^{'''''}	7.77 d(8.0)	6.98 br q(6.5)	6.98 br q(6.5)	7.77 d(8.0)	
4 ^{'''''}	6.60 t(8.0)	1.84 d(6.5)	1.84 d(6.5)	6.60 t(8.0)	
5 ^{'''''}	7.20 t(8.0)	1.89 s	1.89 s	7.20 t(8.0)	
6 ^{'''''}	7.91 d(8.0)			7.91 d(8.0)	

Table 3-11-57: ¹H NMR spectroscopic data of steroidal saponins 3-11-236~3-11-240.

H	3-11-236	3-11-237	3-11-238	3-11-239	3-11-240
1	—	—	α 1.04~1.09 m β 1.83~1.87 m	α 1.01~1.06 m β 1.80~1.84 m	—
2	—	—	α 1.89~1.93 m β 1.54~1.57 m	α 1.84~1.88 m β 1.51~1.55 m	—
3	α 3.89 m	α 3.89 m	3.50~3.58 m	3.47~3.59 m	3.86 m
4	—	—	α 2.34~2.38 m β 2.17~2.23 m	α 2.30~2.35 m β 2.12~2.16 m	—
6	5.53 d(5.7)	5.53 d(5.7)	5.39 br s	5.36 br s	5.38 m
7	—	—	2.20~2.24 m	2.16~2.20 m	—
8	—	—	1.72~1.76 m	1.72~1.77 m	—
9	—	—	1.05~1.10 m	1.01~1.05 m	—
11	β 4.15 m (ov)	β 4.15 m (ov)	1.48~1.53 m	1.43~1.48 m	—
12	α 3.55 d(9.7)	α 3.55 d(9.4)	α 1.00~1.04 m β 1.61~1.64 m	α 0.96~1.02 m β 1.58~1.63 m	5.28 dd(12, 4)
15	—	—	α 1.96~2.02 m β 1.78~1.81 m	α 1.93~2.01 m β 1.74~1.79 m	—
16	—	—	α 1.77~1.82 m β 1.78~1.82 m	α 1.76~1.82 m β 1.76~1.80 m	—
17	α 2.65 m	α 2.65 m			
18	1.72 s	1.72 s	1.19 s	1.16 s	2.14 s
19	1.33 s	1.33 s	0.99 s	0.95 s	1.37 s
20	—	—	3.79~3.83 m	3.79~3.83 m	4.12 q(6)
21	1.49 d(6.6)	1.49 d(6.2)	3.54~3.58 m 3.48~3.53 m	3.50~3.59 m 3.45~3.50 m	1.34 d(6)

Table 3-11-57 (continued)

H	3-11-236	3-11-237	3-11-238	3-11-239	3-11-240
OMe	3.61 s(3'-OMe) 3.60 s(3''-OMe) 3.84 s(3'''-OMe)	3.6 s(3''-OMe) 3.84 s(3'''-OMe)	3.38 s(21-OMe) 3.43 s(3''-OMe)	3.34 s(21-OMe) 3.40 s(3''-OMe) 3.34 s(3'''-OMe)	3.57 s(3'-OMe) 3.61 s(3''-OMe) 3.93 s(3'''-OMe)
1'	5.28 dd(9.6, 1.6)	5.28 dd(9.6, 1.7)	4.90 dd(9.6, 1.6)	4.86 br d(9.6)	5.28 br d(10)
2'	2.29 1.89 m	2.29 dd-like 1.88 m	2.07~2.13 m 1.68~1.72 m	2.00~2.07 m 1.63~1.68 m	—
3'	4.03 m	4.63	4.22 br s	4.18 br s	—
4'	3.47 dd(9.9, 2.5)	3.48 dd(9.4, 2.5)	3.20 br d(9.4)	3.13 br d(9.5)	—
5'	4.21 m	4.20 m	3.78 dq(9.4, 6.2)	3.70 dq(9.5, 6.0)	—
6'	1.34 d(6.1)	1.33 d(6.1)	1.21 d(6.2)	1.18 d(6.0)	1.38 d(6)
1''	5.09 dd(9.4, 1.7)	5.31 dd(9.7, 1.6)	4.70 dd(9.6, 1.6)	4.75 br d(9.6)	5.11 br d(10)
2''	2.29 1.81	2.40 dd-like 1.96 m	2.18~2.26 m 1.58~1.62 m	2.02~2.09 m 1.53~1.56 m	—
3''	4.03 m	4.05 m	3.62 br s	3.75 br s	—
4''	3.45 dd(2.5, 9.9)	3.48 dd(2.5, 9.4)	3.18 br d(9.4)	3.17 br d(9.5)	—
5''	4.15 m	4.28 m	3.59 dq(9.4, 6.4)	3.85 dq(9.5, 6.0)	—
6''	1.45 d(6.0)	1.49 d(6.2)	1.24 d(6.4)	1.18 d(6.0)	1.56 d(6)
1'''	5.08 d(7.8)	5.14 d(7.8)		4.44 br d(9.6)	4.69 d(8)
2'''	3.80 dd-like	3.76 m		2.25~2.31 m 1.38~1.42 m	—
3'''	4.45 t(2.8)	4.43 t(2.8)		3.12 dd(9.6, 9.0)	—
4'''	3.72 dd(9.9, 2.5)	3.68 dd(9.8, 2.5)		3.05 dd(9.0, 9.0)	—
5'''	4.26 dd(6.0, 9.9)	4.27 m		3.24 dq(9.0, 6.0)	—
6'''	1.63 d(6.1)	1.58 d(6.2)		1.25 d(6.0)	1.73 d(6)
1''''	4.98 d(7.8)	4.97 d(7.8)			5.12 d(8)
2''''	4.03 m	4.03 m			—
3''''	4.26 t(9.0)	4.26 m			—
4''''	4.20 m	4.20 dd(6.6, 9.4)			—
5''''	4.0 m	3.99 m			—
6''''	4.38 dd(5.2, 11.4) 4.54 dd(2.1, 11.4)	4.36 m 4.54 d			—
2'''''					6.94 d(16)
3'''''					8.17 d(16)

Table 3-11-58: ¹H NMR spectroscopic data of steroidal saponins 3-11-241~3-11-245.

H	3-11-241	3-11-242	3-11-243	3-11-244	3-11-245
3	3.41 m	3.43 m	3.43 m	3.43 m	3.55 m
4	—	—	—	—	α 2.42 dd(13, 4.3) β 2.28 bt(12)
6	5.36 m	5.36 m	5.35 m	5.35 m	5.41 br m
7	—	—	—	—	α 2.24 m

Table 3-11-58 (continued)

H	3-11-241	3-11-242	3-11-243	3-11-244	3-11-245
12	4.70 dd(10.0, 4.0)	4.76 dd(10.0, 4.0)	4.78 dd(10.0, 4.0)	4.78 dd(10.0, 4.0)	
18	1.62 s	1.70 s	1.66 s	1.66 s	1.11 s
19	1.20 s	1.10 s	1.08 s	1.08 s	1.02 s
20	3.88 q(6.5)	4.98 q(6.5)	5.02 q(6.5)	5.02 q(6.5)	4.01 br q(6.4)
21	1.12 d(6.0)	1.34 d(6.5)	1.31 d(6.5)	1.31 d(6.5)	1.30 d(6.4)
1'	4.90 dd(9.5, 2.0)	4.90 dd(9.5, 2.0)	4.90 dd(9.5, 2.0)	4.70 dd(9.3, 2.0)	4.32 d(7.9)
2'	2.12 m, 1.57 m	2.12 m, 1.57 m	2.12 m, 1.57 m	1.43 ddd (13.0, 9.3, 9.0) 2.30 ddd (13.0, 3.5, 2.0)	
3'	3.85 q(3.0)	3.85 q(3.0)	3.85 q(3.0)	3.40 ddd (9.3, 9.0, 3.5)	3.17 d(7.9)
4'	3.30 dd(9.5, 3.0)	3.30 dd(9.5, 3.0)	3.30 dd(9.5, 3.0)	3.19 dd(9.3, 9.3)	3.82 br d(3.2)
5'	3.88 dq(9.5, 6.0)	3.88 dq(9.5, 6.0)	3.88 dq(9.5, 6.0)	3.37 dq(6.0, 9.3)	
6'	1.28 d(6.0)	1.28 d(6.0)	1.28 d(6.0)	1.29 d(6.0)	1.29 d(6.2)
3'-OMe	3.48 s	3.48 s	3.48 s	3.43 s	3.46 s
3''-OMe	3.46 s	3.46 s	3.46 s	3.46 s	
3'''-OMe	3.50 s	3.50 s	3.50 s	3.52 s	
3''''-OMe	3.44 s	3.44 s	3.44 s	3.44 s	
1''	4.82 dd(9.0, 2.0)	4.82 dd(9.0, 2.0)	4.82 dd(9.0, 2.0)	4.89 dd(9.5, 1.5)	4.39 d(7.9)
2''	2.18 m, 1.60 m	2.18 m, 1.60 m	2.18 m, 1.60 m	2.18 m, 1.53 m	3.13 dd(9.6, 4)
3''	3.85 q(3.0)	3.85 q(3.0)	3.85 q(3.0)	3.88 q(3.0)	—
4''	3.32 t(3.0, 9.0)	3.32 t(3.0, 9.0)	3.32 t(3.0, 9.0)	3.34 dd(3.0, 9.5)	—
5''	3.83 dq(9.5, 6.2)	3.83 dq(9.5, 6.2)	3.83 dq(9.5, 6.2)	3.83 dq(9.5, 6.0)	—
6''	1.26 d(6.2)	1.26 d(6.2)	1.26 d(6.2)	1.28 d(6.0)	3.84 dd(2, 12) 3.68 dd(12, 5.4)
1'''	4.56 dd(9.0, 2.0)	4.56 dd(9.0, 2.0)	4.56 dd(9.0, 2.0)	4.85 dd(9.5, 1.5)	
2'''	1.46 ddd (13.0, 9.0, 9.0) 2.37 ddd (9.5, 9.0, 4.0)	1.46 ddd (13.0, 9.0, 9.0) 2.37 ddd (9.5, 9.0, 4.0)	1.46 ddd (13.0, 9.0, 9.0) 2.37 ddd (9.5, 9.0, 4.0)	2.13 m 1.65 m	
3'''	3.31 ddd (9.5, 9.0, 4.0)	3.31 ddd (9.5, 9.0, 4.0)	3.31 ddd (9.5, 9.0, 4.0)	3.88 q(3.0)	
4'''	3.16 dd(9.5, 9.5)	3.16 dd(9.5, 9.5)	3.16 dd(9.5, 9.5)	3.25 dd(3.0, 9.5)	
5'''	3.43 dq(6.4, 9.5)	3.43 dq(6.4, 9.5)	3.43 dq(6.4, 9.5)	3.84 dq(9.5, 6.0)	
6'''	1.42 d(6.4)	1.42 d(6.4)	1.42 d(6.4)	1.23 d(6.0)	
1''''	4.54 d(8.0)	4.54 d(8.0)	4.54 d(8.0)	4.54 d(8.0)	
2''''	3.88 dd(9.2, 8.0)	3.88 dd(9.2, 8.0)	3.88 dd(9.2, 8.0)	3.88 dd(9.2, 8.0)	
3''''	3.39 dd(9.3, 3.5)	3.39 dd(9.3, 3.5)	3.39 dd(9.3, 3.5)	3.39 dd(9.3, 3.5)	
4''''	3.85 dd(3.5, 2.0)	3.85 dd(3.5, 2.0)	3.85 dd(3.5, 2.0)	3.85 dd(3.5, 2.0)	
5''''	3.61 m	3.61 m	3.61 m	3.61 m	
6''''	1.36 d(6.5)	1.36 d(6.5)	1.36 d(6.5)	1.36 d(6.5)	

Table 3-11-58 (continued)

H	3-11-241	3-11-242	3-11-243	3-11-244	3-11-245
2a	6.67 d(16.0)	6.64 d(16.0)			
3a	7.81 d(16.0)	7.81 d(16.0)	8.01 dd(7.5, 1.5)	8.01 dd(7.5, 1.5)	
4a			7.42 t(7.6)	7.42 t(7.6)	
5a	7.42 dd(8.0, 1.5)	7.44 dd(8.0, 1.5)	7.59 t(8.0)	7.59 t(8.0)	
6a	7.63 t(8.0)	7.60 t(8.0)	7.42 t(7.6)	7.42 t(7.6)	
7a	7.36 t(8.0)		8.01 dd(7.5, 1.5)	8.01 dd(7.5, 1.5)	
8a	7.63 t(8.0)	7.60 t(8.0)			
9a	7.42 dd(8.0, 1.5)	7.44 dd(8.0, 1.5)			
2b, 6b		8.07 dd(7.5, 1.5)	8.01 dd(7.5, 1.5)	8.01 dd(7.5, 1.5)	
3b, 5b		7.54 t(7.5)	7.42 t(7.6)	7.42 t(7.6)	
4b		7.65 t(7.5)	7.59 t(8.0)	7.59 t(8.0)	

Table 3-11-59: ¹H NMR spectroscopic data of steroidal saponins 3-11-246~3-11-250.

H	3-11-246	3-11-247	3-11-248	3-11-249	3-11-250
1	—	1.91 m, 1.10 m	1.28, 1.42	1.15, 1.77	—
2	—	1.93 m, 1.62 m	1.54, 2.18	1.70, 2.10	—
3	3.52 m	3.55 m	3.77 m	3.81 m	3.55 m
4	α 2.45 dd (13.6, 4.2) β 2.28 br t(13.6)	2.43 br t(9.0) 2.28 dd(10.0, 2.5)	2.20, 2.32	2.41, 2.58	2.31 dd(9.5, 2.5) 2.47 br t(9.5)
6	5.42 br m	5.40 br d(4.5)	5.37 br s	5.55 br s	5.45 br d(4.0)
7	α 2.22 m	2.08 m	2.17, 2.26	2.03, 2.67	1.90 m, 2.25 m
8	—	2.18 m	2.32	1.90 m	—
9	—	0.90 m	1.21	1.22 m	—
11	—	1.32 m	1.42, 1.85	1.37, 1.74	—
12	—	2.03 m, 1.72 m	1.17, 1.74	1.20, 1.34	—
15	—	1.61 m, 1.32 m	1.74, 1.85	1.40	—
16	—	1.76 m, 1.57 m	1.23, 1.95	1.82, 1.99	—
17	1.7 dd(11.1, 4.7)	1.81 m	1.60	1.58 m	1.70 m
18	1.12 s	0.80 s	1.03 s	1.34 s	1.15 s
19	1.02 s	1.06 s	0.97 s	0.98 s	1.08 s
20	4.01 br q(6.4)	3.80 br q(6.5)	4.03 q(7)	4.06 m	4.03 m
21	1.28 d(6.4)	1.29 d(6.5)	1.10 d(6)	1.51 d(6)	1.31 d(6.4)
1'	4.35 d(7.7)	4.34 d(8.0)	4.56 br d(10)	4.83	4.39 d(8.0)
2'		3.51 dd(9.0, 8.0)	1.74, 1.85	1.72, 1.83	3.63 dd(9.5, 8.0)
3'		3.15 dd(9.0, 3.5)	3.34	3.62 (ov)	3.26 dd(9.5, 4.0)
4'	4.16 br d(2.1)	3.85 dd(1.5, 3.5)	3.34	3.65 (ov)	4.20 dd(4.0, 2.5)
5'		3.63 dq(1.5, 6.0)	3.39 (ov)	4.03	3.61 m
6'	1.28 d(6.4)	1.30 d(6.0)	1.34 d(5)	1.72 d(6)	1.30 d(6.0)
3'-OMe	3.51 s	3.49 s	3.36 s	3.53 s	3.54 s
3''-OMe			3.64 s	3.68 s	

Table 3-11-59 (continued)

H	3-11-246	3-11-247	3-11-248	3-11-249	3-11-250
1''	4.60 d(7.7)	4.67 dd(9.0, 1.5)	4.47 d(8)	4.94 d(8)	4.43 d(7.8)
2''	—	1.53 m, 2.19 m	3.43	4.03	3.23 dd(9.5, 7.8)
3''	—	3.51 m	3.09	3.69 m	3.39 d(9.5)
4''	—	2.91 t(9.5)	3.15	5.21 t(9)	3.37 d(9.5)
5''	—	3.27 dq(9.5, 6.0)	3.38 (ov)	3.73 m	3.49 m
6''	3.85 dd(12, 3.5)	1.29 d(6.0)	1.29 d(6)	1.34	3.82 dd(12.0, 5.0) 4.15 dd(12.0, 3.0)
1'''	4.38 d(7.9)			4.81	4.64 d(8.0)
2'''	3.16 t(8.5)			3.92, 4.03	3.24 dd(9.5, 8.0)
3'''	—			4.07 (ov)	3.37 d(9.5)
4'''	—			4.20	3.29 d(9.5)
5'''	—			4.06 (ov)	3.30 m
6'''	3.85 dd(12, 3.5)			4.25	3.69 dd(12.0, 5.0) 4.77
					3.90 dd(12.0, 3.5)
1''''				5.07 d(8)	4.40 d(7.8)
2''''				3.92, 4.03	3.16 dd(9.5, 7.8)
3''''				4.03	3.38 d(9.5)
4''''				4.20	3.28 d(9.5)
5''''				3.92	3.30 m
6''''				4.33 m	3.68 dd(12.0, 5.0) 4.49 br d(12)
					3.88 dd(12.0, 3.0)
3a				7.05 dd(6, 8)	
4a				1.68 d(7)	
5a				1.90 s	

Table 3-11-60: ¹H NMR spectroscopic data of steroidal saponins 3-11-251~3-11-253.

H	3-11-251	3-11-252	3-11-253	H	3-11-251	3-11-252	3-11-253
1	1.11, 1.79	1.13, 1.75	1.12, 1.76	3''	3.68 m	3.64 m	3.53
2	1.75, 2.14	1.75, 2.13	1.74, 2.09	4''	5.23 t(9)	3.62	5.11
3	3.83 m	3.83 m	3.79	5''	3.73 m	3.75	3.63
4	2.42, 2.59	2.43, 2.61	2.35, 2.57	6''	1.35	1.60 d(6)	1.44 d(6)
6	5.56 brs	5.58 brs	5.50 brs	1'''	4.84	4.82	4.81
7	2.01, 2.65	2.04, 2.67	2.00, 2.64	2'''	3.83, 3.92	3.83, 3.92	3.81, 3.98
8	1.90 m	1.87 m	1.90 m	3'''	4.04	4.04	4.06
9	1.23 m	1.24 m	1.22	4'''	4.01	4.01	4.00
11	1.37, 1.79	1.37, 1.77	1.79, 2.16	5'''	4.04	4.04	4.00
12	1.20, 1.31	1.24, 1.32	1.22, 1.34	6'''	4.26, 4.79	4.32, 4.80	4.28, 4.78
15	1.38	1.41	1.38	1''''	5.07 d(8)	5.07 d(8)	5.06 d(8)
16	1.85, 1.95	1.84, 1.99	1.79, 1.86	2''''	3.83, 3.92	3.83, 3.92	3.81, 3.98
17	1.59 m	1.62 m	1.58 m	3''''	4.04	4.04	4.06
18	1.35 s	1.37 s	1.34 s	4''''	4.16	4.18	4.17

Table 3-11-60 (continued)

H	3-11-251	3-11-252	3-11-253	H	3-11-251	3-11-252	3-11-253
19	0.98 s	1.00 s	0.96 s	5''''	4.10	4.04	4.06
20	4.04 m	4.04	4.06	6''''	4.26, 4.79	4.32, 4.80	4.24, 4.78
21	1.51 d(6)	1.52 d(5)	1.49 d(6.8)	1''''	4.98 d(8)	4.98	4.97 d(8)
1'	4.82	4.84	5.28 br d(8)	2''''	3.97, 4.04	3.83, 3.92	3.90, 4.02
2'	1.79, 1.85	1.80, 1.84	1.76, 2.32	3''''	4.04	4.04	4.06
3'	3.62	3.64	4.05	4''''	4.23	4.24	4.22
4'	3.66	3.70	3.53	5''''	4.04	4.06	4.06
5'	4.04	4.18	4.22	6''''	4.33 m	4.35	4.37 m
6'	1.74 d(6)	1.75 d(6)	1.34		4.50 br d(11)	4.50 br d(11)	4.48 br d(11)
3'-OMe	3.53 s	3.57 s	3.59 s	3a	7.04 dd(6, 7)		6.99 br d(8)
3''-OMe	3.68 s	3.92 s	3.34 s	4a	1.68 d(7)		1.64 d(7)
1''	4.96 d(8.0)	4.98	4.78	5a	1.90 s		1.86 s
2''	4.00	4.04	1.76, 1.90				

Table 3-11-61: ¹H NMR spectroscopic data of steroidal saponins 3-11-254~3-11-257.

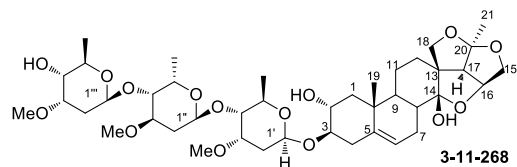
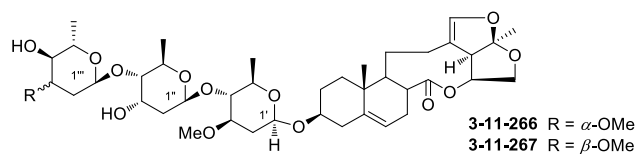
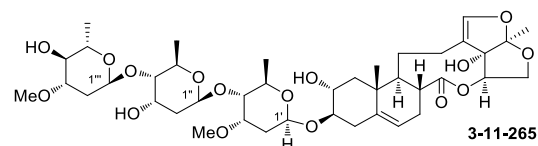
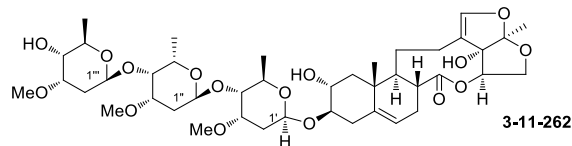
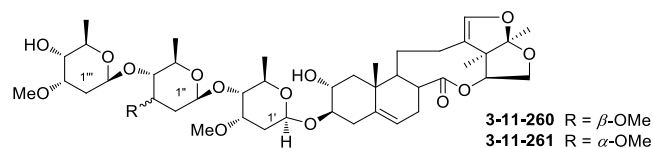
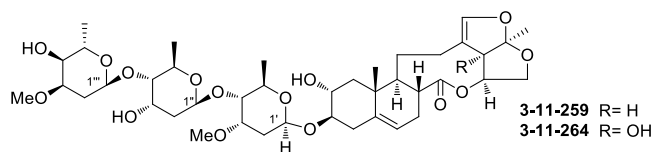
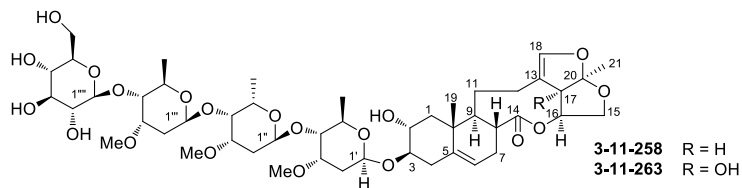
H	3-11-254	3-11-255	3-11-256	3-11-257
1	1.62 m, 1.10 m	1.80 m, 0.96 m	1.83 m, 0.89 m	1.80 m, 1.04 m
2	1.74 m, 1.24 m	1.90 m, 1.75 m	1.71 m, 1.64 m	1.76 m, 1.48 m
3	3.35 m	4.26 m	3.53 m	3.29 m
4	1.54 m	4.27 m	3.89 m	2.31 dd (12.5, 2.0) 2.13 dd (12.5, 12.0)
5	1.17 m	1.36 m	1.34 m	
6	1.25 m	2.36 dddd (4.0, 12.4, 12.9, 14.2)	2.30 dddd (4.0, 12.4, 12.9, 14.2)	5.33 m
		1.36 m	1.37 m	
7	1.64 m, 1.37 m	1.83 m, 0.99 m	1.84 m, 0.98 m	1.93 m, 1.39 m
8	1.66 m	1.87 m	1.89 m	1.50 m
9	0.98 m	0.72 m	0.71 m	0.91 m
11	1.37 m, 1.54 m	1.52 m, 1.56 m	1.60 m, 1.54 m	1.36 m, 1.54 m
12	1.63 m	1.68 m, 1.02 m	1.70 m, 1.03 m	1.60 m, 1.05 m
14	0.97 m	0.92 m	0.93 m	0.98 m
15	1.12 m, 1.70 m	1.70 m, 1.21 m	1.70 m, 1.22 m	1.16 m, 1.61 m
16	1.54 m, 1.24 m	1.76 m, 1.56 m	1.76 m, 1.57 m	1.70 m, 1.53 m
17	1.95 m	1.94 m	1.94 m	1.94 m
18	0.55 s	0.66 s	0.66 s	0.58 s
19	0.77 s	4.08 d(12.5) 3.84 d(12.5)	4.03 d(12.5) 3.90 d(12.5)	0.97 s
20	5.76 m	5.75 ddd(8.0, 9.3, 18.0)	5.75 ddd(8.0, 9.3, 18.0)	5.77 ddd (7.7, 11.7, 17.4)

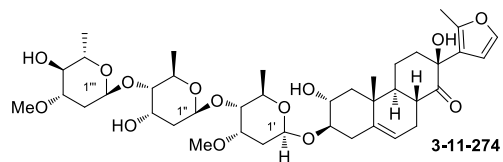
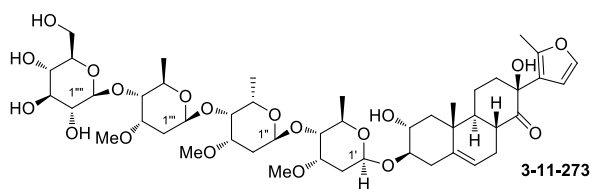
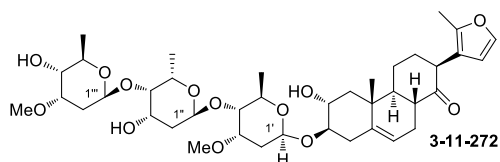
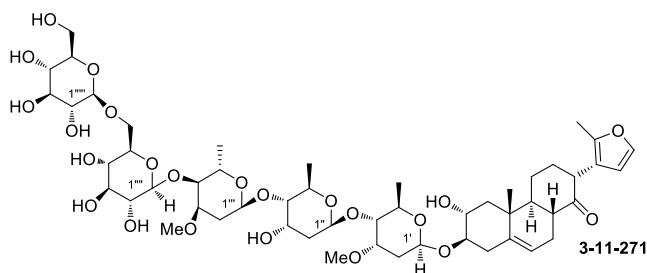
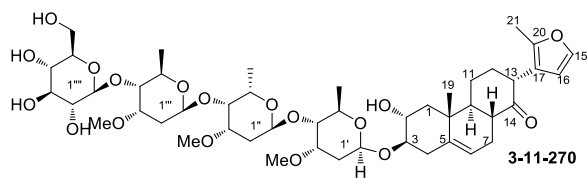
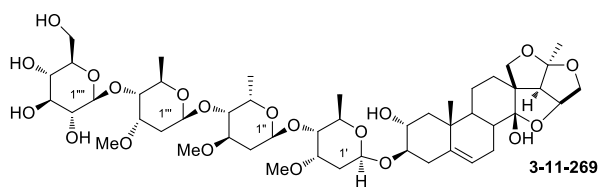
Table 3-11-61 (continued)

H	3-11-254	3-11-255	3-11-256	3-11-257
21	4.98 m	4.93 m	4.94 m	4.99 br d(11.7)
	4.96 m	4.92 m	4.93 m	4.97 br d(17.4)
1'	4.73 br	4.46 d(7.8)	4.45 d(7.8)	4.74 d(2.9)
2'	3.51 m	3.51 dd(7.8, 9.0)	3.49 dd(7.8, 8.8)	3.51 dd(2.9, 10.0)
3'	3.49 m	4.24 t(9.0)	4.25 dd(8.8, 9.2)	3.48 dd(3.5, 10.0)
4'	3.46 m	3.44 dd(9.0, 9.7)	3.53 m	3.46 br d(3.5)
5'	3.84 m	3.31 m	3.37 ddd(2.2, 5.4, 8.0)	3.85 br q(6.5)
6'	1.07 d(6.5)	3.86 dd(2.4, 12.1)	3.86 dd(2.2, 12.0)	1.06 d(6.5)
		3.70 dd(6.7, 12.1)	3.67 dd(5.4, 12.0)	

Table 3-11-62: Compounds, MFs, and test solvents of steroidal saponins 3-11-258~3-11-285.

No.	Compounds	MFs	Test solvents	References
3-11-258	cyanoside I	C ₄₈ H ₇₄ O ₂₀	C ₅ D ₅ N	[362]
3-11-259	cyanoside J	C ₄₁ H ₆₂ O ₁₅	C ₅ D ₅ N	[362]
3-11-260	tylophoside B	C ₄₂ H ₆₄ O ₁₅	C ₅ D ₅ N	[363]
3-11-261	tylophoside C	C ₄₂ H ₆₄ O ₁₅	C ₅ D ₅ N	[363]
3-11-262	cyanoside E	C ₄₂ H ₆₄ O ₁₆	C ₅ D ₅ N	[362]
3-11-263	cyanoside F	C ₄₈ H ₇₄ O ₂₁	C ₅ D ₅ N	[362]
3-11-264	cyanoside G	C ₄₁ H ₆₂ O ₁₆	C ₅ D ₅ N	[362]
3-11-265	cyanoside H	C ₄₁ H ₆₂ O ₁₆	C ₅ D ₅ N	[362]
3-11-266	tylophoside A	C ₄₁ H ₆₂ O ₁₄	C ₅ D ₅ N	[363]
3-11-267	cynatratoside B	C ₄₁ H ₆₂ O ₁₄	C ₅ D ₅ N	[363]
3-11-268	tylophoside D	C ₄₂ H ₆₆ O ₁₅	C ₅ D ₅ N	[363]
3-11-269	tylophoside E	C ₄₈ H ₇₆ O ₂₀	C ₅ D ₅ N	[363]
3-11-270	cyanoside K	C ₄₇ H ₇₂ O ₁₈	C ₅ D ₅ N	[364]
3-11-271	cyanoside L	C ₅₂ H ₈₀ O ₂₃	C ₅ D ₅ N	[364]
3-11-272	cyanoside M	C ₄₁ H ₆₂ O ₁₃	C ₅ D ₅ N	[364]
3-11-273	cyanoside Q ₁	C ₄₇ H ₇₂ O ₁₉	C ₅ D ₅ N	[365]
3-11-274	cyanoside Q ₂	C ₄₀ H ₆₀ O ₁₄	C ₅ D ₅ N	[365]
3-11-275	cyanoside Q ₃	C ₄₆ H ₇₀ O ₁₉	C ₅ D ₅ N	[365]
3-11-276	cyanoside N	C ₄₇ H ₇₂ O ₂₀	C ₅ D ₅ N	[364]
3-11-277	cyanoside O	C ₄₈ H ₇₄ O ₁₉	C ₅ D ₅ N	[364]
3-11-278	cyanoside R ₁	C ₄₂ H ₆₂ O ₁₃	C ₅ D ₅ N	[365]
3-11-279	cyanoside R ₂	C ₄₂ H ₆₂ O ₁₄	C ₅ D ₅ N	[365]
3-11-280	cyanoside R ₃	C ₄₈ H ₇₂ O ₁₉	C ₅ D ₅ N	[365]
3-11-281	cyanoside P ₃	C ₄₂ H ₆₄ O ₁₄	C ₅ D ₅ N	[365]
3-11-282	cyanoside P ₄	C ₄₈ H ₇₄ O ₁₉	C ₅ D ₅ N	[365]
3-11-283	cyanoside P ₁	C ₄₂ H ₆₄ O ₁₄	C ₅ D ₅ N	[365]
3-11-284	cyanoside P ₂	C ₄₈ H ₇₄ O ₁₉	C ₅ D ₅ N	[365]
3-11-285	cyanoside P ₅	C ₄₉ H ₇₆ O ₂₀	C ₅ D ₅ N	[365]





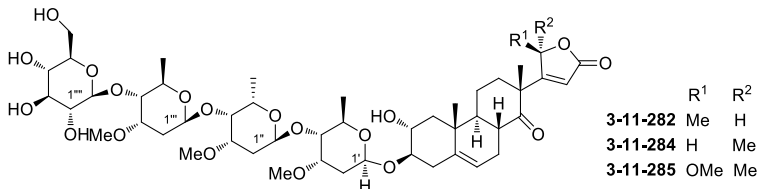
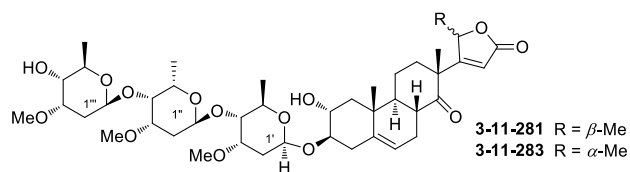
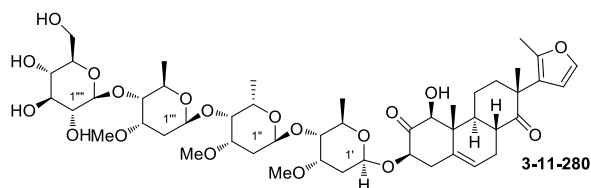
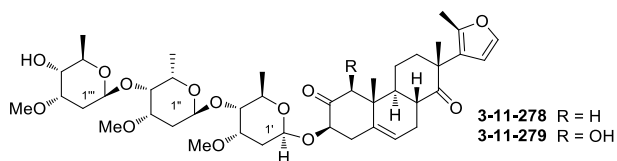
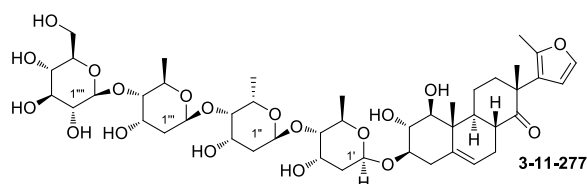
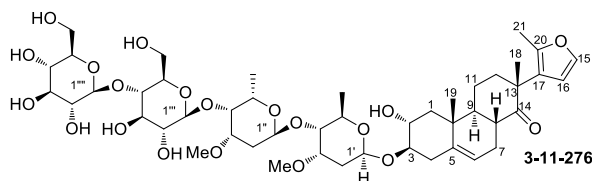
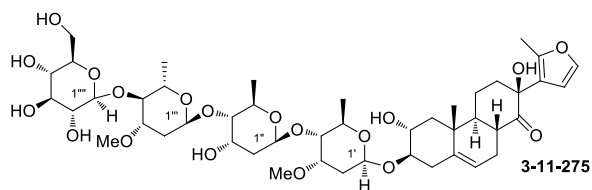


Table 3-11-63: ¹H NMR spectroscopic data of steroidal saponins **3-11-258**, **3-11-259**, **3-11-262**, **3-11-264**, and **3-11-265**.

H	3-11-258	3-11-259	3-11-262	3-11-264	3-11-265
1	α 1.26 t(12.4) β 2.49 (ov)	α 1.25 t(12.4) β 2.49 (ov)	α 1.23 t(12.4) β 2.47 (ov)	α 1.22 t(12.4) β 2.48 dd(12.8, 4.6)	α 1.22 t(12.4) β 2.48 (ov)
2	4.04 (ov)	4.03 ddd (11.7, 8.8, 4.5)	4.02 (ov)	4.00 (ov)	4.00 (ov)
3	3.62 ddd (11.7, 9.0, 5.6)	3.60 (ov)	3.58 (ov)	3.56 ddd (11.2, 8.9, 5.7)	3.57 (ov)
4	2.49 (ov)	2.49 (ov)	2.49 (ov)	2.46 (ov)	2.47 (ov)
6	5.41 br d(5.5)	5.43 br d(4.0)	5.42 br d(5.3)	5.42 br d(5.1)	5.42 br d(5.3)
7	2.67 m, 2.17 m	2.67 m, 2.16 m	2.68 m, 2.16 m	2.69 m, 2.16 m	2.69 m, 2.16 m
8	2.53 (ov)	2.51 (ov)	2.54 td(11.0, 4.7)	2.53 td(11.1, 4.8)	2.54 (ov)
9	1.33 (ov)	1.32 (ov)	1.38 t(11.0)	1.38 (ov)	1.38 t(10.7)
11	2.12 m, 1.39 m	2.11 m, 1.41 m	2.23 m, 1.56 m	2.22 m, 1.55 m	2.22 m, 1.57 m
12	2.56 m, 1.36 m	2.55 m, 1.36 m	2.47 m, 1.85 m	2.48 m, 1.85 m	2.47 m, 1.83 m
15	4.25 dd(8.7, 7.0) 3.95 t(9.2)	4.25 dd(8.7, 7.0) 3.96 dd(9.6, 8.6)	4.32 dd(9.4, 7.3) 4.01 t(9.1)	4.32 dd(9.2, 7.4) 4.01 t(9.1)	4.32 dd(9.3, 7.4) 4.01 t(9.2)
16	5.45 dt(9.4, 7.6)	5.45 m	6.00 dd(8.7, 7.3)	6.00 dd(8.9, 7.4)	6.00 dd(8.5, 7.4)
17	3.56 (ov)	3.55 d(8.0)			
18	6.49 s	6.49 s	6.67 s	6.67 s	6.67 s
19	0.92 s	0.91 s	0.94 s	0.93 s	0.92 s
21	1.55 s	1.55 s	1.76 s	1.76 s	1.77 s
1'	5.20 dd(9.8, 2.0)	5.21 dd(9.7, 2.0)	5.18 dd(9.6, 1.8)	5.18 dd(9.8, 2.0)	5.20 dd(9.8, 2.0)
2'	ax 1.82 ddd (13.7, 9.8, 2.2) eq 2.47 (ov)	ax 1.88 (ov) eq 2.35 (ov)	ax 1.82 (ov) eq 2.44 (ov)	ax 1.87 (ov) eq 2.33 ddd (13.3, 3.2, 2.0)	ax 1.91 ddd (13.5, 9.8, 2.5) eq 2.36 ddd (13.5, 3.5, 2.0)
3'	3.91 q-like(2.8)	4.09 q-like(2.8)	3.92 q-like(2.8)	4.07 q-like(2.8)	4.11 q-like(2.8)
4'	3.45 dd(9.6, 2.8)	3.48 dd(9.6, 2.8)	3.45 (ov)	3.47 dd(9.8, 2.8)	3.49 dd(9.6, 2.8)
5'	4.27 (ov)	4.23 dq(9.6, 6.2)	4.26 dq(9.7, 6.2)	4.21 dq(9.8, 6.2)	4.23 dq(9.6, 6.3)
6'	1.32 d(6.2)	1.30 d(6.2)	1.32 d(6.2)	1.29 d(6.2)	1.30 d(6.3)
OMe	3.55 s(3'-OMe) 3.41 s(3''-OMe) 3.52 s(3'''-OMe)	3.62 s(3'-OMe) 3.43 s(3''-OMe) 3.41 s(3'''-OMe)	3.55 s(3'-OMe) 3.44 s(3''-OMe) 3.47 s(3'''-OMe)	3.62 s(3'-OMe) 3.40 s(C-3''')	3.65 s(3'-OMe) 3.53 s(3'''-OMe)
1''	5.14 br s	5.24 dd(9.7, 1.9)	5.16 d(4.3)	5.22 dd(9.6, 1.7)	5.36 dd(9.6, 1.6)
2''	ax 2.34 td (12.4, 3.7) eq 1.99 dd (12.4, 4.4)	ax 1.92 ddd (13.9, 9.7, 2.8) eq 2.39 (ov)	ax 2.34 td (12.4, 3.8) eq 1.99 dd (12.4, 4.4)	ax 1.91 ddd (13.8, 9.6, 2.7) eq 2.39 ddd (13.8, 3.4, 1.7)	ax 1.97 dddd (13.3, 9.6, 2.5) eq 2.41 (ov)
3''	3.80 ddd (12.4, 4.4, 3.0)	4.48 (ov)	3.82 ddd (12.4, 4.4, 2.9)	4.46 (ov)	4.60 q-like(2.8)
4''	4.05 br s	3.45 dd(9.6, 3.0)	4.08 br d(1.9)	3.44 dd(9.6, 3.0)	3.53 (ov)
5''	4.21 (ov)	4.15 dq(9.6, 6.3)	4.23 (ov)	4.13 dq(9.6, 6.2)	4.40 dq(9.8, 6.4)
6''	1.42 d(6.4)	1.40 d(6.3)	1.46 d(6.4)	1.39 d(6.2)	1.45 d(6.4)

Table 3-11-63 (continued)

H	3-11-258	3-11-259	3-11-262	3-11-264	3-11-265
1 ^{'''}	5.14 dd(9.6, 2.0)	5.11 dd(4.1, 2.5)	5.12 dd(9.8, 1.9)	5.09 dd(4.1, 2.3)	5.26 d(3.7)
2 ^{'''}	ax 1.87 ddd (13.6, 9.6, 2.2) eq 2.38 ddd (13.6, 3.6, 2.0)	ax 1.86 (ov) eq 2.41 (ov)	ax 1.85 ddd (13.4, 9.8, 2.5) eq 2.46 (ov)	ax 1.86 (ov) eq 2.40 (ov)	ax 1.75 m eq 2.49 (ov)
3 ^{'''}	4.10 q-like(2.8)	3.74 q-like(3.5)	3.73 q-like(3.0)	3.72 q-like(3.7)	3.84 ddd (11.5, 9.0, 4.8)
4 ^{'''}	3.71 dd(9.6, 2.8)	3.62 (ov)	3.56 (ov)	3.62 (ov)	3.54 t(9.0)
5 ^{'''}	4.28 dq(9.6, 6.4)	4.51 m	4.11 dq(9.6, 6.2)	4.48 m	4.41 dq(9.6, 6.2)
6 ^{'''}	1.65 d(6.4)	1.44 d(6.4)	1.53 d(6.2)	1.44 d(6.4)	1.52 d(6.2)
1 ^{''''}	4.93 d(7.5)				
2 ^{''''}	4.01 dd(8.7, 7.5)				
3 ^{''''}	4.22 t(8.7)				
4 ^{''''}	4.20 t(8.7)				
5 ^{''''}	3.97 ddd (8.7, 5.2, 2.5)				
6 ^{''''}	4.40 dd(11.7, 5.2) 4.56 dd(11.7, 2.5)				

Table 3-11-64: ¹H NMR spectroscopic data of steroidal saponins 3-11-260, 3-11-261, and 3-11-266~3-11-268.

H	3-11-260	3-11-261	3-11-266	3-11-267	3-11-268
1	1.22 t(12) 2.45 dd(12, 4)	1.24 t(12) 2.47 dd(12, 4)	0.96 td(13, 3) 1.84 dt(13, 3)	0.96 td(13, 3) 1.84 dt(13, 3)	1.25 t(12) 2.35 dd(12, 4)
2	3.99 ddd (12, 10, 4)	4.02 ddd(12, 10, 4)	1.70 m, 2.10 m	1.70 m, 2.11 m	4.02 ddd (12, 10, 4)
3	3.56 m	3.59 m	3.77 m	3.77 m	3.55 m
6	5.41 br d(4)	5.42 br d(4)	5.42 br d(4)	5.41 br d(3)	5.49 br d(3)
15	3.95 dd(10, 9) 4.23 dd(9, 7)	3.95 t(9) 4.24 dd(9, 7)	3.96 dd(10, 9) 4.25 dd(9, 7)	3.96 dd(10, 9) 4.25 dd(9, 7)	3.80 dd(10, 4) 4.33 dd(10, 2)
16	5.44 ddd (10, 9, 7)	5.45 td(9, 7)	5.46 ddd(10, 8, 7)	5.46 ddd(10, 8, 7)	4.77 ddd (8, 4, 2)
17	3.54 d(9)	3.56 d(9)	3.56 d(8)	3.57 d(8)	2.91 d(8)
18	6.47 s	6.47 s	6.48 s	6.48 s	3.76 d(9) 4.71 d(9)
19	0.91 s	0.92 s	0.87 s	0.87 s	0.98 s
21	1.55 s	1.55 s	1.56 s	1.56 s	1.52 s
1'	5.18 dd(9, 2)	5.19 dd(10, 2)	4.82 dd(10, 2)	4.81 dd(10, 2)	5.16 dd(9, 2)
3'	3.91 br q(3)	3.92 br q(3)	3.59 m	3.57 m	3.89 br q(3)
4'	3.45 dd(10, 3)	3.47 dd(9, 3)	3.54~3.58 (ov)	3.53~3.57 (ov)	3.44 dd(10, 3)
5'	4.22 dq(10, 6)	4.24 (ov)	3.54~3.58 (ov)	3.53~3.57 (ov)	4.22 dq(10, 6)

Table 3-11-64 (continued)

H	3-11-260	3-11-261	3-11-266	3-11-267	3-11-268
6'	1.31 d(6)	1.33 d(6)	1.45 d(6)	1.46 d(6)	1.29 d(6)
OMe	3.38 s(3'-OMe) 3.47 s(3''-OMe) 3.64 s(3'''-OMe)	3.45 s(3'-OMe) 3.47 s(3''-OMe) 3.55 s(3'''-OMe)	3.35 s(3'-OMe) 3.57 s(3'''-OMe)	3.39 s(3'-OMe) 3.55 s(3'''-OMe)	3.37 s(3'-OMe) 3.47 s(C-3'') 3.63 s(3'''-OMe)
1''	5.06 br d(4)	5.16 br d(3)	5.55 dd(10, 2)	5.43 dd(10, 2)	5.01 br d(3)
3''	4.03 br q(3)	3.82 br d(9)	4.60 br q(3)	4.46 br q(3)	4.02 br q(3)
4''	3.74 br s	4.09 br s	3.54 dd(9, 3)	3.45 dd(9, 3)	3.73 br s
5''	4.64 br q(6)	4.25 (ov)	4.39 dq(9, 6)	4.13 dq(9, 6)	4.63 br q(6)
6''	1.39 d(6)	1.46 d(6)	1.45 d(6)	1.39 d(6)	1.39 d(6)
1'''	5.14 dd(10, 2)	5.13 dd(10, 2)	5.25 br d(3)	5.08 dd(4, 2)	5.13 dd(10, 2)
3'''	3.76 br q(3)	3.74 br q(3)	3.82 m	3.72 br q(3)	3.76 br q(3)
4'''	3.55 dd(9, 3)	3.56 dd(9, 3)	3.52 t(9)	3.60 dd(9, 3)	3.55 dd(10, 3)
5'''	4.11 dq(9, 6)	4.11 dq(9, 6)	4.41 dq(9, 6)	4.47 dq(9, 6)	4.10 dq(10, 6)
6'''	1.51 d(6)	1.53 d(6)	1.52 d(6)	1.45 d(6)	1.51 d(6)

Table 3-11-65: ¹H NMR spectroscopic data of steroidal saponins 3-11-263, and 3-11-269~3-11-272.

H	3-11-263	3-11-269	3-11-270	3-11-271	3-11-272
1	α 1.24 t(12.4) β 2.47 (ov)	1.24 t(12) 2.35 dd(12, 4)	α 1.32 t(12.4) β 2.42 dd (13.1, 4.6)	α 1.31 t(12.2) β 2.42 (ov)	α 1.31 t(12.4) β 2.40 dd (13.2, 4.6)
2	4.03 (ov)	4.02 ddd (12, 10, 4)	4.06 ddd (11.7, 8.9, 4.6)	4.06 (ov)	4.03 ddd (11.7, 8.7, 4.6)
3	3.59 ddd (11.6, 8.9, 5.8)	3.56 m	3.63 (ov)	3.62 (ov)	3.62 (ov)
4	2.50 (ov)	—	2.50 (ov)	2.50 (ov)	2.49 (ov)
6	5.41 br d(5.3)	5.48 br d(3)	5.42 br d(4.3)	5.43 br d(4.3)	5.42 br d(5.0)
7	2.70 m, 2.16 m	—	2.50 (ov) 2.22 (ov)	2.50 (ov) 2.21 (ov)	2.49 (ov) 2.19 (ov)
8	2.54 td(10.9, 4.9)	—	2.52 (ov)	2.52 (ov)	2.64 ddd (11.9, 10.5, 5.7)
9	1.38 (ov)	—	1.62 td(12.1, 3.0)	1.61 m	1.58 m
11	2.23 m, 1.57 m	—	1.89 m, 1.65 m	1.90 m, 1.62 m	1.83 m, 1.65 m
12	2.47 m, 1.84 m	—	2.11 m, 1.76 m	2.10 m, 1.77 m	2.16 m, 1.85 m
14			3.64 dd(12.3, 5.3)	3.63 (ov)	3.65 t(4.4)
15	4.32 dd(9.4, 7.4) 4.01 t(9.0)	3.81 dd(10, 4) 4.33 dd(10, 2)	7.50 d(1.8)	7.50 d(1.8)	7.51 d(1.8)
16	6.01 dd(8.8, 7.4)	4.78 ddd (8, 4, 2)	6.50 d(1.8)	6.50 d(1.8)	6.53 d(1.8)

Table 3-11-65 (continued)

H	3-11-263	3-11-269	3-11-270	3-11-271	3-11-272
17		2.92 d(8)			
18	6.67 s	3.77 d(8), 4.71 d(8)			
19	0.94 s	0.98 s	1.09 s	1.08 s	1.02 s
21	1.77 s	1.53 s	2.21 s	2.21 s	2.21 s
1'	5.18 dd(9.8, 1.8)	5.16 dd(9, 2)	5.19 dd(9.6, 1.8)	5.21 dd(9.6, 1.9)	5.20 dd(9.6, 1.8)
2'	ax 1.81 ddd (13.7, 9.8, 2.4) eq 2.47 (ov)	—	ax 1.82 ddd (13.8, 9.6, 2.3) eq 2.48 ddd (13.8, 3.5, 1.8)	ax 1.89 (ov) eq 2.39 (ov)	ax 1.82 (ov) eq 2.48 (ov)
3'	3.91 q-like(2.8)	3.88 br q(3)	3.92 q-like(2.8)	4.08 (ov)	3.93 q-like(2.9)
4'	3.44 dd(9.6, 2.8)	3.43 dd(10, 3)	3.45 dd(9.6, 2.8)	3.48 dd(9.6, 2.5)	3.46 (ov)
5'	4.26 dq(9.6, 6.2)	4.19 dq(10, 6)	4.25 dq(9.6, 6.2)	4.23 (ov)	4.25 (ov)
6'	1.31 d(6.2)	1.29 d(6)	1.31 d(6.2)	1.30 d(6.2)	1.32 d(6.1)
OMe	3.54 s(3'-OMe) 3.41 s(3''-OMe) 3.52 s(3'''-OMe)	3.34 s(3'-OMe) 3.54 s(3''-OMe) 3.62 s(3'''-OMe)	3.55 s(3'-OMe) 3.41 s(3''-OMe) 3.52 s(3'''-OMe)	3.63 s(3'-OMe) 3.45 s(3'''-OMe)	3.56 s(3'-OMe) 3.45 s(3''-OMe) 3.47 s(3'''-OMe)
1''	5.13 br d(2.0)	4.98 br d(3)	5.14 d(3.6)	5.24 dd(9.6, 1.8)	5.17 d(3.4)
2''	ax 2.33 td(12.4, 3.7) eq 1.99 dd(12.4, 4.4)	—	ax 2.33 td(12.3, 3.6) eq 1.99 dd(12.3, 4.5)	ax 1.94 (ov) eq 2.43 (ov)	ax 2.36 td(12.5, 3.7) eq 2.01 dd(12.5, 4.4)
3''	3.80 ddd (12.4, 4.4, 2.9)	3.97 br q(3)	3.80 ddd (12.3, 4.5, 2.9)	4.45 q-like(2.9)	3.83 ddd (12.2, 4.4, 2.8)
4''	4.04 br d(2.1)	3.67 br s	4.04 br d(2.5)	3.39 dd(9.6, 2.9)	4.09 br s
5''	4.23 (ov)	4.60 br q(6)	4.22 (ov)	4.13 dq(9.6, 6.2)	4.25 (ov)
6''	1.41 d(6.4)	1.34 d(6)	1.41 d(6.4)	1.36 d(6.2)	1.47 d(6.6)
1'''	5.14 dd(9.6, 1.8)	5.14 dd(10, 2)	5.13 dd(9.6, 1.6)	5.00 (ov)	5.13 dd(9.6, 1.9)
2'''	ax 1.87 ddd (13.4, 9.6, 2.5) eq 2.38 ddd (13.4, 3.4, 1.8)	—	ax 1.87 ddd (13.5, 9.6, 2.4) eq 2.38 ddd (13.8, 3.7, 2.1)	ax 1.99 (ov) eq 2.33 (ov)	ax 1.88 (ov) eq 2.49 (ov)
3'''	4.10 q-like(2.8)	4.13 br q(3)	4.10 q-like(2.8)	3.98 (ov)	3.74 q-like(3.0)
4'''	3.71 dd(9.6, 2.8)	3.68 dd(10, 3)	3.71 dd(9.6, 2.8)	4.18 (ov)	3.57 (ov)
5'''	4.28 dq(9.6, 6.2)	4.27 dq(10, 6)	4.28 dq(9.6, 6.2)	4.66 m	4.12 dq(9.7, 6.2)
6'''	1.65 d(6.2)	1.62 d(6)	1.64 d(6.2)	1.47 d(6.4)	1.55 d(6.2)
1''''	4.94 d(7.8)	4.94 d(8)	4.93 d(7.8)	4.99 (ov)	
2''''	4.02 dd(8.8, 7.8)	3.99 dd(8, 9)	4.01 dd(8.9, 7.8)	3.97 dd(8.7, 7.8)	
3''''	4.24 t(8.9)	4.22 t(9)	4.23 t(8.7)	4.20 t(8.7)	
4''''	4.20 t(8.9)	4.17 t(9)	4.19 t(9.0)	4.04 t(8.7)	
5''''	3.97 ddd (8.9, 5.3, 2.5)	3.97 m	3.96 ddd (9.2, 5.5, 2.6)	4.16 (ov)	

Table 3-11-65 (continued)

H	3-11-263	3-11-269	3-11-270	3-11-271	3-11-272
6 ^{'''}	4.40 dd(11.7, 5.3) 4.56 dd(11.7, 2.5)	4.38 dd(12, 5) 4.55 dd(12, 2)	4.39 dd(11.7, 5.5) 4.55 dd(11.7, 2.6)	4.34 dd(11.8, 6.5) 4.85 dd(11.8, 1.5) 5.22 d(8.1) 4.06 dd(8.7, 8.1) 4.27 t(8.7) 4.22 t(8.7) 3.97 (ov) 4.38 dd(11.8, 5.7) 4.54 dd(11.8, 2.4)	
1 ^{'''}					
2 ^{'''}					
3 ^{'''}					
4 ^{'''}					
5 ^{'''}					
6 ^{'''}					

Table 3-11-66: ¹H NMR spectroscopic data of steroidal saponins 3-11-273~3-11-277.

H	3-11-273	3-11-274	3-11-275	3-11-276	3-11-277
1	1.29 t(12.8) 2.35 dd(12.8, 4.3)	1.28 t(12.6) 2.33 dd(12.6, 4.8)	1.28 t(12.6) 2.33 dd(12.6, 4.6)	α 1.33 t(12.2) β 2.42 dd(12.5, 4.7)	3.61 d(9.2)
2	3.99 (ov)	3.96 ddd (12.6, 9.0, 4.8)	3.99 (ov)	4.07 (ov)	3.99 t(9.2)
3	3.59 ddd (11.4, 8.9, 5.7)	3.57 ddd (11.8, 9.0, 5.5)	3.58 ddd (11.5, 8.9, 5.6)	3.64 m	3.79 (ov)
4	2.50 dd(13.9, 5.7) 2.46 (ov)	2.51 dd(13.1, 5.5) 2.45 (ov)	2.48 dd(14.0, 5.6) 2.45 (ov)	2.54 m	2.56 m
6	5.43 dd(3.2, 1.7)	5.43 br d(4.8)	5.43 br d(4.9)	5.44 t like(2.8)	5.76 br d(3.9)
7	2.65 m, 2.22 m	2.65 m, 2.21 m	2.65 m, 2.21 m	2.33 (ov)	2.30 (ov)
8	2.70 m	2.69 m	2.69 m	2.74 dt (13.0, 8.7)	2.73 ddd (12.2, 10.8, 5.3)
9	1.60 td(11.4, 5.5)	1.59 td(11.3, 5.3)	1.58 td(11.3, 5.4)	1.62 td(12.0, 4.5)	1.95 (ov)
11	1.78 m, 1.74 m	1.78 m, 1.73 m	1.78 m, 1.74 m	1.77 m, 1.70 m	3.05 m, 2.05 m
12	1.97 td(13.5, 4.5) 2.89 dt(13.5, 3.2)	1.97 (ov) 2.88 dt(13.3, 3.1)	1.97 (ov) 2.89 dt(13.5, 3.2)	1.98 (ov) 1.92 dt(13.5, 3.9)	2.06 m 1.97 m
15	7.53 d(2.0)	7.52 d(2.0)	7.53 d(1.9)	7.45 d(1.9)	7.43 d(1.8)
16	6.69 d(2.0)	6.68 d(2.0)	6.69 d(1.9)	6.42 d(1.9)	6.41 d(1.8)
18				1.49 s	1.53 s
19	0.88 s	0.87 s	0.87 s	1.12 s	1.37 s

Table 3-11-66 (continued)

H	3-11-273	3-11-274	3-11-275	3-11-276	3-11-277
21	2.20 s	2.19 s	2.20 s	2.23 s	2.21 s
1'	5.18 dd(9.6, 1.8)	5.20 dd(9.6, 1.9)	5.20 dd(9.6, 1.8)	5.20 dd(9.6, 1.8)	5.25 dd(9.6, 1.8)
2'	1.82 ddd (13.5, 9.6, 2.3) 2.46 ddd (13.5, 3.4, 1.8)	1.90 ddd (13.3, 9.6, 2.3) 2.38 ddd (13.3, 3.7, 1.9)	1.90 ddd (13.5, 9.6, 2.3) 2.37 (ov)	ax 1.82 (ov) eq 2.48 ddd (13.7, 3.2, 1.8)	ax 1.81 ddd (13.8, 9.6, 2.3) eq 2.46 ddd (13.8, 3.7, 2.0)
3'	3.91 q like(2.8)	4.11 q like(2.8)	4.10 q like(2.8)	3.92 (ov)	3.91 q-like(2.8)
4'	3.44 dd(9.6, 2.8)	3.49 dd(9.6, 2.8)	3.49 dd(9.6, 2.8)	3.47 dd(9.4, 2.8)	3.44 dd(9.6, 2.8)
5'	4.24 dq(9.6, 6.2)	4.22 dq(9.6, 6.2)	4.22 (ov)	4.27 (ov)	4.24 (ov)
6'	1.30 d(6.2)	1.29 d(6.2)	1.29 d(6.2)	1.33 d(6.1)	1.31 d(6.2)
OMe	3.54 s(3'-OMe) 3.41 s(3''-OMe) 3.52 s(3'''-OMe)	3.65 s(3'-OMe) 3.35 s(3'''-OMe)	3.64 s(3'-OMe) 3.35 s(3'''-OMe)	3.55 s(3'-OMe) 3.43 s(3''-OMe)	3.54 s(3'-OMe) 3.41 s(3''-OMe) 3.52 s(3'''-OMe)
1''	5.13 br d(3.4)	5.35 dd(9.5, 1.7)	5.36 dd(9.6, 1.5)	5.18 br s	5.13 br s
2''	2.33 td(12.3, 3.4) 1.99 dd(12.3, 4.4)	1.93 (ov) 2.40 (ov)	1.93 (ov) 2.40 (ov)	ax 2.33 (ov) eq 2.02 dd (12.4, 4.4)	ax 2.37 td (12.4, 3.7) eq 1.99 dd (12.4, 4.4)
3''	3.79 ddd (12.3, 4.4, 3.0)	4.60 ddd (3.5, 3.2, 2.6)	4.53 (ov)	3.84 ddd (12.1, 4.4, 2.7)	3.80 ddd (12.2, 4.4, 3.0)
4''	4.04 br d(3.0)	3.53 dd(9.4, 2.6)	3.49 dd(9.6, 2.7)	4.23 br s	4.04 br d(2.1)
5''	4.22 (ov)	4.40 dq(9.4, 6.2)	4.36 (ov)	4.28 (ov)	4.23 (ov)
6''	1.41 d(6.6)	1.45 d(6.2)	1.42 d(6.2)	1.71 d(6.6)	1.41 d(6.6)
1'''	5.13 dd(9.6, 1.6)	5.26 d(3.2)	5.21 br s	4.94 d(7.8)	5.15 dd(9.7, 1.9)
2'''	1.86 ddd (13.3, 9.6, 2.5) 2.37 ddd (13.3, 3.4, 1.6)	1.74 m 2.47 (ov)	1.69 m 2.44 (ov)	ax 4.02 dd (8.5, 7.8)	ax 1.86 ddd (13.3, 9.7, 2.6) eq 2.38 (ov)
3'''	4.09 q-like(2.8)	3.83 ddd (11.4, 9.2, 5.0)	4.00 (ov)	4.28 (ov)	4.10 q-like(2.8)
4'''	3.70 dd(9.6, 2.8)	3.54 t(9.2)	3.82 t(9.1)	4.31 t(8.5)	3.71 dd(9.6, 2.8)
5'''	4.28 dq(9.6, 6.2)	4.41 dq(9.2, 6.2)	4.37 dq(9.1, 6.2)	3.92 (ov)	4.28 dq(9.6, 6.2)
6'''	1.64 d(6.2)	1.52 d(6.2)	1.55 d(6.2)	4.53 (ov)	1.65 d(6.2)
1''''	4.93 d(7.8)		5.27 d(7.8)	5.20 d(7.8)	4.94 d(7.6)
2''''	4.00 dd(8.3, 7.8)		3.98 dd(8.4, 7.8)	4.10 dd(8.3, 7.8)	4.01 dd(8.8, 7.6)

Table 3-11-66 (continued)

H	3-11-273	3-11-274	3-11-275	3-11-276	3-11-277
3 ^{'''}	4.24 dd(8.9, 8.3)		4.24 t(8.4)	4.22 t(8.5)	4.23 t(8.7)
4 ^{'''}	4.20 t(8.9)		4.21 dd(9.1, 8.4)	4.19 t(8.5)	4.20 t(8.9)
5 ^{'''}	3.96 ddd (8.9, 5.3, 2.3)		3.92 ddd (9.1, 5.3, 2.5)	3.99 (ov)	3.97 ddd (9.2, 5.3, 2.7)
6 ^{'''}	4.40 dd(11.7, 5.3)		4.35 (ov)	4.27 (ov)	4.41 dd(11.7, 5.3)
	4.55 dd(11.6, 2.3)		4.53 (ov)	4.53 (ov)	4.56 dd(11.7, 2.7)

Table 3-11-67: ¹H NMR spectroscopic data of steroidal saponins 3-11-278~3-11-282.

H	3-11-278	3-11-279	3-11-280	3-11-281	3-11-282
1	2.30 d(12.6) 2.64 d(12.6)	4.36 br s	4.39 d(1.3)	1.31 t(12.3) 2.39 dd(13.0, 4.6)	1.32 t(12.9) 2.39 dd(12.9, 4.6)
2				4.05 ddd (12.0, 9.0, 4.6)	4.05 ddd (11.6, 8.9, 4.6)
3	4.79 dd(12.5, 7.3)	4.85 ddd (12.6, 7.6, 1.3)	4.87 ddd (12.6, 7.5, 1.3)	3.63 m	3.63 m
4	2.98 dd(13.7, 7.3) 2.70 (ov)	2.99 dd(13.5, 7.6) 2.72 (ov)	3.00 dd(13.5, 7.5) 2.75 (ov)	2.53 (ov)	2.54 (ov)
6	5.56 br s	5.76 br d(5.5)	5.76 br d(5.7)	5.42 br s	5.42 br s
7	2.37 m	2.40 m	2.40 m	2.25 m	2.25 m
8	2.69 (ov)	2.68 ddd (12.3, 10.5, 5.3)	2.67 ddd (12.6, 10.3, 5.6)	2.72 ddd (12.4, 10.4, 6.2)	2.73 ddd (12.2, 10.1, 6.1)
9	1.74 m	2.14 td(11.7, 4.1)	2.15 td(11.9, 3.8)	1.56 td(12.4, 4.6)	1.56 td(12.2, 4.4)
11	1.73 m, 1.57 m	2.88 m, 1.96 m	2.91 m, 1.96 m	1.77 m, 1.71 m	1.77 m, 1.70 m
12	1.95 m	2.08 m, 1.99 m	2.08 m, 1.99 m	1.96 m, 1.75 m	1.96 m, 1.75 m
15	7.46 d(1.8)	7.42 d(1.8)	7.44 d(1.8)		
16	6.42 d(1.8)	6.40 d(1.8)	6.42 d(1.8)	6.18 d(1.6)	6.19 d(1.6)
18	1.49 s	1.51 s	1.52 s	1.44 s	1.44 s
19	1.08 s	—	1.15 s	1.11 s	1.11 s
20				5.55 qd(6.7, 1.6)	5.54 qd(6.7, 1.6)
21	2.24 s	2.24 s	2.24 s	1.39 d(6.7)	1.39 d(6.7)
1'	5.32 dd(9.2, 1.9)	5.32 dd(9.2, 2.1)	5.32 dd(9.2, 1.8)	5.21 dd(9.7, 1.6)	5.20 dd(9.6, 1.8)

Table 3-11-67 (continued)

H	3-11-278	3-11-279	3-11-280	3-11-281	3-11-282
2'	1.93 ddd (13.8, 9.2, 2.1) 2.52 ddd (13.8, 3.9, 1.9)	1.90 ddd (13.8, 9.2, 2.2) 2.49 (ov)	2.50 ddd (14.0, 4.1, 1.8) 1.92 (ov)	1.83 ddd (13.6, 9.7, 2.1) 2.48 (ov)	1.82 ddd (13.7, 9.6, 2.2) 2.48 (ov)
3'	3.95 q-like(2.8)	3.93 q-like(2.8)	3.92 q-like(2.8)	3.93 q-like(2.8)	3.91 q-like(2.8)
4'	3.52 dd(9.2, 2.8)	3.50 dd(9.2, 2.8)	3.48 dd(9.6, 2.8)	3.45 (ov)	3.45 dd(9.6, 2.8)
5'	4.23 dq(9.2, 6.4)	4.20 dq(9.2, 6.4)	4.22 (ov)	4.25 (ov)	4.25 (ov)
6'	1.34 d(6.4)	1.29 d(6.4)	1.29 d(6.2)	1.32 d(6.2)	1.31 d(6.2)
OMe	3.53 s(3'-OMe) 3.45 s(3''-OMe) 3.47 s(3'''-OMe)	3.52 s(3'-OMe) 3.44 s(3''-OMe) 3.46 s(3'''-OMe)	3.64 s(3'-OMe) 3.41 s(3''-OMe) 3.52 s(3'''-OMe)	3.56 s(3'-OMe) 3.46 s(3''-OMe) 3.47 s(3'''-OMe)	3.55 s(3'-OMe) 3.41 s(3''-OMe) 3.52 s(3'''-OMe)
1''	5.14 br d(3.4)	5.14 br d(3.4)	5.14 br s	5.16 br d(3.2)	5.14 br s
2''	2.35 td(12.4, 3.4) 2.02 dd(12.4, 4.4)	2.34 td(12.3, 3.4) 2.02 dd(12.3, 4.5)	2.33 td(12.4, 3.7) 1.99 dd(12.4, 4.3)	2.35 td(12.4, 3.2) 2.00 dd(12.4, 4.4)	2.33 td(12.5, 3.7) 1.99 dd(12.5, 4.6)
3''	3.84 ddd (12.4, 4.4, 2.9)	3.82 ddd (12.3, 4.5, 2.8)	3.81 ddd (12.4, 4.3, 2.8)	3.83 ddd (12.4, 4.4, 2.7)	3.80 ddd (12.5, 4.6, 2.9)
4''	4.08 br d(2.3)	4.08 br s	4.04 br d(2.0)	4.09 br s	4.05 br d(2.9)
5''	4.26 q(6.4)	4.26 q(6.4)	4.23 (ov)	4.25 (ov)	4.22 (ov)
6''	1.46 d(6.4)	1.44 d(6.4)	1.41 d(6.4)	1.47 d(6.6)	1.42 d(6.4)
1'''	5.12 dd(9.6, 1.5)	5.12 dd(9.6, 1.8)	5.14 dd(9.6, 1.8)	5.13 dd(9.6, 1.6)	5.15 dd(9.8, 1.8)
2'''	1.86 ddd (13.8, 9.6, 2.3) 2.49 m	1.84 ddd (13.8, 9.6, 2.5) 2.47 (ov)	1.87 ddd (13.4, 9.6, 2.3) 2.38 (ov)	1.86 ddd (13.3, 9.6, 2.3) 2.49 (ov)	1.87 ddd (13.5, 9.8, 2.5) 2.38 (ov)
3'''	3.74 q-like(2.9)	3.73 q-like(2.9)	4.10 q-like(2.8)	3.74 q-like(3.0)	4.10 q-like(2.9)
4'''	3.56 dd(9.6, 2.9)	3.53 dd(9.8, 2.9)	3.70 dd(9.6, 2.8)	3.58 dd(9.5, 3.0)	3.71 dd(9.8, 2.9)
5'''	4.12 dq(9.6, 6.2)	4.09 dq(9.8, 6.4)	4.28 dq(9.6, 6.2)	4.12 dq(9.5, 6.2)	4.29 dq(9.8, 6.2)
6'''	1.54 d(6.2)	1.52 d(6.4)	1.64 d(6.2)	1.54 d(6.2)	1.65 d(6.2)
1''''			4.93 d(7.8)		4.94 d(7.8)
2''''			4.01 dd(9.0, 7.8)		4.02 dd(8.7, 7.8)
3''''			4.23 t(9.0)		4.24 t(8.7)
4''''			4.20 t(9.0)		4.21 dd(9.2, 8.7)
5''''			3.96 ddd (9.0, 5.3, 2.7)		3.97 ddd (9.2, 5.2, 2.5)
6''''			4.40 dd(11.7, 5.3) 4.56 dd(11.7, 2.7)		4.41 dd(11.7, 5.2) 4.56 dd(11.7, 2.5)

Table 3-11-68: ^1H NMR spectroscopic data of steroidal saponins **3-11-283~3-11-285**.

H	3-11-283	3-11-284	3-11-285
1	1.33 (ov) 2.42 dd(12.8, 4.6)	1.33 t(12.4) 2.42 dd(13.1, 4.6)	1.34 t(12.4) 2.42 dd(13.1, 4.6)
2	4.06 ddd(12.0, 9.0, 4.6)	4.06 ddd(12.8, 8.9, 4.6)	4.06 ddd(12.2, 9.1, 4.6)
3	3.64 m	3.64 m	3.64 m
4	2.53 (ov)	2.53 (ov)	2.53 m
6	5.41 (ov)	5.40 (ov)	5.43 t-like(2.5)
7	2.25 (ov)	2.25 m	2.25 m
8	2.67 ddd(12.6, 10.3, 6.0)	2.66 ddd(12.6, 10.2, 6.0)	2.70 ddd(12.4, 10.7, 5.9)
9	1.57 m	1.57 m	1.59 (ov)
11	1.83 m, 1.73 m	1.83 m, 1.73 m	1.72 m
12	1.86 m	1.86 m	2.32 m, 1.85 m
16	6.17 d(1.6)	6.17 d(1.6)	6.41 s
18	1.40 s	1.39 s	1.49 s
19	1.11 s	1.10 s	1.10 s
20	5.41 qd(6.7, 1.6)	5.42 qd(6.7, 1.6)	
21	1.37 d(6.7)	1.36 d(6.7)	1.65 s
1'	5.21 dd(9.6, 1.8)	5.20 dd(9.6, 1.8)	5.21 dd(9.6, 1.9)
2'	1.83 (ov), 2.48 (ov)	1.82 ddd(13.8, 9.6, 2.3) 2.48 ddd(13.8, 3.2, 1.8)	1.81 ddd(13.5, 9.6, 2.1) 2.48 ddd(13.5, 3.4, 1.9)
3'	3.93 q-like(2.8)	3.92 q-like(2.8)	3.92 q-like(2.8)
4'	3.45 (ov)	3.45 dd(9.6, 2.8)	3.45 dd(9.4, 2.8)
5'	4.25 (ov)	4.25 dq(9.6, 6.2)	4.25 (ov)
6'	1.33 d(6.2)	1.31 d(6.2)	1.31 d(6.2)
OMe	3.56 s(3'-OMe) 3.45 s(3''-OMe) 3.47 s(3'''-OMe)	3.54 s(3'-OMe) 3.40 s(3''-OMe) 3.52 s(3'''-OMe)	3.16 s(20-OMe) 3.54 s(3'-OMe) 3.40 s(3''-OMe) 3.52 s(3'''-OMe)
1''	5.17 br d(2.4)	5.17 br d(2.7)	5.13 br d(2.0)
2''	2.36 td(12.6, 2.4) 2.00 dd(12.6, 4.4)	2.34 td(12.3, 2.7) 1.99 dd(12.3, 4.4)	2.33 td(12.3, 2.0) 1.99 dd(12.3, 4.2)
3''	3.83 ddd(12.6, 4.4, 2.7)	3.80 ddd(12.3, 4.4, 3.0)	3.80 ddd(12.3, 4.2, 3.0)
4''	4.09 br s	4.04 br s	4.04 br s
5''	4.25 (ov)	4.22 (ov)	4.22 (ov)
6''	1.47 d(6.6)	1.42 d(6.4)	1.42 d(6.4)
1'''	5.13 dd(9.6, 1.6)	5.14 dd(9.6, 1.6)	5.14 dd(9.6, 2.0)
2'''	1.86 (ov), 2.49 (ov)	1.86 ddd(13.7, 9.6, 2.5) 2.38 ddd(13.7, 3.5, 1.6)	1.86 (ov), 2.37 m
3'''	3.74 q-like(2.8)	4.10 q-like(2.8)	4.10 q-like(2.8)
4'''	3.57 dd(9.5, 2.8)	3.71 dd(9.6, 2.8)	3.71 dd(9.6, 2.8)
5'''	4.12 dq(9.5, 6.2)	4.28 dq(9.6, 6.2)	4.28 dq(9.6, 6.2)
6'''	1.54 d(6.2)	1.65 d(6.2)	1.65 d(6.2)
1''''		4.95 d(7.8)	4.94 d(7.7)
2''''		4.01 dd(9.6, 7.8)	4.01 dd(8.7, 7.7)
3''''		4.25 t(9.6)	4.25 t(8.7)
4''''		4.20 t(9.6)	4.21 t(8.7)
5''''		3.97 ddd(9.6, 5.6, 2.7)	3.97 ddd(8.7, 5.3, 2.4)
6''''		4.41 dd(11.2, 5.6) 4.56 dd(11.2, 2.7)	4.41 dd(11.7, 5.3) 4.56 dd(11.7, 2.4)

Bibliography

- [271] Hernández JC, León F, Quintana J et al. *Bioorg Med Chem*. 2004;12:4423.
- [272] Cui CB, Xu C, Gu QQ et al. *Chin Chem Lett*. 2004;15(10):1191.
- [273] Coreia G, Fattorusso E, Lanzotti V et al. *J Agric Food Chem*. 2005;53(4):935.
- [274] Tran QL, Tezuka Y, Banskota A et al. *J Nat Prod*. 2001;64(9):1127.
- [275] Watanabe K, Sakagami H, Mimaki Y. *Heterocycles*. 2005;65(4):775.
- [276] Zhang Y, Li HZ, Zhang YJ et al. *Steroids*. 2006;71:712.
- [277] Combarieu ED, Fuzzati N, Lovati M et al. *Fitoterapia*. 2003;74:583.
- [278] Acharya D, Mitaine-Offer AC, Kaushik N et al. *Helv Chim Acta*. 2008;91:2262.
- [279] Sautour M, Miyamoto T, Lacaille-Dubois MA. *Phytochemistry*. 2007;68:2554.
- [280] Belhouchet Z, Sautour M, Miyamoto T et al. *Chem Pharm Bull*. 2008;56(9):1324.
- [281] Zhang Y, Zhang YJ, Jacob MR et al. *Phytochemistry*. 2008;69:264.
- [282] Hayes PY, Jahidin AH, Lehmann R et al. *Tetrahedron Lett*. 2006;47:6965.
- [283] Debella A, Haslinger E, Kunert O et al. *Phytochemistry*. 1999;51:1069.
- [284] Hamed AI, Oleszek W, Stochmal A et al. *Phytochemistry*. 2004;65:2935.
- [285] Murakami T, Kishi A, Matsuda H et al. *Chem Pharm Bull*. 2000;48(7):994.
- [286] Su L, Feng SG, Qiao L et al. *J Asian Nat Prod Res*. 2009;11(1):38.
- [287] Zhao Y, Kang LP, Liu YG et al. *Planta Med*. 2009;75:356.
- [288] Ohtsuki T, Sato M, Koyano J et al. *Bioorg Med Chem*. 2006;14:659.
- [289] Yang S-L, Liu X-K, Wu H et al. *Steroids*. 2009;74:7.
- [290] Zou K, Wang JZ, Du M et al. *Chem Pharm Bull*. 2006;54(10):1440.
- [291] Sautour M, Mitaine-Offer AC, Miyamoto T et al. *Planta Med*. 2004;70:90.
- [292] Braca A, Prieto JM, Tommasi ND et al. *Phytochemistry*. 2004;65:2921.
- [293] Sang SM, Lao A, Wang HC et al. *Phytochemistry*. 1999;52:1611.
- [294] He XJ, Qiu F, Shoyama Y et al. *Chem Pharm Bull*. 2002;50(5):653.
- [295] Yuan L, Ji TF, Li CJ et al. *J Asian Nat Prod Res*. 2009;11(3):213.
- [296] Shao B, Guo HZ, Cui YJ et al. *Phytochemistry*. 2007;68:623.
- [297] Wu G, Jiang SH, Jiang FX et al. *Phytochemistry*. 1996;42(6):1677.
- [298] Zhang YN, Yin F, Hu LH. *Heterocycles*. 2005;65(5):1197.
- [299] Dong M, Feng XZ, Wang BX et al. *Tetrahedron*. 2001;57:501.
- [300] Hayes PY, Jahidin AH, Lehmann R et al. *Phytochemistry*. 2008;69:796.
- [301] Mandal D, Banerjee S, Mondal NB et al. *Phytochemistry*. 2006;67:1316.
- [302] Zhou LB, Chen TH, Bastow KF et al. *J Nat Prod*. 2007;70(8):1263.
- [303] Acharya D, Mitaine-Offer AC, Kaushik N et al. *J Nat Prod*. 2010;73(1):7.
- [304] Sharma U, Saini R, Bobita et al. *Chem Pharm Bull*. 2009;57(8):890.
- [305] Konishi T, Fujiwara Y, Konoshima T et al. *Chem Pharm Bull*. 2001;49(3):318.
- [306] Ohtsuki T, Koyano T, Kowithayakorn T et al. *Bioorg Med Chem*. 2004;12:3841.
- [307] Alvarez L, Pérez MDC, González JL et al. *Planta Med*. 2001;67:372.
- [308] Kuroda M, Mimaki Y, Hasegawa F et al. *Chem Pharm Bull*. 2001;49(6):726.
- [309] Zhou XL, He XJ, Wang GH et al. *J Nat Prod*. 2006;69(8):1158.
- [310] Kim GS, Kim HT, Seong JD et al. *J Nat Prod*. 2005;68(5):766.
- [311] Zhou LB, Chen DC. *Steroids*. 2008;73:83.
- [312] Huang XF, Kong LY. *Steroids*. 2006;71:171.
- [313] Itabashi M, Segawa K, Ikeda Y et al. *Carbohydr Res*. 2000;323:57.
- [314] Ikeda T, Tsumagari H, Nohara T. *Chem Pharm Bull*. 2000;48(7):1062.
- [315] Jin JM, Zhang Y-J, Li HZ et al. *J Nat Prod*. 2004;67(12):1992.
- [316] Yokosuka A, Mimaki Y, Kuroda M et al. *Planta Med*. 2000;66:393.
- [317] Shen P, Wang SL, Liu XK et al. *Chem Pharm Bull*. 2003;51(3):305.
- [318] Deng DW, Lauren DR, Cooney JM et al. *Planta Med*. 2008;74:1397.

- [319] Ahn MJ, Kim CY, Yoon KD et al. *J Nat Prod.* 2006;69(3):360.
- [320] Kougan GB, Miyamoto T, Tanaka C et al. *J Nat Prod.* 2010;73(7):1266.
- [321] Cheng ZH, Wu T, Yu BY. *J Asian Nat Prod Res.* 2006;8(6):555.
- [322] Nakamura S, Hongo M, Sugimoto S et al. *Phytochemistry.* 2008;69:1565.
- [323] Kostadinova EP, Alipieva KI, Kokubun T et al. *Phytochemistry.* 2007;68:1321.
- [324] Zhang L, Liu JY, Xu LZ et al. *Chem Pharm Bull.* 2009;57(10):1126.
- [325] Huang Y, Cui LJ, Wang Q et al. *Acta Pharm Sin.* 2006;41(4):361.
- [326] Kuroda M, Mimaki Y, Ori K et al. *J Nat Prod.* 2004;67(10):1690.
- [327] Mimaki Y, Kuroda M, Takaashi Y et al. *Phytochemistry.* 1998;47(1):79.
- [328] González AG, Hernández JC, León F et al. *J Nat Prod.* 2003;66(6):793.
- [329] Yokosuka A, Mimaki Y, Sashida Y. *J Nat Prod.* 2000;63(9):1239.
- [330] Mimaki Y, Kuroda M, Ide A et al. *Phytochemistry.* 1999;50:805.
- [331] Kameyama A, Shibuya Y, Kusuoku H et al. *Tetrahedron Lett.* 2003;44:2737.
- [332] Zhang T, Liu H, Liu XT et al. *Steroids.* 2009;74:809.
- [333] Mimaki Y, Kuroda M, Yokosuka A et al. *Phytochemistry.* 1999;51:689.
- [334] Wang WH, Li FM, Alam N et al. *J Nat Prod.* 2002;65(11):1649.
- [335] Plaza A, Perrone A, Balestrieri ML et al. *Steroids.* 2005;70:594.
- [336] Plaza A, Piacente S, Perrone A et al. *Tetrahedron.* 2004;60:12201.
- [337] Gupta VS, Kumar A, Deepak D et al. *Phytochemistry.* 2003;64:1327.
- [338] Chen XC, Zhu QX, Jia ZJ. *Planta Med.* 2001;67:270.
- [339] Yin J, Kouda K, Tezuka Y et al. *J Nat Prod.* 2003;66(5):646.
- [340] Liu HW, Xiong ZL, Li FM et al. *Chem Pharm Bull.* 2003;51(9):1089.
- [341] Feng JQ, Zhao WM. *Helv Chim Acta.* 2008;91:1798.
- [342] Li YB, Zhang JF, Gu XJ et al. *Planta Med.* 2008;74:551.
- [343] Cioffi G, Sango R, Vassallo A et al. *J Nat Prod.* 2006;69(4):625.
- [344] Ma X-X, Jiang F-T, Yang QX et al. *Steroids.* 2007;12:778.
- [345] Zheng QA, Yang CR. *J Asian Nat Prod Res.* 2003;5(4):291.
- [346] Yokosuka A, Mimaki Y, Sashida Y. *J Nat Prod.* 2002;65(9):1293.
- [347] Pan WB, Wei LM, Wei LL et al. *Chem Pharm Bull.* 2006;54(7):954.
- [348] Tan XG, Peng SL, Liao X et al. *Chin Chem Lett.* 2003;14(10):1027.
- [349] Zhang H, Tan AM, Feng F et al. *Helv Chim Acta.* 2008;91:1489.
- [350] Abdel-Sattar E, Al-Yahya MAA, Nakamura N et al. *Phytochemistry.* 2001;57:1213.
- [351] Xia ZH, Xing WX, Mao SL et al. *J Asian Nat Prod Res.* 2004;6(2):79.
- [352] Ye YP, Chen FY, Sun HX et al. *Bioorg Med Chem Lett.* 2006;16:4586.
- [353] Oyama M, Iliya I, Tanaka T et al. *Helv Chim Acta.* 2007;90:63.
- [354] Al-Yahya MAA, Abdel-Sattar E, Guittet E. *J Nat Prod.* 2000;63(10):1451.
- [355] Braca A, Bader A, Morelli I et al. *Tetrahedron.* 2002;58:5837.
- [356] Sahu NP, Panda N, Mandal NB et al. *Phytochemistry.* 2002;61:383.
- [357] Abe F, Yamauchi T, Honda K et al. *Chem Pharm Bull.* 2000;48(1):154.
- [358] Siciliano T, Bader A, Tommasi ND et al. *J Nat Prod.* 2005;68:1164.
- [359] Pawar RS, Shukla YJ, Khan IA. *Steroids.* 2007;72:881.
- [360] Huang XP, Deng ZW, Ofwegen LV et al. *J Asian Nat Prod Res.* 2006;8(4):287.
- [361] Gabant M, Schmitz-Afonso I, Gallard J-F et al. *J Nat Prod.* 2009;72(4):760.
- [362] Bai H, Li W, Koike K et al. *Tetrahedron.* 2005;61:5797.
- [363] Abe F, Hirokawa M, Yamauchi T et al. *Chem Pharm Bull.* 1999;47(10):1384.
- [364] Bai H, Li W, Koike K. *Steroids.* 2008;73:96.
- [365] Bai H, Li W, Asada Y et al. *Steroids.* 2009;74:198.

Index of compound names

- 1-deoxychiisanoside 56
- 11,21-dioxo-2 β ,3 β ,15 α -trihydroxyurs-12-ene-2-*O*- β -D-glucopyranoside 292
- 11,21-dioxo-3 β ,15 α ,24-trihydroxyurs-12-ene-24-*O*- β -D-glucopyranoside 292
- 11-dehydroxymogroside III 327
- 11-deoxyisochiisanoside 56
- 11-deoxymogroside III 327
- 11-oxomogroside II A₁ 327
- 11-oxomogroside III 327
- 11-oxomogroside IV A 327
- 12,20- β -*O*-dibenzoylbenzoylsarcostin-3-*O*- β -D-digitalopyranosyl-(1 $\rightarrow$ 4)- β -D-oleandropyranosyl-(1 $\rightarrow$ 4)- β -D-cymaropyranosyl-(1 $\rightarrow$ 4)- β -D-cymaropyranoside 451
- 12,20- β -*O*-dibenzoylsarcostin-3-*O*- β -D-digitalopyranosyl-(1 $\rightarrow$ 4)- β -D-cymaropyranosyl-(1 $\rightarrow$ 4)- β -D-cymaropyranosyl-(1 $\rightarrow$ 4)- β -D-oleandropyranoside 451
- 12- β -*O*-cinnamoyl-20-*O*-benzoylsarcostin-3-*O*- β -D-digitalopyranosyl-(1 $\rightarrow$ 4)- β -D-oleandropyranosyl-(1 $\rightarrow$ 4)- β -D-cymaropyranosyl-(1 $\rightarrow$ 4)- β -D-cymaropyranoside 451
- 12- β -*O*-cinnamoylsarcostin-3-*O*- β -D-digitalopyranosyl-(1 $\rightarrow$ 4)- β -D-oleandropyranosyl-(1 $\rightarrow$ 4)- β -D-cymaropyranosyl-(1 $\rightarrow$ 4)- β -D-cymaropyranoside 451
- 12-*O*-acetyl-20-*O*-(*N*-methyl)anthraniloyl-5,6-dihydrosarcostin 3-*O*- β -D-glucopyranosyl-(1 $\rightarrow$ 4)-6-deoxy-3-*O*-methyl- β -D-allopyranosyl-(1 $\rightarrow$ 4)- β -D-cymaropyranosyl-(1 $\rightarrow$ 4)- β -D-cymaropyranoside 450
- 12-*O*-cinnamoyldeacetylmetaplexigenin-3-*O*- β -D-digitalopyranosyl-(1 $\rightarrow$ 4)- β -D-oleandropyranosyl-(1 $\rightarrow$ 4)- β -D-cymaropyranosyl-(1 $\rightarrow$ 4)- β -D-cymaropyranoside 435
- 12 β -*O*-acetylbourcerin-3-*O*- β -D-glucopyranosyl-(1 $\rightarrow$ 4)- β -D-thetopyranosyl-(1 $\rightarrow$ 4)- β -D-cymaropyranosyl-(1 $\rightarrow$ 4)- β -D-cymaropyranoside 451
- 12 β -*O*-*o*-hydroxybenzoylboucerin-3-*O*- β -D-glucopyranosyl-(1 $\rightarrow$ 4)-6-deoxy-3-*O*-methyl- β -D-allopyranosyl-(1 $\rightarrow$ 4)- β -D-
- cymaropyranosyl-(1 $\rightarrow$ 4)- β -D-cymaropyranoside 450
- 12 β -*O*-*o*-hydroxybenzoylboucerin-3-*O*- β -D-glucopyranosyl-(1 $\rightarrow$ 4)- β -D-thetopyranosyl-(1 $\rightarrow$ 4)- β -D-cymaropyranosyl-(1 $\rightarrow$ 4)- β -D-cymaropyranoside 450
- 12 β -*O*-tigloyl-20-*O*-acetylbourcerin-3-*O*- β -D-glucopyranosyl-(1 $\rightarrow$ 4)-6-deoxy-3-*O*-methyl- β -D-allopyranosyl-(1 $\rightarrow$ 4)- β -D-cymaropyranosyl-(1 $\rightarrow$ 4)- β -D-cymaropyranoside 450
- 12 β -*O*-tigloyl-20-*O*-acetylbourcerin-3-*O*- β -D-glucopyranosyl-(1 $\rightarrow$ 4)- β -D-quinovopyranosyl-(1 $\rightarrow$ 4)- β -D-cymaropyranosyl-(1 $\rightarrow$ 4)- β -D-cymaropyranoside 450
- 12 β -*O*-tigloylboucerin-3-*O*- β -D-glucopyranosyl-(1 $\rightarrow$ 4)-6-deoxy-3-*O*-methyl- β -D-allopyranosyl-(1 $\rightarrow$ 4)- β -D-cymaropyranosyl-(1 $\rightarrow$ 4)- β -D-cymaropyranoside 450
- 12 β -*O*-tigloylboucerin-3-*O*- β -D-glucopyranosyl-(1 $\rightarrow$ 4)- β -D-thetopyranosyl-(1 $\rightarrow$ 4)- β -D-cymaropyranosyl-(1 $\rightarrow$ 4)- β -D-cymaropyranoside 450
- 15-deoxoeucosterol-3-*O*-{*O*- α -L-rhamnopyranosyl-(1 $\rightarrow$ 2)-*O*-[β -D-glucopyranosyl-(1 $\rightarrow$ 2)-*O*- β -D-glucopyranosyl-(1 $\rightarrow$ 3)]-*O*- β -D-glucopyranosyl-(1 $\rightarrow$ 2)-*O*-arabinopyranosyl-(1 $\rightarrow$ 6)- β -D-glucopyranoside} 319
- 16 α -methoxyl-3 β -[(*O*- α -L-rhamnopyranosyl-(1 $\rightarrow$ 2)-*O*-[α -L-rhamnopyranosyl-(1 $\rightarrow$ 4)]- β -D-glucopyranosyl)oxy]pregn-5-en-20-one 435
- 16 β -hydroxyeucosterol-3-*O*-{*O*- α -L-rhamnopyranosyl-(1 $\rightarrow$ 2)-*O*- β -D-glucopyranosyl-(1 $\rightarrow$ 2)-*O*- α -L-arabinopyranosyl-(1 $\rightarrow$ 6)- β -D-glucopyranoside} 320
- 19-oxo-3 β ,20*S*,21,24*S*-tetrahydroxydammar-25-ene-3-*O*-{[α -L-rhamnopyranosyl-(1 $\rightarrow$ 2)][β -D-xylopyranosyl-(1 $\rightarrow$ 3)]- α -L-arabinopyranosyl}-21-*O*- β -D-glucopyranoside 21
- 19-oxo-3 β ,20*S*,21-trihydroxy-25-hydroperoxydammar-23-ene-3-*O*-{ α -L-

- rhamnopyranosyl(1→2)][β -D-xylopyranosyl(1→3)]- α -L-arabinopyranosyl)-21-O- β -D-glucopyranoside 20
- 19-oxo-3 β ,20(S)-dihydroxydammar-24-ene-3-O-[α -L-arabinopyranosyl(2→1)- β -D-glucopyranosyl]-20-O- β -D-glucopyranoside 20
- 19-oxo-3 β ,20(S)-dihydroxydammar-24-ene-3-O-[β -D-glucopyranosyl(2→1)- β -D-glucopyranosyl]-20-O-[α -L-rhamnopyranosyl(6→1)- β -D-glucopyranoside] 20
- 1 β ,2 α ,3 β ,20(R)-tetrahydroxydammar-24-ene-3-O- α -L-rhamnopyranosyl-(1→2)- β -D-glucopyranoside 10
- 2',3'-O-diacetylsalsolide C 145
- 2''-O- β -D-xylopyranosylsaikosaponin b₂ 101
- 2''-O-acetyl glycoside B 69
- 2'-O-acetyl-27-deoxyactein 294
- 2'-O-acetylactein 294
- 20-hydroxy-11-oxomogroside IA₁ 327
- 20-O- β -D-xylopyranosyl(1→6)- β -D-glucopyranosyl-20(S)-protopanaxadiol 19
- 20-O-acetyl russelioside C 450
- (20S)-3 β ,20,25-trihydroxydammar-23-ene-21,29-dioic acid 3-O-[[α -L-rhamnopyranosyl(1→6)- β -D-glucopyranosyl-(1→3)]- α -L-arabinopyranosyl]-21-O- β -D-glucopyranoside 35
- (20S)-3 β ,20,29-trihydroxydammar-24-ene-21-carboxylic acid 3-O-[[α -L-rhamnopyranosyl(1→2)][α -L-rhamnopyranosyl(1→6)- β -D-glucopyranosyl(1→3)]- α -L-arabinopyranosyl]-21-O- β -D-glucopyranoside 35
- (20S)-3 β ,20-dihydroxydammar-24-ene-21,29-dioic acid 3-O-[α -L-arabinopyranosyl]-21-O- β -D-glucopyranoside 35
- (20S)-3 β ,20-dihydroxydammar-24-ene-21,29-dioic acid 3-O-[[α -L-rhamnopyranosyl(1→6)- β -D-glucopyranosyl(1→3)]- α -L-arabinopyranosyl]-21-O- β -D-glucopyranoside 35
- (20S)-3 β ,20-dihydroxydammar-24-ene-21,29-dioic acid 3-O-[[β -D-glucopyranosyl(1→3)]- α -L-arabinopyranosyl]-21-O- β -D-glucopyranoside 35
- α -L-arabinopyranosyl)-21-O- β -D-glucopyranoside 35
- 21-methoxyl-3 β -[[O- α -L-rhamnopyranosyl-(1→2)-O-[α -L-rhamnopyranosyl-(1→4)]- β -D-glucopyranosyl]oxy]pregn-5,16-en-20-one 435
- 21 β -O-benzoylsitakisenin-3-O- β -D-glucopyranosyl(1→3)- β -D-glucuronopyranoside 116
- 22-epiyamogenin-3-O- α -L-rhamnopyranosyl-(1→4)- β -D-glucopyranosyl-(1→4)-[α -L-rhamnopyranosyl-(1→2)]- β -D-glucopyranoside 396
- (22S)-16 β -[[α -L-rhamnopyranosyl]oxy]-3 β ,22-dihydroxycholest-24-en-1 β -yl α -L-rhamnopyranoside 428
- (22S)-16 β -[[α -L-rhamnopyranosyl]oxy]-3 β ,22-dihydroxycholest-5-en-1 β -yl α -L-rhamnopyranoside 428
- (22S)-16 β -[[α -L-rhamnopyranosyl]oxy]-3 β ,22-dihydroxycholesta-5,24-dien-1 β -yl α -L-rhamnopyranoside 428
- (22S)-16 β -[(β -D-glucopyranosyl)oxy]-3 β ,22-dihydroxy-5 α -cholestan-1 β -yl β -D-glucopyranoside 428
- (22S)-16 β -[(O- β -D-apiofuranosyl-(1→4)-6-O-acetyl- β -D-glucopyranosyl)oxy]-3 β ,22-dihydroxy-5 α -cholestan-16 β -yl α -L-rhamnopyranoside 428
- 23-*epi*-15-deoxoeucosterol-3-O-{O- α -L-rhamnopyranosyl-(1→2)-O-[β -D-glucopyranosyl-(1→2)-O- β -D-glucopyranosyl-(1→3)]-O- β -D-glucopyranosyl-(1→2)-O-arabinopyranosyl-(1→6)- β -D-glucopyranoside} 319
- 23-*epi*-15-deoxoeucosterol-3-O-{O- α -L-rhamnopyranosyl-(1→2)-O- β -D-glucopyranosyl-(1→2)-O- α -L-arabinopyranosyl-(1→6)- β -D-glucopyranoside} 319
- 23-O-acetyl-3 β ,12 β ,23S,24R-tetrahydroxy-20S,25-epoxydammarane 3-O-[β -D-xylopyranosyl(1→2)]- β -D-glucopyranoside 1
- 23-O-acetyl-3 β ,12 β ,23S,24R-tetrahydroxy-20S,25-epoxydammarane 3-O-[β -D-xylopyranosyl(1→2)]- β -D-xylopyranoside 1

- 23-*O*-acetyl-3 β ,12 β ,23 S ,24*R*-tetrahydroxy-20 S ,25-epoxydammarane
3-*O*-[β -D-xylopyranosyl-(1 $\rightarrow$ 2)][β -D-xylopyranosyl-(1 $\rightarrow$ 6)]- β -D-glucopyranoside 1
(23*S*,24*S*)-spirosta-5,25(27)-diene-1 β ,3 β ,23,24-tetrol-1-*O*-{*O*-(2,3,4-tri-*O*-acetyl- α -L-rhamnopyranosyl)-(1 $\rightarrow$ 2)- α -L-arabinopyranosyl} 24-*O*- β -D-fucopyranoside 416
(23*S*,25*R*)-17 α ,23-epoxy-29-hydroxy-3 β -[(*O*- α -L-rhamnopyranosyl-(1 $\rightarrow$ 2)-*O*-[β -D-glucopyranosyl-(1 $\rightarrow$ 3)]-*O*- β -D-glucopyranosyl-(1 $\rightarrow$ 2)- α -L-arabinopyranosyl-(1 $\rightarrow$ 6)- β -D-glucopyranosyl)oxy]lanost-8-en-23,26-olide 310
(23*S*,25*R*)-3 β ,30,31-trihydroxy-17 α ,23-epoxy-5 α -lanost-5-en-23,26-olactone
3-*O*-{*O*- α -L-rhamnopyranosyl-(1 $\rightarrow$ 2)-*O*- β -D-glucopyranosyl-(1 $\rightarrow$ 2)-*O*- α -L-arabinopyranosyl-(1 $\rightarrow$ 6)- β -D-glucopyranoside} 310
(23*S*,25*R*)-3 β ,30,31-trihydroxy-17 α ,23-epoxy-5 α -lanost-5-en-23,26-olactone
3-*O*-{*O*- β -D-apio-D-furanosyl-(1 $\rightarrow$ 2)-*O*- β -D-glucopyranosyl-(1 $\rightarrow$ 2)-*O*- α -L-arabinopyranosyl-(1 $\rightarrow$ 6)- β -D-glucopyranoside} 310
(23*S*,25*R*)-spirost-5-ene-3 β ,23-diol-23-*O*-{*O*- β -D-glucopyranosyl-(1 $\rightarrow$ 6)- β -D-glucopyranoside} 416
(23*S*)-17 α ,23-epoxy-29-hydroxy-3 β -[(*O*- α -L-rhamnopyranosyl-(1 $\rightarrow$ 2)-*O*-[*O*- β -D-glucopyranosyl-(1 $\rightarrow$ 2)- β -D-glucopyranosyl-(1 $\rightarrow$ 3)]-*O*- β -D-glucopyranosyl-(1 $\rightarrow$ 2)- α -L-arabinopyranosyl-(1 $\rightarrow$ 6)- β -D-glucopyranosyl)oxy]-27-nor-lanost-8-ene-15,24-dione 320
(23*S*)-3 β -[(*O*- β -D-apiofuranosyl-(1 $\rightarrow$ 2)-*O*-[β -D-glucopyranosyl-(1 $\rightarrow$ 3)]-*O*- β -D-glucopyranosyl-(1 $\rightarrow$ 2)- α -L-arabinopyranosyl-(1 $\rightarrow$ 6)- β -D-glucopyranosyl)oxy]-17 α ,23-epoxy-28,29-dihydroxy-27-norlanost-8-en-24-one 319
24-hydroxychiisanoside 56
24-*O*-[α -L-rhamnopyranosyl-(1 $\rightarrow$ 2)- β -D-glucopyranosyl]-28-*O*-[β -D-glucopyranosyl-(1 $\rightarrow$ 2)- β -D-glucopyranosyl]-16-desoxy-protoaescigenin 116
24-*O*-[α -L-rhamnopyranosyl-(1 $\rightarrow$ 2)- β -D-glucopyranosyl]-28-*O*-[β -D-glucopyranosyl-(1 $\rightarrow$ 2)- β -D-glucopyranosyl]-protoaescigenin 115
(24*S*,25*S*)-3 β ,24-dihydroxyspirost-5-en-1 β -yl-*O*- α -L-rhamnopyranosyl-(1 $\rightarrow$ 2)-*O*-[β -D-xylopyranosyl-(1 $\rightarrow$ 3)]- α -L-arabinopyranoside 415
(24*S*,25*S*)-3 β ,24-dihydroxyspirost-5-en-1 β -yl-*O*- α -L-rhamnospyranosyl-(1 $\rightarrow$ 2)- α -L-arabinopyranoside 415
25-methoxycucurbita-5(6),23(*E*)-dien-19-ol-3-*O*- β -D-allopyranoside 327
25-*O*-ethylcimigenol-3-*O*- β -D-xylopyranoside 294
25(27)-ene-2 β ,3 β -diol-3-*O*- β -D-glucopyranosyl-(1 $\rightarrow$ 2)- β -D-galactopyranoside 396
(25*R*)-12 β -hydroxy-5 α -spirostan-3 β -yl-*O*- β -D-glucopyranosyl-(1 $\rightarrow$ 3)-*O*- β -D-glucopyranosyl-(1 $\rightarrow$ 2)-*O*-[*O*- α -L-rhamnopyranosyl-(1 $\rightarrow$ 4)- β -D-glucopyranosyl-(1 $\rightarrow$ 3)]-*O*- β -D-glucopyranosyl-(1 $\rightarrow$ 4)- β -D-galactopyranoside 378
(25*R*)-26-[(α -L-rhamnopyranosyl)oxy]-22 α -methoxyfurost-5-ene-3 β -yl-*O*- β -D-glucopyranosyl-(1 $\rightarrow$ 3)-*O*-[6-acetyl- β -D-glucopyranosyl-(1 $\rightarrow$ 3)]-*O*- β -D-glucopyranoside 350
(25*R*)-3 β ,6 α -dihydroxy-5 α -spirostan-12-one-3,6-di-*O*- β -D-glucopyranoside 395
(25*R*)-3 β -hydroxy-5 α -spirostan-1 β -yl- β -D-glucopyranoside 415
(25*R*)-3 β -hydroxy-5 α -spirostan-6 α -yl-*O*- β -D-xylopyranosyl-(1 $\rightarrow$ 2)- β -D-glucopyranoside 416
(25*R*)-3 β -hydroxy-5 β -spirostan-12-one-3-*O*-[β -D-glucopyranosyl-(1 $\rightarrow$ 2)-[α -L-arabinopyranosyl-(1 $\rightarrow$ 6)]- β -D-glucopyranoside} 395
(25*R*)-3 β -hydroxyspirost-5-en-1 β -yl-*O*- α -L-rhamnopyranosyl-(1 $\rightarrow$ 2)-*O*-[β -D-xylopyranosyl-(1 $\rightarrow$ 3)]- α -L-arabinopyranoside 415
(25*R*)-3 β -[(*O*- β -D-glucopyranosyl-(1 $\rightarrow$ 2)-*O*-[*O*- α -L-rhamnopyranosyl-(1-4)- β -D-

- glucopyranosyl-(1→3)]-*O*-β-D-glucopyranosyl-(1→4)-β-D-galactopyranosyl]oxy]-5α-spirostane-12-one 395
- (25*R*)-3β-[(*O*-β-D-glucopyranosyl-(1→3)-*O*-β-D-glucopyranosyl-(1→2)-*O*-[*O*-α-L-rhamnopyranosyl-(1→4)-β-D-glucopyranosyl-(1→3)]-*O*-β-D-glucopyranosyl-(1→4)-β-D-galactopyranosyl]oxy]-15α-hydroxy-5α-spirostan-12-one 395
- (25*R*)-5β-spirostane-3β-ol-3-*O*-[β-D-glucopyranosyl-(1→2)-[α-L-arabinopyranosyl-(1→6)]-β-D-glucopyranoside} 377
- (25*R*)-spirost-5-ene-3β,17α-diol(pennogenin)-3-*O*-[*O*-α-L-rhamnopyranosyl-(1→2)-*O*-[*O*-β-xylopyranosyl-(1→5)-α-L-arabinofuranosyl-(1→4)]-β-D-glucopyranoside} 395
- (25*S*)-26-*O*-(β-D-glucopyranosyl)-furost-5-ene-3β,22α,26-triol-3-*O*-β-D-glucopyranosyl-(1→2)-β-D-glucopyranosyl-(1→4)-β-D-glucopyranoside 350
- (25*S*)-3β,5β,22α-22-methoxyfurostane-3,26-diol-3-*O*-β-D-xylopyranosyl-(1→2)-β-D-glucopyranosyl-26-*O*-β-D-glucopyranoside 349
- (25*S*)-3β,5β,22α-22-methoxyfurostane-3,26-diol-3-*O*-β-D-xylopyranosyl-(1→2)-[β-D-xylopyranosyl-(1→4)]-β-D-glucopyranosyl-26-*O*-β-D-glucopyranoside 349
- (25*S*)-3β,5β,22α-furostane-3,22,26-triol-3-*O*-α-L-rhamnopyranosyl-(1→2)-β-D-glucopyranosyl-(1→2)-β-D-glucopyranosyl-26-*O*-β-D-glucopyranoside 349
- (25*S*)-3β,5β,22α-furostane-3,22,26-triol-3-*O*-β-D-xylopyranosyl-(1→2)-[β-D-xylopyranosyl-(1→4)]-β-D-glucopyranosyl-26-*O*-β-D-glucopyranoside 349
- (25*S*)-5β-spirostane-3β,17α-diol-3-*O*-β-D-glucopyranosyl-(1→2)-[β-D-xylopyranosyl-(1→4)]-β-D-glucopyranoside 378
- (25*S*)-5β-spirostane-3β,17α-diol-3-*O*-β-D-xylopyranosyl-(1→2)-[β-D-xylopyranosyl-(1→4)]-β-D-glucopyranoside 378
- (25*S*)-5β-spirostane-3β-ol-3-*O*-α-L-rhamnopyranosyl-(1→2)-β-D-glucopyranosyl-(1→2)-β-D-glucopyranoside 377
- (25*S*)-5β-spirostane-3β-ol-3-*O*-β-D-xylopyranosyl-(1→2)-[β-D-xylopyranosyl-(1→4)]-β-D-glucopyranoside 377
- 26-[(β-D-glucopyranosyl]oxy]-22α-methoxyfurosta-5,25(27)-diene-3β-yl-*O*-β-D-glucopyranosyl-(1→6)-*O*-[α-L-rhamnopyranosyl-(1→2)]-β-D-glucopyranoside 350
- 26-[(β-D-glucopyranosyl]oxy]-3β-hydroxy-22α-methoxyfurosta-5,25(27)-diene-1β-yl-*O*-β-D-apipfuranosyl-(1→3)-α-L-rhamnopyranosyl-(1→2)-*O*-[β-D-xylopyranosyl-(1→3)]-α-L-arabinopyranoside 349
- 26-*O*-β-D-glucopyranosyl-22-methoxy-3β,26-dihydroxy-(25*R*)-furost-5-ene-3-*O*-α-L-rhamnopyranosyl-(1→4)-α-L-rhamnopyranosyl-(1→4)-[α-L-rhamnopyranosyl-(1→2)]-β-D-glucopyranoside 350
- 26-*O*-β-D-glucopyranosyl-22α-hydroxy-5β-furost-25(27)-ene-1β,3β,6β,26-tetraol-3-*O*-β-D-galactopyranoside 350
- 26-*O*-β-D-glucopyranosyl-22α-methoxy-(25*R*)-furostan-3β,26-diol-3-*O*-[β-D-glucopyranosyl-(1→2)-β-D-glucopyranoside} 349
- 26-*O*-β-D-glucopyranosyl-(25*R*)-5α-furostan-12-one-3β,22α,26-triol-3-*O*-β-D-glucopyranosyl-(1→2)-β-D-glucopyranosyl-(1→4)-β-D-galactopyranoside 351
- 26-*O*-β-D-glucopyranosyl-(25*S*)-5α-furostan-22-methoxy-2α,3β,26-triol-3-*O*-β-D-glucopyranosyl-(1→2)-β-D-glucopyranosyl-(1→4)-β-D-galactopyranoside 350
- 26-*O*-β-D-glucopyranosyl-3-*O*-[β-D-xylopyranosyl(1→3)]{β-D-galactopyranosyl(1→2)}-β-D-glucopyranosyl(1→4)-β-D-glucopyranosyl]-5α-furost-20(22)-en-12-one-3β,26-diol 351
- 26-*O*-β-D-glucopyranosyl-3-*O*-[β-D-xylopyranosyl(1→3)]{β-D-galactopyranosyl(1→2)}-β-D-glucopyranosyl(1→4)-β-D-glucopyranosyl]-5α-furostan-12-one-3β,22,26-triol 351
- 26-*O*-β-D-glucopyranosyl-furost-5(6),20(22)-dien-3β,26-diol 349

- 26-*O*- β -D-glucopyranosyl(25*R*)-furost-5-ene-3 β ,22 α ,26-triol-3-*O*- α -L-rhamnopyranosyl-(1 $\rightarrow$ 4)- β -D-glucopyranosyl-(1 $\rightarrow$ 4)-[α -L-rhamnopyranosyl-(1 $\rightarrow$ 2)]- β -D-glucopyranoside 350
- 28-*O*- β -D-glucopyranosyl-6 β ,23-dihydroxytormentic acid 268
- 28-*O*- β -D-glucopyranosyl-6 β -hydroxytormentic acid 268
- 2 α ,3 α ,19 α ,23-tetrahydroxyolean-12-ene-28-*O*- β -D-galactoside 161
- 2 α ,3 α ,23-trihydroxyurs-12-en-24,28-dioic acid 28- β -D-glucopyranosyl ester 268
- 2 α ,3 β ,12 β ,20*S*-tetrahydroxydammar-24-ene-3-*O*- β -D-glucopyranosyl-20-*O*-[β -D-6-*O*-acetylglucopyranosyl-(1 $\rightarrow$ 2)]- β -D-glucopyranoside] 20
- 2 α ,3 β ,12 β ,20*S*-tetrahydroxydammar-24-ene-3-*O*-[β -D-glucopyranosyl(1 $\rightarrow$ 4)]- β -D-glucopyranosyl]-20-*O*-[β -D-xylopyranosyl-(1 $\rightarrow$ 6)]- β -D-glucopyranoside] 20
- 2 α ,3 β ,23-trihydroxyurs-12,19-dien-28-oic acid 28-*O*- β -D-glucopyranoside 278
- 2 α ,3 β -dihydroxyurs-12,20(30)-dien-28-oic acid 3-*O*-{*O*- β -D-glucopyranosyl(1 $\rightarrow$ 2)-*O*- α -L-arabinopyranosyl-(1 $\rightarrow$ 2)-*O*-[β -D-xylopyranosyl-(1 $\rightarrow$ 3)] β -D-glucopyranoside} 279
- 2 β ,3 β ,17,23-tetrahydroxy-28-norolean-12-en-16-one-3-*O*- α -L-arabinopyranosyl(1 $\rightarrow$ 2)- α -L-arabinopyranosyl(1 $\rightarrow$ 6)-[α -L-rhamnopyranosyl(1 $\rightarrow$ 2)]- β -D-glucopyranoside 251
- 2 β ,3 β ,17,23-tetrahydroxy-28-norolean-12-en-16-one-3-*O*- α -L-arabinopyranosyl(1 $\rightarrow$ 2)- α -L-arabinopyranosyl(1 $\rightarrow$ 6)- β -D-glucopyranoside 251
- 3'',6''-*O*,*O*-diacetylsaikosaponin b₂ 101
- 3- β -*O*-[α -L-rhamnopyranosyl-(1 $\rightarrow$ 3)]- β -D-glucuronopyranosyl]-2 β ,3 β -dihydroxy-23-oxo-olean-12-en-28-oic acid-28-*O*- β -D-glucopyranosyl ester 199
- 3- β -*O*-[α -L-rhamnopyranosyl(1 $\rightarrow$ 3)]- β -D-glucuronopyranosyl]22 β ,3 β ,23-trihydroxyolean-12-en-28-oic acid-28-*O*- β -D-glucopyranosyl ester 161
- 3- β -*O*-[α -L-rhamnopyranosyl(1 $\rightarrow$ 3)]- β -D-glucuronopyranosyl]2 β ,3 β -dihydroxyolean-12-en-28-oic acid 28-*O*- β -D-glucopyranosyl ester 161
- 3- β -*O*-[β -glucuronopyranosyl]-2 β ,3 β -dihydroxy-30-norolean-12,20(29)-diene-23,28-dioic acid 28-*O*-[glucopyranosyl] ester 254
- 3-*O*-{2'-(2''-*O*-glycolyl)-glyoxylyl- β -D-glucuronopyranosyl}28-*O*- β -D-glucopyranosyl olean-12-en-3 β -ol-28-oic acid 145
- 3-*O*-{2'-*O*-glycolyl)-glyoxylyl- β -D-glucuronopyranosyl]-olean-12-en-3 β -ol-28-oic acid 135
- 3-*O*- α -L-arabinofuranosyl-(1 $\rightarrow$ 3)-[β -D-glucopyranosyl-(1 $\rightarrow$ 2)]- β -D-glucopyranosyl-21 β ,22 α -di-*O*-angeloylprotoaescigenin 115
- 3-*O*- α -L-arabinofuranosyl-(1 $\rightarrow$ 3)-[β -D-xylopyranosyl-(1 $\rightarrow$ 2)]- β -D-glucopyranosyl-21 β ,22 α -di-*O*-angeloylprotoaescigenin 115
- 3-*O*- α -L-arabinopyranosyl echinocystic acid-28-*O*- α -L-rhamnopyranosyl-(1 $\rightarrow$ 4)- β -D-glucopyranosyl-(1 $\rightarrow$ 6)- β -D-glucopyranosyl] ester 161
- 3-*O*- α -L-arabinopyranosyl-(1 $\rightarrow$ 2)- β -D-glucuronopyranosyl-21 β ,22 α -di-*O*-angeloylprotoaescigenin 115
- 3-*O*- α -L-arabinopyranosyl-(1 $\rightarrow$ 3)-[β -D-galactopyranosyl-(1 $\rightarrow$ 2)]- β -D-glucuronopyranosyl-21 β ,22 α -di-*O*-angeloyl barringtonenol C 115
- 3-*O*-[α -L-arabinopyranosyl]-hederagenin 28-*O*-[β -D-glucopyranosyl-(1 $\rightarrow$ 4)]- β -D-glucopyranosyl-(1 $\rightarrow$ 6)- β -D-glucopyranosyl] ester 162
- 3-*O*- α -L-arabinopyranosyl(1 $\rightarrow$ 3)-[β -D-glucopyranosyl-(1 $\rightarrow$ 2)]- α -L-arabinopyranosyl-oleanolic acid 136
- 3-*O*-[α -L-rhamnopyranosyl-(1 $\rightarrow$ 2)- α -L-arabinopyranosyl]-3 β ,23-dihydroxy-olean-18-en-28-oic acid 28-*O*-[α -L-rhamnopyranosyl-(1 $\rightarrow$ 4)]- β -D-6-*O*-acetylglucopyranosyl-(1 $\rightarrow$ 6)- β -D-glucopyranosyl] ester 244
- 3-*O*-[α -L-rhamnopyranosyl-(1 $\rightarrow$ 2)- α -L-arabinopyranosyl]-hederagenin 28-*O*-[α -L-rhamnopyranosyl-(1 $\rightarrow$ 4)]- β -D-glucopyranosyl-(1 $\rightarrow$ 6)-[α -L-

- arabinopyranosyl-(1→2)]-β-D-glucopyranosyl} ester 162
- 3-*O*-[α-L-rhamnopyranosyl-(1→2)-α-L-arabinopyranosyl]-hederagenin
28-*O*-{α-L-rhamnopyranosyl-(1→4)-β-D-glucopyranosyl-(1→6)-[β-D-xylopyranosyl-(1→2)]-β-D-glucopyranosyl} ester 162
- 3-*O*-[α-L-rhamnopyranosyl-(1→2)]-β-D-glucopyranosyl (1→3)]-β-D-glucopyranosyl-26-*O*-β-D-glucopyranosyl
cholest-5-ene-16,22-dione 351
- 3-*O*-[α-L-rhamnopyranosyl-(1→2)-β-D-glucopyranosyl-(1→2)-β-D-glucuronopyranosyl]-3β,22α,27-trihydroxyolean-12-en-16-one 108
- 3-*O*-[α-L-rhamnopyranosyl-(1→2)-β-D-glucopyranosyl-(1→2)-β-D-glucuronopyranosyl]-3β,22α-dihydroxyolean-12-en-16-one 108
- 3-*O*-[α-L-rhamnopyranosyl-(1→2)]-β-D-glucopyranosyl-(1→3)]-β-D-glucopyranosyl-27-hydroxypennogenin 396
- 3-*O*-(α-L-rhamnopyranosyl-(1→2)-β-D-glucopyranosyl-(1→4)-α-L-arabinopyranosyl) cyclamiretin A 86
- 3-*O*-[α-L-rhamnopyranosyl-(1→2)-β-D-glucopyranosyl]-3β-hydroxyolean-11,13(18)-dien-28-oic acid-28-*O*-[α-L-rhamnopyranosyl-(1→4)-β-D-glucopyranosyl-(1→6)-β-D-glucopyranosyl] ester 101
- 3-*O*-α-L-rhamnopyranosyl-(1→3)-[β-D-galactopyranosyl-(1→2)]-β-D-glucuronopyranosyl-21β,22α-di-*O*-angeloylbarringtonol C 115
- 3-*O*-[β-D-3-*O*-*trans*-coumaroyl-glucopyranosyl-(1→3)]-[β-D-glucopyranosyl-(1→2)]-α-L-arabinopyranosyl echinocystic acid-28-*O*-α-L-rhamnopyranosyl-(1→4)-β-D-(1→6)-β-D-glucopyranosyl} ester 162
- 3-*O*-β-D-apiofuranosyl-(1→3)-β-D-galactopyranosyl-(1→3)-[β-D-glucopyranosyl-(1→2)]-α-L-arabinopyranosyl-oleanolic acid 136
- 3-*O*-β-D-apiofuranosyl(1→3)-α-L-arabinopyranosyl-(1→3)-[β-D-glucopyranosyl-(1→2)]-β-D-glucopyranosyl-oleanolic acid 136
- 3-*O*-β-D-apiofuranosyl(1→3)-[β-D-glucopyranosyl-(1→2)]-β-D-glucopyranosyl-oleanolic acid 135
- 3-*O*-β-D-galactopyranosyl-(1→2)-β-D-glucuronopyranosyl-21β,22α-di-*O*-angeloylbarringtonol C 115
- 3-*O*-[β-D-galactopyranosyl-(1→2)-β-D-glucuronopyranosyl]-28-*O*-[β-D-glucuronopyranosyl-(1→2)-α-L-rhamnopyranosyl-β-D-4-*O*-*trans*-*p*-methoxycinnamoyl-fucopyranosyl] quillaic acid 199
- 3-*O*-β-D-galactopyranosyl-(1→2)[α-L-rhamnopyranosyl(1→3)]
β-D-glucuronopyranosyl 16-*O*-β,β-dimethyla-cryloyl-camelliagenin A 116
- 3-*O*-β-D-galactopyranosyl-(1→2)[α-L-rhamnopyranosyl(1→3)]
β-D-glucuronopyranosyl
28-*O*-angeloyl-A1-barrigenol 116
- 3-*O*-β-D-galactopyranosyl-(1→3)-[β-D-glucopyranosyl-(1→2)]-α-L-arabinopyranosyl-oleanolic acid 136
- 3-*O*-[β-D-glucopyranosyl-(1→2)-α-L-arabinopyranosyl]-27-hydroxy oleanolic acid 28-*O*-[β-D-glucopyranosyl-(1→6)-β-D-glucopyranosyl] ester 163
- 3-*O*-[β-D-glucopyranosyl-(1→2)-α-L-arabinopyranosyl]-hederagenin-28-*O*-β-D-glucopyranosyl ester 162
- 3-*O*-[β-D-glucopyranosyl-(1→2)-β-D-glucopyranosyl] hederagenin
28-*O*-[α-L-rhamnopyranosyl-(1→4)-β-D-glucopyranosyl-(1→6)-β-D-glucopyranosyl] ester 163
- 3-*O*-[β-D-glucopyranosyl-(1→2)-(β-D-glucopyranosyl-(1→3))-α-L-rhamnopyranosyl(1→4)-β-D-glucopyranosyl]steganogenin(peracetate) 246
- 3-*O*-[β-D-glucopyranosyl-(1→2)-β-D-glucopyranosyl-(1→3)-β-D-glucopyranosyl-(1→3)-α-L-arabinopyranosyl]-echinocystic

- acid-28-*O*-[α -L-rhamnopyranosyl-(1 $\rightarrow$ 4)- β -D-glucopyranosyl(1 $\rightarrow$ 6)- β -D-glucopyranosyl] ester 162
- 3-*O*-[β -D-glucopyranosyl-(1 $\rightarrow$ 2)- β -D-glucopyranosyl]-dammara-20*S*,24*S*-epoxy-3 β ,12 β ,25-triol 9
- 3-*O*-[[β -D-glucopyranosyl-(1 $\rightarrow$ 2)]- β -D-xylopyranosyl-(1 $\rightarrow$ 4)]-[3-*O*-acetyl]- β -D-glucuronopyranosyl]-28-*O*-[β -D-glucopyranosyl]-oleanolic acid 145
- 3-*O*- β -D-glucopyranosyl-(1 $\rightarrow$ 2)[α -L-rhamnopyranosyl(1 $\rightarrow$ 3)]
 β -D-glucuronopyranosyl
28-*O*-angeloyl-camelliagenin A 116
- 3-*O*- β -D-glucopyranosyl-(1 $\rightarrow$ 2)[α -L-rhamnopyranosyl(1 $\rightarrow$ 3)]- β -D-glucuronopyranosyl
22-*O*-angeloyl-A1-barrigenol 116
- 3-*O*-(β -D-glucopyranosyl-(1 $\rightarrow$ 3)- β -D-glucopyranosyl)-28-*O*-(α -L-rhamnopyranosyl-(1 $\rightarrow$ 3)- β -D-xylopyranosyl(1 $\rightarrow$ 4)- α -L-rhamnopyranosyl(1 $\rightarrow$ 2)- α -L-arabinopyranosyl) probassic acid 160
- 3-*O*-[β -D-glucopyranosyl-(1 $\rightarrow$ 3)]-[β -D-glucopyranosyl-(1 $\rightarrow$ 2)]- α -L-arabinopyranosyl echinocystic acid
28-*O*-[α -L-rhamnopyranosyl-(1 $\rightarrow$ 4)- β -D-glucopyranosyl-(1 $\rightarrow$ 6)- β -D-glucopyranosyl] ester 161
- 3-*O*-(β -D-glucopyranosyl-(1 $\rightarrow$ 3)- β -D-glucopyranosyl-(1 $\rightarrow$ 3)-[β -D-glucopyranosyl-(1 $\rightarrow$ 2)]- α -L-arabinopyranosyl]oleanolic acid
28-*O*-[α -L-rhamnopyranosyl-(1 $\rightarrow$ 4)- β -D-glucopyranosyl-(1 $\rightarrow$ 6)- β -D-glucopyranosyl] ester 145
- 3-*O*- β -D-glucopyranosyl-20-*O*-[α -L-arabinopyranosyl(1 $\rightarrow$ 2)- β -D-glucopyranosyl] 3 β ,12 β ,20(*S*)-trihydroxydammar-24-ene 19
- 3-*O*-[β -D-glucopyranosyl]-28-*O*-[[α -L-arabinopyranosyl-(1 $\rightarrow$ 2)]- β -D-xylopyranosyl(1 $\rightarrow$ 4)] α -L-rhamnopyranosyl(1 $\rightarrow$ 2)-4-*O*-[(3'-hydroxy-2'-methyl-butyroyloxy)-3-hydroxy-2-methyl-butyroyloxy]- β -D-fucopyransyl]zanhic acid 215
- 3-*O*-(β -D-glucopyranosyl)-28-*O*-(α -L-rhamnopyranosyl-(1 $\rightarrow$ 3)- β -D-xylopyranosyl-(1 $\rightarrow$ 4)- α -L-rhamnopyranosyl(1 $\rightarrow$ 2)- α -L-arabinopyranosyl)-16- α -hydroxyprotobassic acid 160
- 3-*O*-(β -D-glucopyranosyl)-28-*O*-(α -L-rhamnopyranosyl-(1 $\rightarrow$ 3)- β -D-xylopyranosyl-(1 $\rightarrow$ 4)[α -L-rhamnopyranosyl(1 $\rightarrow$ 3)] α -L-rhamnopyranosyl(1 $\rightarrow$ 2)- α -L-arabinopyranosyl) protobassic acid 160
- 3-*O*- β -D-glucopyranosyl-3 β ,15 α -dihydroxypregn-5-en-20-one 435
- 3-*O*- β -D-glucopyranosyl-3 β -hydroxy
olean-11,13(18)-dien-28-oic acid-28-*O*-[α -L-rhamnopyranosyl-(1 $\rightarrow$ 4)- β -D-glucopyranosyl-(1 $\rightarrow$ 6)- β -D-glucopyranosyl] ester 101
- 3-*O*-[[β -D-glucopyranosyl(1 $\rightarrow$ 2)]- α -L-arabinofuranosyl-(1 $\rightarrow$ 4)]-[3-*O*-acetyl]- β -D-glucuronopyranosyl]-28-*O*-[β -D-glucopyranosyl]-oleanolic acid 145
- 3-*O*-[β -D-glucopyranosyl(1 $\rightarrow$ 2)- α -L-arabinopyranosyl] oleanolic acid
28-*O*-[β -D-glucopyranosyl
(1 $\rightarrow$ 6)- β -D-glucopyranosyl] ester 145
- 3-*O*-[β -D-glucopyranosyl(1 $\rightarrow$ 2)- α -L-arabinopyranosyl-(1 $\rightarrow$ 6)]- β -D-glucopyranosyl]oleanolic acid 135
- 3-*O*-[β -D-glucopyranosyl(1 $\rightarrow$ 2)- β -D-glucopyranosyl]-28-*O*-[[α -L-arabinopyranosyl-(1 $\rightarrow$ 2)]- β -D-xylopyranosyl-(1 $\rightarrow$ 4)] α -L-rhamnopyranosyl-(1 $\rightarrow$ 2)-4-*O*-[(3'-hydroxy-2'-methyl-butyroyloxy)-3-hydroxy-2-methyl-butyroyloxy]- β -D-fucopyransyl] medicagenic acid 215
- 3-*O*-(β -D-glucopyranosyl(1 $\rightarrow$ 2)- β -D-glucopyranosyl)-28-*O*-[[α -L-arabinopyranosyl-(1 $\rightarrow$ 2)- β -D-xylopyranosyl-(1 $\rightarrow$ 6)][4-*O*-angeloyloxy- α -L-arabinopyranosyl(1 $\rightarrow$ 2)- α -L-rhamnopyranosyl(1 $\rightarrow$ 2)]]- β -D-glucopyranosyl gypsogenic acid 215
- 3-*O*-(β -D-glucopyranosyl)-28-*O*-[[α -L-arabinopyranosyl-(1 $\rightarrow$ 2)- β -D-xylopyranosyl(1 $\rightarrow$ 6)][4-*O*-angeloyloxy- α -L-

- arabinopyranosyl(1→2)- α -L-rhamnopyranosyl(1→2)]- β -D-glucopyranosyl medicagenic acid 215
- 3-*O*- β -D-glucopyranosyl(1→2)[α -L-rhamnopyranosyl(1→3)]- β -D-glucuronopyranosyl
28-*O*-angeloyl-A1-barrigenol 116
- 3-*O*- β -D-glucopyranosyl(1→3)- β -D-glucuronopyranoside 116
- 3-*O*-[β -D-glucopyranosyl(1→6)- β -D-glucopyranosyl]-20-*O*- β -D-glucopyranosyl-3 β ,12 β ,20(*S*)-trihydroxydammar-24-ene 20
- 3-*O*- β -D-glucopyranosylpyrocincholate 248
- 3-*O*-[β -D-xylopyranosyl-(1→2)- α -L-arabinopyranosyl-(1→6)-2-acetamido-2-deoxy- β -D-glucopyranosyl] acacic acid lactone 235
- 3-*O*- β -D-xylopyranosyl-3 β -hydroxyurs-12,18(19)-dien-28-oic acid-28- β -D-glucopyranosyl ester 279
- 3'-*O*-acetyl cimigenol 3-*O*- β -D-xylopyranoside 294
- 3-*O*-(methyl- β -D-glucuronopyranosiduronate)-28-*O*- β -D-glucopyranosyl oleanolate 145
- 3-*O*-{*O*- α -L-rhamnopyranosyl-(1→2)-*O*-[β -D-xylopyranosyl-(1→3)]-*O*- β -D-glucopyranosyl-(1→2)-*O*- α -L-arabinopyranosyl-(1→6)- β -D-glucopyranoside} of 15-deoxo-30-hydroxyeucosterol 319
- 3-*O*-{*O*- α -L-rhamnopyranosyl-(1→2)-*O*-[β -D-xylopyranosyl-(1→3)]-*O*- β -D-glucopyranosyl-(1→2)-*O*- α -L-arabinopyranosyl-(1→6)- β -D-glucopyranoside} of 16 β -hydroxyeucosterol 320
- 3-*O*-{*O*- α -L-rhamnopyranosyl-(1→2)-*O*-[β -D-xylopyranosyl-(1→3)]-*O*- β -D-glucopyranosyl-(1→2)-*O*- α -L-arabinopyranosyl-(1→6)- β -D-glucopyranoside} of eucosterol 320
- 3 β ,12,20*S*-trihydroxy-25-hydroperoxydammar-23-ene 3-*O*-[β -D-glucopyranosyl(1→2)]- β -D-glucopyranosyl]-20-*O*-[β -D-xylopyranosyl(1→6)]- β -D-glucopyranoside 19
- 3 β ,12 β ,23*S*,24*R*-tetrahydroxy-20*S*,25-epoxydammarane 3-*O*-[β -D-glucopyranosyl(1→2)]- β -D-xylopyranoside 1
- 3 β ,12 β ,23*S*,24*R*-tetrahydroxy-20*S*,25-epoxydammarane 3-*O*-[β -D-glucopyranosyl(1→2)][β -D-xylopyranosyl-(1→6)]- β -D-glucopyranoside 1
- 3 β ,12 β ,23*S*,24*R*-tetrahydroxy-20*S*,25-epoxydammarane 3-*O*-[β -D-xylopyranosyl(1→2)]- β -D-glucopyranoside 1
- 3 β ,12 β ,23*S*,24*R*-tetrahydroxy-20*S*,25-epoxydammarane 3-*O*-[β -D-xylopyranosyl(1→2)][β -D-xylopyranosyl-(1→6)]- β -D-glucopyranoside 1
- 3 β ,12 β ,23*S*,25-tetrahydroxy-20*S*,24*S*-epoxydammarane 3-*O*-[β -D-xylopyranosyl(1→2)]- β -D-glucopyranoside 1
- 3 β ,19,20*S*,21-tetrahydroxydammar-24-ene-3-*O*-{[α -L-rhamnopyranosyl(1→2)][β -D-xylopyranosyl(1→3)]- α -L-arabinopyranosyl}-21-*O*- β -D-glucopyranoside 21
- 3 β ,19,20*S*,21-tetrahydroxydammar-24-ene-3-*O*-{[α -L-rhamnopyranosyl(1→2)][β -D-xylopyranosyl(1→3)]- β -D-glucopyranosyl}-21-*O*- β -D-glucopyranoside 21
- 3 β ,19,20(*S*)-dihydroxydammar-24-ene-3-*O*-[β -D-glucopyranosyl(2→1)- β -D-glucopyranosyl]-20-*O*-[α -L-rhamnopyranosyl(6→1)- β -D-glucopyranoside] 20
- 3 β ,20*S*,21-trihydroxy-25-methoxydammar-23-ene-3-*O*- α -L-rhamnopyranosyl(1→2)-[β -D-xylopyranosyl(1→3)]- β -D-glucopyranosyl-21-*O*- β -D-xylopyranoside 20
- 3 β ,20*S*,21-trihydroxydammar-24-ene-3-*O*-{[α -L-rhamnopyranosyl-(1→2)][β -D-glucopyranosyl(1→3)]- α -L-arabinopyranosyl}-21-*O*- β -D-glucopyranoside 20
- 3 β ,20*S*,21-trihydroxydammar-24-ene-3-*O*-{[α -L-rhamnopyranosyl(1→2)][β -D-glucopyranosyl(1→3)]- β -D-glucopyranosyl}-21-*O*- β -D-glucopyranoside 21
- 3 β ,20*S*,21-trihydroxydammar-24-ene-3-*O*-{[α -L-rhamnopyranosyl(1→2)][β -D-xylopyranosyl-(1→3)]- β -D-[6-*O*-acetylglucopyranosyl]}-21-*O*- β -D-glucopyranoside 20

- 3 β ,20S,21-trihydroxydammar-24-ene-3-*O*-{[α -L-rhamnopyranosyl(1 $\rightarrow$ 2)][β -D-xylopyranosyl(1 $\rightarrow$ 3)]- β -D-glucopyranosyl}-21-*O*- β -D-glucopyranoside 21
- 3 β ,20S,24*S*-trihydroxydammar-25-ene-21,28-dioic acid
3-*O*-{[α -L-rhamnopyranosyl(1 $\rightarrow$ 2)][α -L-rhamnopyranosyl(1 $\rightarrow$ 6)- β -D-glucopyranosyl(1 $\rightarrow$ 3)]- α -L-arabinopyranosyl}-21-*O*- β -D-glucopyranoside 36
- 3 β ,20S,25-trihydroxydammar-23-ene-21,28-dioic acid
3-*O*-{[α -L-rhamnopyranosyl(1 $\rightarrow$ 2)][α -L-rhamnopyranosyl(1 $\rightarrow$ 6)- β -D-glucopyranosyl(1 $\rightarrow$ 3)]- α -L-arabinopyranosyl}-21-*O*- β -D-glucopyranoside 35
- 3 β ,20S-dihydroxydammar-24-ene-21,28-dioic acid 3-*O*-{[α -L-rhamnopyranosyl(1 $\rightarrow$ 2)][α -L-rhamnopyranosyl(1 $\rightarrow$ 6)- β -D-glucopyranosyl(1 $\rightarrow$ 3)]- α -L-arabinopyranosyl}-21-*O*- β -D-glucopyranoside 36
- 3 β ,20S-dihydroxydammar-24-ene-21,28-dioic acid 3-*O*-{[α -L-rhamnopyranosyl(1 $\rightarrow$ 2)][β -D-glucopyranosyl(1 $\rightarrow$ 3)]- α -L-arabinopyranosyl}-21-*O*- β -D-glucopyranoside 36
- 3 β ,20S-dihydroxydammar-24-ene-21,28-dioic acid 3-*O*-{[α -L-rhamnopyranosyl(1 $\rightarrow$ 2)][β -D-glucopyranosyl(1 $\rightarrow$ 3)]- α -L-arabinopyranosyl}-21-*O*- β -D-glucopyranoside 36
- 3 β ,20S-dihydroxydammar-24-ene-21,28-dioic acid 3-*O*-[β -D-glucopyranosyl(1 $\rightarrow$ 3)]- α -L-arabinopyranosyl]-21-*O*- β -D-glucopyranoside 35
- 3 β ,21 β ,22 β ,24-tetrahydroxy-12-en-3-*O*- α -L-rhamnopyranosyl-(1 $\rightarrow$ 3)-[α -L-rhamnopyranosyl(1 $\rightarrow$ 2)]- β -D-galactopyranosyl-(1 $\rightarrow$ 2)- β -D-glucuronopyranoside 107
- 3 β ,21 β ,22 β ,24-tetrahydroxy-12-en-3-*O*- α -L-rhamnopyranosyl-(1 $\rightarrow$ 3)-[α -L-rhamnopyranosyl(1 $\rightarrow$ 2)]- β -D-galactopyranosyl-(1 $\rightarrow$ 2)- β -D-glucuronopyranosyl-21-*O*- α -L-rhamnopyranoside 107
- 3 β ,23-dihydroxyurs-12,19(20)-dien-28-oic acid 28- β -D-glucopyranosyl ester 278
- 3 β ,23-dihydroxyurs-12,19(29)-dien-28-oic acid 28- β -D-glucopyranosyl ester 279
- 3 β ,23-dihydroxyurs-12,18(19)-dien-28-oic acid 28- β -D-glucopyranosyl ester 279
- (3 β ,5 α ,12 β ,14 β ,17 α)-3-(β -cymaropyranosyloxy)-8,14,17,20-tetrahydroxypregnan-12-yl benzoate 449
- (3 β ,5 α ,12 β ,14 β ,17 α)-3-(β -cymaropyranosyloxy)-8,14,17,20-tetrahydroxypregnan-12-yl cinnamate 449
- (3 β)-3-[(2-*O*-sulfo- β -D-glucopyranurosonyl)oxy]urs-20-en-28-oic acid 28-(2-*O*-sulfo- β -D-glucopyranosyl] ester 287
- (3 β)-3-{[6-deoxy- α -L-mannopyranosyl-(1 $\rightarrow$ 2)- α -L-arabinopyranosyl-(1 $\rightarrow$ 2)- β -D-glucopyranurosonyl]oxy}urs-20-en-28-oic acid 28-(2-*O*-sulfo- β -D-glucopyranosyl] ester 287
- 3 β -[(α -L-arabinopyranosyl)oxy]-19 β -hydroxyurs-12,20(30)-dien-28-oic acid 279
- 3 β -[(α -L-arabinopyranosyl)oxy]-urs-11,13(18)-dien-28-oic acid- β -D-glucopyranosyl ester 289
- 3 β -[(α -L-arabinopyranosyl)oxy]-urs-12,19(20)-dien-28-oic acid 279
- 3 β -[(α -L-arabinopyranosyl)oxy]-urs-12,19(29)-dien-28-oic acid 279
- 3 β -[(*O*- α -L-rhamnopyranosyl-(1 $\rightarrow$ 2)-*O*-[*O*- β -D-glucopyranosyl-(1 $\rightarrow$ 4)- α -L-rhamnopyranosyl-(1 $\rightarrow$ 3)]- β -D-glucopyranosyl)oxy]pregna-5,16-dien-20-one 435
- 3 β -*O*-{ α -L-rhamnopyranosyl-(1 $\rightarrow$ 3)-[β -D-xylopyranosyl-(1-2)]- β -D-glucopyranosyl-(1 $\rightarrow$ 4)-[β -D-glucopyranosyl-(1 $\rightarrow$ 2)]- α -L-arabinopyranoside]-16,28-dihydroxy-30-acetoxyoleana-12-en 116
- 3 β -[(*O*- α -L-rhamnopyranosyl-(1 $\rightarrow$ 6)-*O*- β -D-glucopyranosyl-(1 $\rightarrow$ 4)-*O*- β -D-glucopyranosyl-(1 $\rightarrow$ 4)-*O*- β -D-ribopyranosyl-(1 $\rightarrow$ 3)]-*O*- α -L-rhamnopyranosyl-(1 $\rightarrow$ 2)- α -L-arabinopyranosyl) oxy]olean-12-en-28-oic acid β -D-glucopyranosyl ester 146
- 3 β -*O*- β -D-galactopyranosyl-(1 $\rightarrow$ 3)- α -L-rhamnopyranosyl-(1 $\rightarrow$ 2)- α -L-arabinopyranosyl-23-hydroxyolean-12-en-28-oic acid 28-*O*- α -L-rhamnopyranosyl-(1 $\rightarrow$ 4)- β -D-glucopyranosyl-(1 $\rightarrow$ 6)- β -D-glucopyranosyl ester 163

- 3 β -[O- β -D-glucopyranosiduronic acid
(1 $\rightarrow$ 2)- β -D-glucopyranosyloxy]-machaerinic
acid γ -lactone 235
- 3 β -{O- β -D-glucopyranosyl-(1 $\rightarrow$ 2)-[O- α -L-
arabinopyranosyl(1 $\rightarrow$ 6)] β -D-
glucopyranosyloxy}-machaerinic acid
 γ -lactone 235
- 3 β -[[O- β -D-glucopyranosyl-(1 $\rightarrow$ 4)-O- β -D-
ribopyranosyl-(1 $\rightarrow$ 3)-O- α -L-
rhamnopyranosyl-(1 $\rightarrow$ 2)- α -L-
arabinopyranosyl]oxy]olean-12-en-28-oic
acid O- β -D-glucopyranosyl ester 146
- 3 β -O-[β -D-methylglucuronopyranosyl-(1 $\rightarrow$ 2)- β -
D-glucopyranosyl]-(20S,22S)-3 β ,22-
dihydroxyl-9,19-cycloanost-24-en-26,29-
dioic acid δ -lactone 294
- 3 β -O-L-arabinopyranosyl olean-12-en-28-oic
acid 28-O- β -D-glucopyranosyl ester 145
- 4''-O-acetylsaikosaponinind 97
- 5''-O-acetyl glycoside C 69
- 5 α -spirost-25(27)-ene-1 β ,3 α -diol-1-O-{O- α -L-
rhamnopyranosyl-(1 $\rightarrow$ 2)-O-[β -D-
xylopyranosyl-(1 $\rightarrow$ 3)]- β -D-fucopyranoside}
415
- 6'-methylesterof-3-O-[α -L-rhamnopyranosyl-
(1 $\rightarrow$ 2)-O- β -D-glucopyranosyl-(1 $\rightarrow$ 2)- β -D-
glucuronopyranosyl]-3 β ,16 β ,22 β ,24-
tetrahydroxy-olean-12-ene 107
- 6-O- β -D-glucopyranosyl-20-O- β -D-
glucopyranosyl-3 β ,6 α ,12 β ,20(S),25-
pentahydroxydammar-23-ene 41
- 6''-O-acetyl diplazioside VII 69
- 6'-O-acetyl glycoside B 69
- 7-oxomogroside II E 327
- 7 β ,25-dimethoxycucurbita-5(6),23(E)-dien-19-al
3-O- β -D-allopyranoside 340
- β -D-glucopyranosyl(1 $\rightarrow$ 2)- β -D-glucopyranosyl-
3-O-{ β -D-glucopyranosyl(1 $\rightarrow$ 2)-[α -L-
arabinopyranosyl(1 $\rightarrow$ 6)]- β -D-
glucopyranosyl}-oleanolate 145
- acanjaposide A 254
- acanjaposide B 254
- acanjaposide C 254
- acankoreoside A 56
- acankoreoside B 56
- acankoreoside C 56
- acankoreoside D 56
- acankoreoside E 56
- acankoreoside F 56
- acankoreoside G 56
- acankoreoside H 56
- acankoreoside I 56
- acantrifoside A 56
- ageratoside A₁ 215
- ageratoside A₂ 216
- ageratoside A₃ 216
- ageratoside A₄ 216
- ageratoside A₅ 216
- ageratoside B₁ 215
- ageratoside B₂ 215
- ageratoside C₁ 235
- albiziasaponin A 235
- albiziasaponin B 235
- albiziasaponin C 235
- albiziasaponin D 235
- amaranthus-saponin III 254
- anagallosaponin IX 86
- anagallosaponin VI 86
- anagallosaponin VII 86
- anagallosaponin VIII 86
- anhuienoside C 145
- anhuienoside D 145
- anhuienoside E 145
- anhuienoside F 146
- Aoibaclylin 340
- aralia-saponin IX 162
- aralia-saponin V 145
- aralia-saponin VI 162
- aralia-saponin VIII 161
- araliasaponin II 145
- araliasaponin VI 145
- araliasaponins V 135
- arboreasaponin A 396
- arboreasaponin B 396
- ardisicrenoside A 86
- ardisicrenoside B 86
- ardisimamilloside A 86
- ardisimamilloside B 86
- arganine A 160
- arganine B 160
- asiaticoside A 294
- asiaticoside B 294
- aspaflioside E 378
- aspaflioside F 378
- aspaoligonin A 378
- aspaoligonin B 378
- assamicin I 115

- assamicin II 115
 aster saponin G 161
 astersedifolioside B 162
 asteryunnanose A 161
 astramembranoside A 294
 astramembranoside B 301
 astraverrucin IV 294
 astraverrucin V 294
 astraverrucin VI 294
 atropurosides A 415
 atropurosides B 415
 atropurosides C 415
 atropurosides D 415
 atropurosides E 415
 atropurosides F 349
 atropurosides G 349
 auriculatusaponin A 251
- bacopasaponin D 1
 bacopasaponin E 1
 bacopasaponin G 1
 bacoside A₆ 1
 baptisiasaponin I 107
 beciumecine 1 160
 beciumecine 2 160
 bellidiastrosides B₃ 161
 bellidiastrosides U_{D2} 161
 bellidioside A 161
 bellisoside A 161
 bellisoside C 161
 bellisoside D 161
 bellisoside E 161
 bersimoside II methyl ester 107
 biondianoside E 449
 bodinioside A 277
 bodinioside B 277
 borivilianoside A 349
 borivilianoside B 349
 borivilianoside C 349
 borivilianoside D 350
 bourneioside A 56
 bourneioside B 56
 brevicuspisaponin 1 276
 brevicuspisaponin 2 276
 bryonioside A 327
 bryonioside B 327
 bryonioside C 327
 bryonioside E 327
 bryonioside F 327
- bryonioside G 327
 buddlejasaponin IVb 101
 butyroside B 160
 butyroside D 160
- callianthaside A 268
 calogenin 3-*O*- β -D-digitalopyranoside-20-*O*- β -D-
 canaropyranoside 451
 calogenin-3-*O*- β -D-glucopyranosyl-(1 $\rightarrow$ 6)- β -D-
 glucopyranosyl-(1 $\rightarrow$ 4)- β -D-3-*O*-
 methylfucoopyranoside-20-*O*- β -D-
 glucopyranoside 451
 camellioside A 251
 camellioside B 251
 camellioside C 251
 caradalzieloside A 450
 caradalzieloside B 450
 caradalzieloside C 450
 caradalzieloside D 450
 caradalzieloside E 450
 centellasaponin D 160
 ceparoside C 350
 ceparoside D 350
 certonardoside A 427
 certonardoside B 427
 certonardoside C 427
 certonardoside D 427
 certonardoside E 427
 certonardoside F 427
 certonardoside G 427
 certonardoside H 427
 certonardoside I 428
 certonardoside J 428
 chantrieroside A 396
 charantoside A 340
 charantoside B 340
 charantoside C 340
 charantoside I 340
 charantoside II 339
 charantoside III 339
 charantoside IV 339
 charantoside V 339
 charantoside VI 339
 charantoside VII 340
 charantoside VIII 340
 chiisanoside 56
 chilianoside A 10
 chilianoside B 10
 chilianoside C 10

- chilianoside D 10
 chilianoside E 9
 chilianoside F 9
 chilianoside G 9
 chilianoside H 10
 chilianoside I 10
 chilianoside J 10
 chilianoside K 9
 chilianoside L 9
 chlorogenin-3-*O*-[α -L-rhamnopyranosyl-(1 $\rightarrow$ 4)- β -D-glucopyranosyl-(1 $\rightarrow$ 3)]- β -D-glucopyranosyl-(1 $\rightarrow$ 3)- β -D-glucopyranosyl-(1 $\rightarrow$ 2)]- β -D-glucopyranosyl-(1 $\rightarrow$ 4)- β -D-galactopyranoside] 377
 clinopodiside G 101
 clinoposaponin IIIb 101
 clinoposaponin IX 97
 clinoposaponin Vb 101
 clinoposaponin VI 97
 clinoposaponin VIII 97
 clinoposaponin X 97
 clinoposaponin XI 97
 colocynthoside A 327
 colocynthoside B 340
 combreglucoside 160
 concinnoside A 235
 concinnoside B 235
 concinnoside C 235
 concinnoside D 235
 concinnoside E 235
 conyzasaponin F 161
 coumoside A 235
 cucurbitacin J 2-*O*- β -glucopyranoside 327
 curculigosaponin A 301
 curculigosaponin C 301
 curculigosaponin D 301
 curculigosaponin E 301
 curculigosaponin G 301
 curculigosaponin J 301
 cussosaponin A 56
 cussosaponin B 56
 cussosaponin C 56
 cyclamiretin A-3 β -*O*- α -L-rhamnopyranosyl-(1 $\rightarrow$ 3)]- β -D-glucopyranosyl-(1 $\rightarrow$ 3)]- β -D-xylopyranosyl-(1-2)]- β -D-glucopyranosyl-(1 $\rightarrow$ 4)]- β -D-glucopyranosyl-(1 $\rightarrow$ 2)]- α -L-arabinopyranoside 86
 cyclamiretin A-3 β -*O*- α -L-rhamnopyranosyl-(1 $\rightarrow$ 3)]- β -D-xylopyranosyl-(1 $\rightarrow$ 2)]- β -D-galactopyranosyl-(1 $\rightarrow$ 4)]- β -D-*O*-acetylglucopyranosyl-(1 $\rightarrow$ 2)]- α -L-arabinopyranoside 86
 cyclamiretin A-3 β -*O*- α -L-rhamnopyranosyl-(1 $\rightarrow$ 3)]- β -D-xylopyranosyl-(1 $\rightarrow$ 2)]- β -D-glucopyranosyl-(1 $\rightarrow$ 4)]- β -D-glucopyranosyl-(1 $\rightarrow$ 2)]- α -L-arabinopyranoside 86
 cyclocarioside B 1
 cyclocarioside C 1
 cyclopasifloside I 302
 cyclopasifloside II 302
 cyclopasifloside III 302
 cyclopasifloside IV 302
 cyclopasifloside V 302
 cyclopasifloside VI 302
 cynanoside E 471
 cynanoside F 471
 cynanoside G 471
 cynanoside H 471
 cynanoside I 471
 cynanoside J 471
 cynanoside K 471
 cynanoside L 471
 cynanoside M 471
 cynanoside N 471
 cynanoside O 471
 cynanoside P₁ 471
 cynanoside P₂ 471
 cynanoside P₃ 471
 cynanoside P₄ 471
 cynanoside P₅ 471
 cynanoside Q₁ 471
 cynanoside Q₂ 471
 cynanoside Q₃ 471
 cynanoside R₁ 471
 cynanoside R₂ 471
 cynanoside R₃ 471
 cynatratoside B 471
 deacetylomentoside I 294
 dehydroazukisaponin V methyl ester 107
 deistelianoside A 396
 deistelianoside B 416
 denin 449
 depressoside C 294
 depressoside D 294
 desacylbellidoside B₄ 161
 dianchinenoside C 216

- dianchinenoside D 215
 dioscoreside A 351
 dioscoreside B 351
 diosegenin-3-*O*- β -D-glucopyranosyl-(1 $\rightarrow$ 4)- α -L-rhamnopyranosyl-(1-4)- β -D-glucopyranosyl-(1 $\rightarrow$ 4)-[α -L-rhamnopyranosyl-(1 $\rightarrow$ 2)]- β -D-glucopyranoside 395
 diplazioside I 69
 diplazioside II 69
 diplazioside III 69
 diplazioside IV 69
 diplazioside V 69
 diplazioside VI 69
 diplazioside VII 69
 diplocisin 233
 dracaenoside C 435
 dracaenoside D 435
 draconin A 415
 draconin B 415
 draconin C 415

 eclalbasaponin IX 266
 eclalbasaponin VII 266
 eclalbasaponin VIII 266
 eclalbasaponin X 266
 elephanoside B 349
 elephanoside C 351
 elephanoside D 351
 elephanoside E 350
 elephanoside F 350
 eryloside G 310
 eryloside H 310
 eryloside I 310
 eryloside J 310

 fargoside A 254
 fargoside B 254
 fargoside C 254
 fargoside D 254
 filiasparoside A 395
 filiasparoside B 395
 filiasparoside C 377
 filiasparoside D 377
 floralginsenoside A 41
 floralginsenoside B 41
 floralginsenoside C 19
 floralginsenoside D 19
 floralginsenoside E 9
 floralginsenoside F 19
 floralginsenoside G 19
 floralginsenoside K 19
 floralginsenoside O 19
 floralginsenoside P 20
 floralquinquenoside A 10
 floralquinquenoside B 10
 floralquinquenoside C 10
 floralquinquenoside D 20
 floralquinquenoside E 41
 floralquinquenoside H 20
 floralquinquenoside I 41
 floralquinquenoside J 41
 floralquinquenoside La 41
 fomitocide A 310
 fomitocide B 310
 fomitocide C 310
 fomitocide D 310
 fomitocide E 310
 fomitocide F 310
 fomitocide G 310
 fomitocide H 310
 fomitocide I 310
 fomitocide J 310
 furcreastatin 395

 gamboukokoenside A 116
 gamboukokoenside B 116
 ginsenoside Rh₄ 10
 ginsenoside Rz₁ 10
 ginsenoside-R_{OA} 146
 gleditsioside H 145
 gleditsioside J 162
 glinuside A 69
 glinuside B 69
 glinuside C 69
 glinuside D 69
 glinuside E 69
 goyaglycoside-a 339
 goyaglycoside-b 339
 goyaglycoside-c 339
 goyaglycoside-d 340
 goyaglycoside-e 339
 goyaglycoside-f 339
 goyaglycoside-h 327
 gymnoside-f 244
 gypsophilinoside 56

- hederagenin 3-*O*- β -D-glucopyranosyl-(1 $\rightarrow$ 4)- β -D-glucopyranosyl-(1 $\rightarrow$ 3)- α -L-rhamnopyranosyl-(1 $\rightarrow$ 2)- α -L-arabinopyranoside 136
 hederagenin 3-*O*-[β -D-glucopyranosyl-(1 $\rightarrow$ 4)- β -D-glucopyranosyl-(1 $\rightarrow$ 4)- β -D-glucopyranosyl]-28-*O*- β -D-glucopyranoside 163
 helixoside B 145
 hemeroside A 415
 hemeroside B 377
 herniaria saponin 3 215
 hoodigoside L 451
 hoodigoside M 451
 hoodigoside N 451
 hoodigoside O 451
 hoodigoside P 451
 hydrocosisaponin A 115
 hydrocosisaponin B 115
 hydrocosisaponin C 115
 hydrocosisaponin D 115
 hydrocosisaponin E 115
 hydrocosisaponin F 116

 icogenin 1 349
 ilexoside XXXIII 199
 indicasaponin A 268
 Inermiside I 249
 inermiside II 248
 inermoside 56
 isochiisanoside 56

 jinfushanoside A 327
 jinfushanoside B 327
 jinfushanoside C 327
 jinfushanoside D 327
 jujuboside C 1
 julibroside J₂₈ 161
 julibrosides J₉ 161
 junceoside 107

 kahiricoside I 294
 kahiricoside II 301
 kahiricoside III 301
 kahiricoside IV 301
 kahiricoside V 301
 kakisaponin B 277
 kakisaponin C 277
 karaviloside IX 339
 karaviloside VI 340
 karaviloside VII 339
 karaviloside VIII 339
 karaviloside X 339
 karaviloside XI 339
 khekadaengoside A 327
 khekadaengoside B 327
 khekadaengoside C 327
 khekadaengoside D 327
 khekadaengoside E 327
 khekadaengoside F 327
 khekadaengoside G 340
 khekadaengoside H 340
 khekadaengoside I 340
 khekadaengoside J 340
 khekadaengoside M 327
 khekadaengoside N 327
 kidjolanin-3-*O*- β -D-glucopyranosyl-(1 $\rightarrow$ 4)- β -D-cymaropyranosyl-(1 $\rightarrow$ 4)- β -D-cymaropyranosyl-(1 $\rightarrow$ 4)- β -D-oleandropyranoside 435
 kidjoranin 3-*O*- α -diginopyranosyl-(1 $\rightarrow$ 4)- β -cymaropyranoside 435
 kidjoranin 3-*O*- β -digitoxopyranoside 435
 koryoginsenoside R₂ 19
 kuguaglycoside A 327
 kuguaglycoside B 327
 kuguaglycoside D 327
 kuguaglycoside E 327
 kuguaglycoside F 327
 kuguaglycoside G 327
 kuguaglycoside H 327

 laetiposide E 310
 laetiposide F 310
 laetiposide G 310
 latifoloside B 162
 latifoloside C 162
 leiyemudanoside A 161
 leiyemudanoside B 161
 leiyemudanoside C 162
 leonticin D 161
 leonticin E 145
 leonticin F 162
 leonticin G 145
 leonticin H 162
 lindernioside B methyl ester 254
 lotoidesid C 69
 lotoideside A 69

- lotoideside B 69
 lotoideside D 69
 lotoideside E 69
 lotoideside F 69
 lotoidoside B 69
 lotoidoside C 69
 lotoside I 1
 lotoside II 1
 lucilianoside A 319
 lucilianoside B 319
 lucilianoside C 319
 lucilianoside D 319
 lucilianoside E 319
 lyconoside Ia 396
 lyconoside Ib 396
 lyconoside II 396
 lyconoside III 396
- mabioside A 1
 mabioside D 1
 madlongiside C 160
 madlongiside D 160
 maesabalide I 86
 maesabalide II 86
 maesabalide III 86
 maesabalide IV 86
 maesabalide V 86
 maesabalide VI 86
 maesasaponin I 86
 maesasaponin IV₃ 86
 maesasaponin V₂ 86
 maesasaponin VI₂ 86
 maesasaponin VI₃ 86
 marsin 434
 marstenacisside A 449
 marstenacisside B 449
 marstomentoside S 451
 masonoside C 161
 metaplexigenin-3-*O*- β -D-digitalopyranosyl-(1 $\rightarrow$ 4)- β -D-oleandropyranosyl-(1 $\rightarrow$ 4)- β -D-cymaropyranoside 435
 metaplexigenin-3-*O*- β -D-thevetopyranosyl-(1 $\rightarrow$ 4)- β -D-ole-andropyranosyl-(1 $\rightarrow$ 4)- β -D-cymaropyranosyl-(1 $\rightarrow$ 4)- β -D-canaropyranoside 435
 mimusin 161
 mogroside II B 327
 monepaloside G 146
 monepaloside H 146
 monepaloside I 146
 monepaloside J 146
 munronoside I 47
 munronoside II 47
 munronoside III 47
 munronoside IV 47
 mussaendoside O (acetate) 302
 mussaendoside P 302
 mussaendoside S 233
 mussaendoside U 302
 mutongsaponin A 254
 mutongsaponin B 254
 mutongsaponin D 254
- namonin A 415
 namonin B 415
 namonin C 415
 namonin D 415
 namonin E 349
 namonin F 351
 neoprotodioscin 349
 neosibiricoside A 396
 neosibiricoside B 396
 neosibiricoside C 395
 neosibiricoside D 395
 nigaichigoside F1 268
 nigrumnin II 395
 nipponoside E 254
 notoginenoside R₈ 10
 notoginenoside R₉ 10
 notoginsenoside B 20
 notoginsenoside C 20
 notoginsenoside E 19
 notoginsenoside G 20
 notoginsenoside H 41
 notoginsenoside I 20
 notoginsenoside M 41
 notoginsenoside N 41
 notoginsenoside Rw1 41
 notoginsenoside Rw2 10
 notoginsenoside ST-1 10
 notoginsenoside ST-2 9
 notoginsenoside ST-3 9
 notoginsenoside ST-5 9
 notoginsenosides A 19
 nudicaucin A 254
 oblonganoside A 278

- oblonganoside B 278
- oblonganoside C 279
- oblonganoside D 279
- oblonganoside E 279
- oblonganoside F 279
- oblonganoside H 268
- oblonganoside I 268
- oblonganoside J 268
- oleanolic acid
 - 3-*O*-[β -D-glucuronopyranoside-6-*O*-butyl ester]-28-*O*- β -D-glucopyranoside 145
- oleanolic acid-3-*O*- α -L-rhamnopyranosyl(1 $\rightarrow$ 3)-6'-*O*-methyl- β -D-glucopyranosyl-28-*O*- β -D-glucopyranoside 144
- ophiopogonin E 396
- orchidastroside A 377
- orchidastroside B 377
- orchidastroside C 377
- orchidastroside D 377
- orchidastroside E 377
- orchidastroside F 377
- otophylloside I 435
- otophylloside K 435
- otophylloside L 435
- otophylloside M 435

- padelaoside A 416
- padelaoside B 416
- parisvietnaside A 396
- parisyunnanoside A 350
- parisyunnanoside B 350
- parisyunnanoside C 396
- penicilloside A 449
- penicilloside B 449
- penicilloside C 449
- pentandroside A 428
- pentandroside B 428
- pentandroside C 428
- pentandroside D 428
- pentandroside E 428
- pentandroside F 349
- periandrin V dimethyl ester 244
- perisepiumoside A 451
- perisepiumoside B 451
- perisepiumoside C 435
- perisepiumoside E 435
- pitheduloside B 136
- pitheduloside C 136
- pitheduloside F 136

- pitheduloside G 136
- platycoside G1 160
- platycoside G2 160
- platycoside G3 161
- polybosaponin A 107
- polygalasaponin XI 161
- polygalasaponin XII 199
- polygalasaponin XIV 199
- polygalasaponin XLII 215
- polygalasaponin XLIII 215
- polygalasaponin XLIV 215
- polygalasaponin XLV 215
- polygalasaponin XLVI 215
- polygalasaponin XV 199
- polygalasaponin XVI 199
- polygalasaponin XVII 199
- polygalasaponin XVIII 199
- polygalasaponin XX 136
- polygalasaponin XXI 215
- polygalasaponin XXII 215
- polygalasaponin XXIII 215
- polygalasaponin XXIX 215
- polygalasaponin XXV 101
- polygalasaponin XXVI 101
- polygalasaponin XXVII 246
- polygalasaponin XXVIII 215
- polygalasaponin XXX 215
- polygalasaponin XXXI 215
- polygonatoside A 395
- polygonatoside B 395
- polygonatoside C 395
- polysciasoside A 9
- pomolic-acid-28-*O*- β -D-glucopyranosyl ester 268
- pregna-20-en-3-*O*- α -fucopyranoside 452
- pregna-5,20-dien-3-*O*- α -fucopyranoside 452
- protochiisanoside 56
- pterocaryoside A 1
- pterocaryoside B 1
- ptilosaponoside A 452
- ptilosaponoside B 452
- pulsatilloside D 56
- pyrocincholic acid
 - 3 β -*O*- β -6-deoxy-D-glucopyranoside-28-*O*- β -D-glucopyranoside 248

- quadranoside VI 278
- quadranoside VII 279
- quadranoside VIII 279

- quinaside A 254
 quinaside B 254
 quinaside C 254
 quinaside D 254
 quinquenoside I 20
 quinquenoside II 20
 quinquenoside III 20
 quinquenoside IV 20
- racemoside A 377
 randiasaponin I 279
 randiasaponin II 268
 randiasaponin III 268
 randiasaponin IV 268
 rarasaponin I 136
 rarasaponin II 136
 rarasaponin III 136
 rarasaponin IV 136
 rarasaponin V 136
 rarasaponin VI 136
 rivaloside C 161
 rotundic acid-28-*O*- β -D-glucopyranosyl ester
 268
 rubelloside C 248
 rubelloside D 249
 rubuside A 279
 rubuside B 279
 rubuside C 279
 rubuside D 278
 rubuside E 279
 rubuside F 279
 rubuside G 289
 rubuside H 289
 russelloside A 451
 russelloside B 451
 russelloside C 450
 russelloside D 450
- sachunoside 56
 saikosaponin O 101
 sandrosaponin II 97
 sandrosaponin III 97
 sandrosaponin IV 97
 sandrosaponin V 97
 sandrosaponin VIII 101
 saniculasaponin I 115
 saniculasaponin II 115
 saniculasaponin III 115
 saniculasaponin IV 115
 saniculasaponin IX 116
 saniculasaponin V 116
 saniculasaponin VI 116
 saniculasaponin VII 116
 saniculasaponin VIII 116
 saniculasaponin X 116
 saniculasaponin XI 116
 sapimukoside A 47
 sapimukoside B 47
 sapimukoside C 47
 sapimukoside D 47
 sapimukoside E 47
 sapimukoside F 47
 sapimukoside G 47
 sapimukoside H 47
 sapimukoside I 47
 sapimukoside J 47
 sapinmusaponin A 10
 sapinmusaponin B 10
 sapinmusaponin C 9
 sapinmusaponin D 9
 sapinmusaponin E 9
 sapinmusaponin F 47
 sapinmusaponin G 47
 sapinmusaponin H 47
 sapinmusaponin I 47
 sapinmusaponin J 47
 sapinmusaponin O 9
 sapinmusaponin P 9
 sapinmusaponin Q 47
 sapinmusaponin R 47
 saponin III A₂ 115
 saponin III A₃ 115
 saponin III B₂ 115
 saponin III C₄ 115
 sarsasapogenin M 378
 sarsasapogenin N 378
 scabrioside A 268
 scabrioside B 268
 scabrioside C 268
 scabrioside D 268
 scillasaponin C 310
 scillasaponin D 310
 scillasaponin E 310
 scillasaponin F 310
 scillasaponin G 310
 scorzoneroside B 242
 scorzoneroside C 242
 securioside A 216

- securioside B 216
 sessilioside 56
 shatavarin I 349
 shatavarin IV 377
 shatavarin IX 377
 shatavarin VII 396
 shatavarin VIII 377
 shatavarin X 377
 shatavaroside A 377
 shatavaroside B 377
 shimadoside A 162
 sideroxyloside B 161
 sieberoside I 294
 sieberoside II 294
 sigmoside C 107
 sigmoside D 107
 smilacinoside A 396
 smilacinoside B 396
 smilacinoside C 350
 smilaxchinoside A 350
 smilaxchinoside B 350
 smilaxchinoside C 350
 smilaxchinoside D 351
 snatzkein C 56
 snatzkein D 56
 solanigroside C 395
 solanigroside D 395
 solanigroside E 395
 solanigroside G 378
 solanigroside H 395
 sorbifoliaside 116
 soyasaponin Bh 235
 spergulin A 69
 spergulin B 69
 spilacleoside A 416
 spilacleoside B 416
 spinoside C₄ 199
 spinoside C1 163
 spinoside C3 254
 spinoside C5 161
 spinoside C6 254
 spinoside C7 254
 spinoside D2 233
 spinoside D3 233
 spinoside D1 233
 spongipregnoside A 435
 spongipregnoside B 435
 spongipregnoside C 435
 spongipregnoside D 435
 stemmoside C 434
 stemmoside D 434
 stemmoside E 434
 stemmoside F 434
 stemmoside G 434
 stemmoside H 434
 stemmoside I 434
 stemmoside J 434
 stemmoside K 434
 succulentoside A 69
 succulentoside B 69
 succulentoside C 69
 succulentoside D 69
 succulentoside E 69
 succulentoside F 69
 surculoside B 415
 surculoside C 415
 symphytoxin B 162
 thalicoside F 86
 the potassium salt of
 29-hydroxylogisipinogenin
 3-*O*- β -D-glucopyranosyl(1 $\rightarrow$ 3)- β -D-
 glucuronopyranoside 116
 tomentoside III 294
 tomentoside IV 294
 TR-saponin A methyl ester 216
 TR-saponin B methyl ester 216
 TR-saponin C methyl ester 216
 tragopogonoside I methyl ester 235
 trigoneoside Xa 349
 trigoneoside Xb 349
 trigoneoside XIb 349
 trigoneoside XIIa 350
 trigoneoside XIIb 350
 tropeoside A1 349
 tropeoside B1 349
 tuberoside A 350
 tuberoside B 350
 tupichinin A 435
 turrillanoside 396
 tylophoside A 471
 tylophoside B 471
 tylophoside C 471
 tylophoside D 471
 tylophoside E 471
 vaccaroside E 199
 vaccaroside F 246

- vaccaroside G 198
vaccaroside H 246
volubiloside A 451
volubiloside B 451
- wattoside G 416
wattoside I 395
wattoside J 416
wujiapioside B 56
- yamogenin-3-*O*- α -L-rhamnopyranosyl-(1 $\rightarrow$ 4)- β -
D-glucopyranosyl-(1 $\rightarrow$ 4)-[α -L-
rhamnopyranosyl-(1 $\rightarrow$ 2)]- β -D-
glucopyranoside 395
- yemuoside YM₁₇ 254
yemuoside YM₁₈ 254
yemuoside YM₁₉ 254
- zygophyloside G 268
zygophyloside H 268
zygophyloside I 287
zygophyloside L 287
zygophyloside N 291

Index of molecular formula of compounds

C ₁₀₁ H ₁₆₀ O ₄₉ 161	C ₃₆ H ₅₆ O ₁₃ 268
C ₁₀₄ H ₁₆₅ NO ₄₈ 161	C ₃₆ H ₅₆ O ₁₃ S 56
C ₂₇ H ₄₀ O ₈ 435	C ₃₆ H ₅₆ O ₇ 310, 339
C ₂₇ H ₄₂ O ₅ 452	C ₃₆ H ₅₆ O ₉ 278, 279, 289
C ₂₇ H ₄₂ O ₇ 434	C ₃₆ H ₅₈ O ₁₀ 268, 277
C ₂₇ H ₄₂ O ₈ 435	C ₃₆ H ₅₈ O ₁₁ 161, 268, 277
C ₂₇ H ₄₄ O ₁₁ S 452	C ₃₆ H ₅₈ O ₁₂ 160, 268, 277
C ₂₇ H ₄₄ O ₁₄ S ₂ 452	C ₃₆ H ₅₈ O ₁₃ 450
C ₂₇ H ₄₄ O ₅ 452	C ₃₆ H ₅₈ O ₈ 310
C ₃₂ H ₅₀ O ₁₀ 415	C ₃₆ H ₅₈ O ₉ 97, 268, 327, 339, 340
C ₃₂ H ₅₂ O ₁₁ 416	C ₃₆ H ₆₀ O ₁₀ 294, 302, 327, 339
C ₃₃ H ₅₀ O ₁₀ 415	C ₃₆ H ₆₀ O ₇ 107
C ₃₃ H ₅₀ O ₁₁ 415, 435	C ₃₆ H ₆₀ O ₈ 10, 107
C ₃₃ H ₅₂ O ₁₅ 395	C ₃₆ H ₆₀ O ₉ 1, 301, 327
C ₃₃ H ₅₂ O ₈ 349	C ₃₆ H ₆₂ O ₁₀ 9, 10, 327
C ₃₃ H ₅₄ O ₈ 294	C ₃₆ H ₆₂ O ₁₁ 9, 10
C ₃₃ H ₅₄ O ₉ 415	C ₃₆ H ₆₂ O ₁₁ S 266
C ₃₃ H ₅₆ O ₁₄ 449	C ₃₆ H ₆₂ O ₈ 266
C ₃₄ H ₅₂ O ₈ 254	C ₃₆ H ₆₂ O ₉ 10
C ₃₄ H ₅₄ O ₈ 251	C ₃₇ H ₅₄ O ₁₀ 449
C ₃₄ H ₅₆ O ₁₀ 451	C ₃₇ H ₅₄ O ₉ 294
C ₃₄ H ₅₆ O ₁₂ 450, 451	C ₃₇ H ₅₆ O ₉ 294
C ₃₄ H ₅₈ O ₁₃ 449	C ₃₇ H ₅₈ O ₁₀ 294
C ₃₅ H ₅₂ O ₁₀ 449	C ₃₇ H ₅₈ O ₈ 310, 340
C ₃₅ H ₅₄ O ₁₀ 116, 254	C ₃₇ H ₅₈ O ₉ 310, 340
C ₃₅ H ₅₄ O ₇ 279, 310	C ₃₇ H ₆₀ O ₁₀ 310
C ₃₅ H ₅₄ O ₈ 279, 310	C ₃₇ H ₆₀ O ₈ 310, 339
C ₃₅ H ₅₆ O ₁₀ 160, 276	C ₃₇ H ₆₀ O ₉ 294, 310, 339, 340
C ₃₅ H ₅₆ O ₁₁ 116	C ₃₇ H ₆₂ O ₁₀ 302
C ₃₅ H ₅₆ O ₇ 248	C ₃₇ H ₆₂ O ₁₂ 302
C ₃₅ H ₅₆ O ₈ 248	C ₃₇ H ₆₂ O ₈ 327
C ₃₅ H ₅₆ O ₉ 276	C ₃₈ H ₅₄ O ₁₄ 327
C ₃₅ H ₅₈ O ₁₀ 451	C ₃₈ H ₅₈ O ₁₀ 278
C ₃₅ H ₅₈ O ₁₁ 451	C ₃₈ H ₆₀ O ₁₁ 268
C ₃₅ H ₅₈ O ₁₁ S 69	C ₃₈ H ₆₀ O ₁₃ 395, 396, 415
C ₃₅ H ₅₈ O ₉ 1	C ₃₈ H ₆₀ O ₁₄ 415
C ₃₅ H ₆₁ NaO ₁₃ S 428	C ₃₈ H ₆₀ O ₈ 310
C ₃₅ H ₆₁ NaO ₁₄ S 428	C ₃₈ H ₆₂ O ₁₀ 301
C ₃₆ H ₄₈ O ₁₀ 435	C ₃₈ H ₆₂ O ₁₂ 377
C ₃₆ H ₅₂ O ₁₀ 340	C ₃₈ H ₆₂ O ₁₃ 349, 378, 416, 428
C ₃₆ H ₅₂ O ₁₁ 327, 340	C ₃₈ H ₆₂ O ₁₄ 428
C ₃₆ H ₅₄ O ₁₁ 199	C ₃₈ H ₆₂ O ₁₅ 415
C ₃₆ H ₅₄ O ₁₂ 327	C ₃₈ H ₆₂ O ₉ 339, 340
C ₃₆ H ₅₄ O ₁₃ 327	C ₃₈ H ₆₄ O ₁₁ 9, 10
C ₃₆ H ₅₄ O ₈ 340	C ₃₈ H ₆₄ O ₁₂ 9, 10
C ₃₆ H ₅₆ O ₁₀ 101, 278, 279, 289, 292	C ₃₉ H ₅₈ O ₁₀ 294
C ₃₆ H ₅₆ O ₁₁ 278, 279	C ₃₉ H ₅₈ O ₁₁ 294

- $C_{39}H_{60}O_{10}$ 294
 $C_{39}H_{60}O_{11}$ 254
 $C_{39}H_{60}O_{12}$ 254
 $C_{39}H_{60}O_{15}$ 395
 $C_{39}H_{60}O_{16}$ 435
 $C_{39}H_{60}O_{17}$ 435
 $C_{39}H_{62}O_{12}$ 396
 $C_{39}H_{62}O_{14}$ 396, 415, 416
 $C_{39}H_{62}O_{15}$ 349, 395
 $C_{39}H_{62}O_{15}S$ 396
 $C_{39}H_{62}O_{16}$ 349
 $C_{39}H_{64}O_{11}$ 69
 $C_{39}H_{64}O_{12}$ 428
 $C_{39}H_{64}O_{13}$ 428
 $C_{39}H_{64}O_{14}$ 349, 378
 $C_{39}H_{64}O_{15}$ 416
 $C_{39}H_{64}O_{16}$ 350
 $C_{39}H_{65}NaO_{15}S$ 427
 $C_{39}H_{65}NaO_{16}S$ 427
 $C_{39}H_{65}NaO_{17}S$ 427
 $C_{39}H_{66}O_{12}$ 428
 $C_{39}H_{67}NaO_{16}S$ 427
 $C_{39}H_{67}NaO_{17}S$ 427
 $C_{39}H_{68}O_{13}$ 427
 $C_{39}H_{68}O_{14}$ 428
 $C_{40}H_{60}O_{14}$ 135, 471
 $C_{40}H_{60}O_{15}$ 415
 $C_{40}H_{62}O_{13}$ 254
 $C_{40}H_{62}O_{16}$ 435
 $C_{40}H_{64}O_{13}$ 254
 $C_{40}H_{64}O_{14}$ 428
 $C_{40}H_{64}O_{16}$ 435
 $C_{40}H_{66}O_{17}$ 450, 451
 $C_{40}H_{68}O_{12}$ 69
 $C_{41}H_{46}O_{13}$ 246
 $C_{41}H_{62}O_{13}$ 116, 471
 $C_{41}H_{62}O_{14}$ 254, 449, 471
 $C_{41}H_{62}O_{15}$ 471
 $C_{41}H_{62}O_{16}$ 235, 471
 $C_{41}H_{64}O_{12}$ 278, 279, 289
 $C_{41}H_{64}O_{13}$ 235, 279
 $C_{41}H_{64}O_{14}$ 279
 $C_{41}H_{64}O_{15}$ 69, 246
 $C_{41}H_{66}O_{12}$ 145, 248
 $C_{41}H_{66}O_{13}$ 1, 268
 $C_{41}H_{66}O_{14}$ 160, 242, 268, 294
 $C_{41}H_{66}O_{15}$ 35
 $C_{41}H_{68}O_{12}$ 69
 $C_{41}H_{68}O_{13}$ 69, 301
 $C_{41}H_{70}O_{13}$ 19
 $C_{41}H_{70}O_{14}$ 1, 10, 301
 $C_{41}H_{70}O_{15}$ 19
 $C_{42}H_{62}O_{13}$ 471
 $C_{42}H_{62}O_{14}$ 471
 $C_{42}H_{62}O_{15}$ 340
 $C_{42}H_{62}O_{16}$ 415
 $C_{42}H_{64}O_{14}$ 235, 471
 $C_{42}H_{64}O_{15}$ 471
 $C_{42}H_{64}O_{16}$ 327, 340, 471
 $C_{42}H_{64}O_{17}$ 254, 327
 $C_{42}H_{66}O_{11}$ 310
 $C_{42}H_{66}O_{13}$ 1, 145
 $C_{42}H_{66}O_{14}$ 235
 $C_{42}H_{66}O_{15}$ 101, 199, 233, 242, 471
 $C_{42}H_{66}O_{16}$ 215, 216
 $C_{42}H_{66}O_{18}S$ 268
 $C_{42}H_{66}O_{20}S_2$ 287
 $C_{42}H_{67}KO_{14}$ 116
 $C_{42}H_{67}KO_{15}$ 116
 $C_{42}H_{68}O_{12}$ 47
 $C_{42}H_{68}O_{13}$ 97, 294, 327, 339
 $C_{42}H_{68}O_{14}$ 56, 69, 97, 136, 161, 327, 339, 435
 $C_{42}H_{68}O_{15}$ 69
 $C_{42}H_{70}O_{12}$ 10
 $C_{42}H_{70}O_{13}$ 1, 9, 301, 327
 $C_{42}H_{70}O_{14}$ 1, 294, 301, 327, 451
 $C_{42}H_{70}O_{15}$ 107, 294, 301, 327
 $C_{42}H_{72}O_{12}$ 1, 9
 $C_{42}H_{72}O_{13}$ 10
 $C_{42}H_{72}O_{14}$ 9, 10, 327
 $C_{42}H_{72}O_{15}$ 9, 10, 19, 20, 41
 $C_{42}H_{72}O_{16}$ 41
 $C_{42}H_{72}O_{18}$ 396
 $C_{43}H_{64}O_{16}$ 294
 $C_{43}H_{66}O_{14}$ 244
 $C_{43}H_{66}O_{15}$ 235
 $C_{43}H_{67}NO_{13}$ 235
 $C_{43}H_{68}O_{14}$ 69, 145
 $C_{43}H_{68}O_{16}$ 233, 415
 $C_{43}H_{68}O_{17}$ 395, 415
 $C_{43}H_{70}O_{12}$ 47
 $C_{43}H_{70}O_{13}$ 47, 435
 $C_{43}H_{70}O_{16}$ 377
 $C_{43}H_{70}O_{17}$ 378
 $C_{43}H_{72}O_{13}$ 327
 $C_{43}H_{72}O_{15}$ 1
 $C_{43}H_{72}O_{16}$ 302
 $C_{43}H_{72}O_{17}$ 302

- $C_{43}H_{74}O_{13}$ 9
 $C_{43}H_{74}O_{14}$ 9
 $C_{43}H_{74}O_{15}$ 9
 $C_{44}H_{62}O_{13}$ 435
 $C_{44}H_{64}O_{17}$ 415
 $C_{44}H_{66}O_{14}$ 450
 $C_{44}H_{66}O_{16}$ 294
 $C_{44}H_{68}O_{18}$ 415
 $C_{44}H_{68}O_{19}$ 351
 $C_{44}H_{70}O_{14}$ 97
 $C_{44}H_{70}O_{16}$ 69, 161, 415
 $C_{44}H_{70}O_{18}$ 251, 395
 $C_{44}H_{72}O_{12}$ 47
 $C_{44}H_{72}O_{14}$ 327
 $C_{44}H_{72}O_{15}$ 294
 $C_{44}H_{72}O_{16}$ 377
 $C_{44}H_{72}O_{17}$ 377, 378
 $C_{44}H_{72}O_{18}$ 378
 $C_{44}H_{74}O_{19}$ 349
 $C_{44}H_{76}O_{18}$ 428
 $C_{45}H_{66}O_{18}$ 254
 $C_{45}H_{68}O_{18}$ 254
 $C_{45}H_{70}O_{19}$ 395
 $C_{45}H_{70}O_{20}$ 395, 435
 $C_{45}H_{72}O_{17}$ 396
 $C_{45}H_{72}O_{18}$ 350, 351, 395, 396, 415
 $C_{45}H_{72}O_{19}$ 396
 $C_{45}H_{74}O_{17}$ 377, 378
 $C_{45}H_{74}O_{18}$ 350, 377, 378
 $C_{45}H_{74}O_{20}$ 351
 $C_{45}H_{76}O_{16}$ 69
 $C_{45}H_{76}O_{18}$ 349
 $C_{45}H_{76}O_{19}$ 349
 $C_{45}H_{76}O_{20}$ 350
 $C_{45}H_{82}O_{19}$ 396
 $C_{46}H_{70}O_{19}$ 145, 415, 471
 $C_{46}H_{72}O_{15}$ 101
 $C_{46}H_{72}O_{17}$ 235, 254
 $C_{46}H_{74}O_{14}$ 86
 $C_{46}H_{74}O_{16}$ 136
 $C_{46}H_{74}O_{19}$ 396
 $C_{46}H_{76}O_{16}$ 136
 $C_{46}H_{76}O_{17}$ 86
 $C_{46}H_{76}O_{18}$ 254, 349
 $C_{46}H_{76}O_{22}$ 451
 $C_{46}H_{78}O_{17}$ 41
 $C_{46}H_{78}O_{18}$ 1, 428
 $C_{46}H_{78}O_{19}$ 349
 $C_{47}H_{70}O_{14}$ 294
 $C_{47}H_{72}O_{18}$ 254, 471
 $C_{47}H_{72}O_{19}$ 254, 449, 471
 $C_{47}H_{72}O_{20}$ 471
 $C_{47}H_{74}O_{17}$ 1, 86, 235
 $C_{47}H_{74}O_{18}$ 235, 254, 268, 396
 $C_{47}H_{74}O_{19}$ 254
 $C_{47}H_{74}O_{20}$ 69
 $C_{47}H_{74}O_{21}$ 396
 $C_{47}H_{76}O_{16}$ 47, 107, 291
 $C_{47}H_{76}O_{17}$ 56, 69, 101, 135, 136, 162, 249, 268
 $C_{47}H_{76}O_{18}$ 162, 254, 268, 377
 $C_{47}H_{76}O_{19}$ 1, 161, 242, 254
 $C_{47}H_{76}O_{20}$ 35, 161
 $C_{47}H_{78}O_{16}$ 69
 $C_{47}H_{78}O_{17}$ 20, 69
 $C_{47}H_{78}O_{18}$ 301
 $C_{47}H_{78}O_{20}$ 451
 $C_{47}H_{80}O_{17}$ 19, 69
 $C_{47}H_{80}O_{18}$ 9, 69
 $C_{47}H_{80}O_{19}$ 1, 41
 $C_{48}H_{72}O_{19}$ 471
 $C_{48}H_{72}O_{20}$ 235
 $C_{48}H_{74}O_{16}$ 294
 $C_{48}H_{74}O_{17}$ 107
 $C_{48}H_{74}O_{18}$ 56
 $C_{48}H_{74}O_{19}$ 56, 254, 471
 $C_{48}H_{74}O_{20}$ 56, 199, 233, 471
 $C_{48}H_{74}O_{21}$ 471
 $C_{48}H_{75}NO_{17}$ 235
 $C_{48}H_{75}O_{23}S^{-}$ 97, 101
 $C_{48}H_{75}O_{24}S^{-}$ 97
 $C_{48}H_{76}O_{17}$ 136
 $C_{48}H_{76}O_{18}$ 56, 108, 235
 $C_{48}H_{76}O_{19}$ 56, 107, 108, 161, 199, 233
 $C_{48}H_{76}O_{20}$ 47, 56, 199, 233, 471
 $C_{48}H_{76}O_{21}$ 215
 $C_{48}H_{76}O_{23}$ 319
 $C_{48}H_{77}O_{22}S^{-}$ 97
 $C_{48}H_{78}O_{16}$ 47
 $C_{48}H_{78}O_{17}$ 97
 $C_{48}H_{78}O_{18}$ 56, 101, 163
 $C_{48}H_{78}O_{19}$ 56, 101, 160, 161, 235
 $C_{48}H_{78}O_{20}$ 47
 $C_{48}H_{80}O_{18}$ 327
 $C_{48}H_{80}O_{19}$ 1, 20, 56, 327
 $C_{48}H_{80}O_{20}$ 451
 $C_{48}H_{82}O_{18}$ 20, 327
 $C_{48}H_{82}O_{19}$ 41
 $C_{48}H_{82}O_{20}$ 19, 41, 449

C ₄₈ H ₈₂ O ₂₁	19	C ₅₂ H ₈₀ O ₁₈	115
C ₄₉ H ₇₂ O ₁₆	116	C ₅₂ H ₈₀ O ₁₉	136
C ₄₉ H ₇₆ O ₂₀	471	C ₅₂ H ₈₀ O ₂₀	449
C ₄₉ H ₇₆ O ₂₂	416	C ₅₂ H ₈₀ O ₂₃	471
C ₄₉ H ₇₈ O ₁₈	107, 144	C ₅₂ H ₈₂ O ₂₂	235, 279
C ₄₉ H ₇₈ O ₁₉	56, 69	C ₅₂ H ₈₂ O ₂₃	254, 395
C ₄₉ H ₇₈ O ₂₀	161	C ₅₂ H ₈₂ O ₂₄	310, 320, 396
C ₄₉ H ₇₈ O ₂₁	395	C ₅₂ H ₈₄ O ₂₁	136, 146, 160, 268, 451
C ₄₉ H ₇₉ NO ₁₆	310	C ₅₂ H ₈₄ O ₂₂	319
C ₄₉ H ₈₀ O ₁₆	47	C ₅₂ H ₈₄ O ₂₃	350
C ₄₉ H ₈₀ O ₁₇	47	C ₅₂ H ₈₆ O ₁₉	20
C ₄₉ H ₈₀ O ₁₉	107	C ₅₂ H ₈₆ O ₂₂	21, 86
C ₄₉ H ₈₂ O ₂₂	349	C ₅₂ H ₈₆ O ₂₃	20
C ₅₀ H ₇₄ O ₂₁	416	C ₅₂ H ₈₈ O ₂₁	21, 69
C ₅₀ H ₇₈ O ₁₈	136	C ₅₂ H ₈₈ O ₂₅	350
C ₅₀ H ₇₈ O ₂₁	47	C ₅₃ H ₈₀ O ₂₀	216
C ₅₀ H ₈₀ O ₂₀	435	C ₅₃ H ₈₂ O ₂₀	216
C ₅₀ H ₈₀ O ₂₁	47, 350	C ₅₃ H ₈₂ O ₂₃	235, 251
C ₅₀ H ₈₀ O ₂₂	251	C ₅₃ H ₈₂ O ₂₄	215
C ₅₀ H ₈₀ O ₂₄	416	C ₅₃ H ₈₄ O ₂₀	116
C ₅₀ H ₈₁ NO ₁₆	310	C ₅₃ H ₈₄ O ₂₁	116
C ₅₀ H ₈₁ NO ₁₇	310	C ₅₃ H ₈₄ O ₂₂	86
C ₅₀ H ₈₂ O ₂₀	451	C ₅₃ H ₈₄ O ₂₄	215, 251, 310
C ₅₀ H ₈₂ O ₂₁	377	C ₅₃ H ₈₄ O ₂₅ S	287
C ₅₀ H ₈₂ O ₂₂	377	C ₅₃ H ₈₆ O ₂₀	47, 450
C ₅₀ H ₈₂ O ₂₃	350, 377, 378	C ₅₃ H ₈₆ O ₂₁	145, 287
C ₅₀ H ₈₄ O ₁₉	20	C ₅₃ H ₈₆ O ₂₂	1, 136, 145, 161, 162, 268
C ₅₀ H ₈₄ O ₂₀	20, 69	C ₅₃ H ₈₆ O ₂₃	86, 161–163
C ₅₀ H ₈₄ O ₂₁	19, 20	C ₅₃ H ₈₆ O ₂₄	35, 36
C ₅₀ H ₈₄ O ₂₂	349	C ₅₃ H ₈₆ O ₂₄ S	287
C ₅₁ H ₇₈ O ₁₇	450	C ₅₃ H ₈₆ O ₂₅	35
C ₅₁ H ₇₈ O ₁₈	115, 450	C ₅₃ H ₈₈ O ₂₂	86, 101, 301
C ₅₁ H ₇₈ O ₂₀	145	C ₅₃ H ₈₈ O ₂₄	69
C ₅₁ H ₈₀ O ₂₂	349	C ₅₃ H ₈₈ O ₂₅	451
C ₅₁ H ₈₂ O ₂₀	435	C ₅₃ H ₉₀ O ₂₁	20, 21
C ₅₁ H ₈₂ O ₂₁	1, 115, 395, 396	C ₅₃ H ₉₀ O ₂₂	21, 41
C ₅₁ H ₈₂ O ₂₂	350, 395	C ₅₃ H ₉₀ O ₂₃	20
C ₅₁ H ₈₂ O ₂₃	351	C ₅₃ H ₉₀ O ₂₄	19
C ₅₁ H ₈₂ O ₂₄	351	C ₅₄ H ₈₀ O ₂₂	435
C ₅₁ H ₈₂ O ₂₆	395	C ₅₄ H ₈₀ O ₂₃	435
C ₅₁ H ₈₃ NO ₁₇	310	C ₅₄ H ₈₂ O ₂₂	107
C ₅₁ H ₈₄ O ₂₂	350, 377	C ₅₄ H ₈₂ O ₂₃	107
C ₅₁ H ₈₄ O ₂₄	350	C ₅₄ H ₈₄ O ₂₂	107
C ₅₁ H ₈₄ O ₂₅	351	C ₅₄ H ₈₄ O ₂₃	56, 115
C ₅₁ H ₈₆ O ₂₁	69	C ₅₄ H ₈₄ O ₂₄	115, 235
C ₅₁ H ₈₆ O ₂₂	349	C ₅₄ H ₈₄ O ₂₅	216, 251
C ₅₁ H ₈₆ O ₂₃	349	C ₅₄ H ₈₄ O ₂₇	319
C ₅₁ H ₈₆ O ₂₄	349	C ₅₄ H ₈₆ O ₂₀	434
C ₅₁ H ₈₆ O ₂₅	350	C ₅₄ H ₈₆ O ₂₁	450

C ₅₄ H ₈₆ O ₂₂	101	C ₅₇ H ₉₂ O ₂₈	160, 319, 395
C ₅₄ H ₈₆ O ₂₄	146	C ₅₇ H ₉₄ O ₂₁	434
C ₅₄ H ₈₆ O ₂₅	199	C ₅₇ H ₉₆ O ₂₇	349
C ₅₄ H ₈₈ O ₂₀	47, 434	C ₅₇ H ₉₆ O ₂₈	349
C ₅₄ H ₈₈ O ₂₃	56, 97, 101, 107, 145, 246	C ₅₇ H ₉₆ O ₃₀	349
C ₅₄ H ₈₈ O ₂₄	86, 162, 163, 350	C ₅₈ H ₈₆ O ₂₀	435
C ₅₄ H ₈₈ O ₂₅	161	C ₅₈ H ₈₈ O ₂₀	451
C ₅₄ H ₉₀ O ₂₀	434	C ₅₈ H ₉₀ O ₂₂	115
C ₅₄ H ₉₀ O ₂₂	20	C ₅₈ H ₉₁ NO ₂₂	450
C ₅₄ H ₉₀ O ₂₄	20, 116, 327	C ₅₈ H ₉₂ O ₂₇	161, 235, 254, 310
C ₅₄ H ₉₀ O ₂₅	115	C ₅₈ H ₉₂ O ₂₈	215
C ₅₄ H ₉₂ O ₂₂	20, 21	C ₅₈ H ₉₄ O ₂₅	146, 162, 451
C ₅₄ H ₉₂ O ₂₃	449	C ₅₈ H ₉₄ O ₂₆	86, 146, 451
C ₅₄ H ₉₂ O ₂₄	19	C ₅₈ H ₉₆ O ₂₆	350
C ₅₄ H ₉₂ O ₂₅	20	C ₅₉ H ₉₂ O ₂₇	115
C ₅₅ H ₈₄ O ₂₁	216, 450	C ₅₉ H ₉₂ O ₂₉	215, 216
C ₅₅ H ₈₆ O ₂₃	115	C ₅₉ H ₉₂ O ₃₁	319
C ₅₅ H ₈₆ O ₂₄	115, 145	C ₅₉ H ₉₄ O ₂₈	199, 310
C ₅₅ H ₈₈ O ₂₀	434	C ₅₉ H ₉₄ O ₂₉	199
C ₅₅ H ₈₈ O ₂₁	450	C ₅₉ H ₉₆ O ₂₄	116
C ₅₅ H ₈₈ O ₂₆	349	C ₅₉ H ₉₆ O ₂₅	56
C ₅₅ H ₈₈ O ₂₇	395	C ₅₉ H ₉₆ O ₂₆	56, 86
C ₅₅ H ₈₈ O ₂₈	395	C ₅₉ H ₉₆ O ₂₇	56, 145, 146, 162, 268
C ₅₅ H ₉₀ O ₂₀	47	C ₅₉ H ₉₆ O ₂₈	36, 160, 161
C ₅₅ H ₉₀ O ₂₅	115, 116	C ₅₉ H ₉₆ O ₂₉	35, 36
C ₅₅ H ₉₂ O ₁₃	396	C ₅₉ H ₉₆ O ₃₀	160
C ₅₅ H ₉₂ O ₂₂	20	C ₅₉ H ₉₈ O ₂₇	35
C ₅₆ H ₈₀ O ₁₇	450	C ₅₉ H ₉₈ O ₂₈	244
C ₅₆ H ₈₂ O ₂₄	416	C ₆₀ H ₉₄ O ₂₇	116
C ₅₆ H ₈₆ O ₂₂	115	C ₆₀ H ₉₄ O ₃₀	216
C ₅₆ H ₉₀ O ₂₁	434	C ₆₀ H ₉₅ NO ₂₃	302
C ₅₆ H ₉₀ O ₂₈	351	C ₆₀ H ₉₆ O ₂₆	101
C ₅₆ H ₉₂ O ₂₁	434	C ₆₀ H ₉₆ O ₂₇	86
C ₅₆ H ₉₂ O ₂₅	69	C ₆₀ H ₉₆ O ₂₉	163, 215
C ₅₆ H ₉₂ O ₂₇	350	C ₆₀ H ₉₈ O ₂₆	145
C ₅₆ H ₉₂ O ₂₉	351	C ₆₀ H ₉₈ O ₂₇	107, 116
C ₅₆ H ₉₄ O ₂₇	349	C ₆₀ H ₉₈ O ₂₈	101
C ₅₇ H ₈₄ O ₂₂	435	C ₆₀ H ₉₈ O ₂₉	86
C ₅₇ H ₈₄ O ₂₆	415	C ₆₀ H ₉₈ O ₃₀	161
C ₅₇ H ₈₆ O ₂₂	451	C ₆₁ H ₁₀₀ O ₂₈	107
C ₅₇ H ₈₈ O ₂₂	115	C ₆₁ H ₉₆ O ₂₉	115
C ₅₇ H ₈₈ O ₂₃	115	C ₆₁ H ₉₈ O ₂₆	435
C ₅₇ H ₉₀ O ₂₆	162	C ₆₁ H ₉₈ O ₂₇	244
C ₅₇ H ₉₀ O ₂₇	215, 320	C ₆₁ H ₉₈ O ₃₂	319
C ₅₇ H ₉₀ O ₂₈	320	C ₆₁ H ₉₈ O ₃₃	319
C ₅₇ H ₉₀ O ₂₉	160	C ₆₂ H ₁₀₀ O ₂₄	435
C ₅₇ H ₉₂ O ₂₁	434	C ₆₂ H ₁₀₀ O ₂₇	86
C ₅₇ H ₉₂ O ₂₆	115, 161, 350, 395	C ₆₂ H ₁₀₄ O ₂₄	20
C ₅₇ H ₉₂ O ₂₇	319	C ₆₂ H ₉₆ O ₂₇	115

$C_{62}H_{96}O_{28}$	116	$C_{68}H_{110}O_{36}$	161
$C_{63}H_{100}O_{29}$	161	$C_{70}H_{102}O_{31}$	199
$C_{63}H_{100}O_{31}$	310	$C_{70}H_{114}O_{34}$	146
$C_{63}H_{100}O_{32}$	310	$C_{70}H_{114}O_{35}$	145
$C_{63}H_{102}O_{28}$	161	$C_{70}H_{114}O_{36}$	162
$C_{63}H_{102}O_{32}$	161	$C_{71}H_{116}O_{36}$	145
$C_{63}H_{102}O_{33}$	160, 395	$C_{71}H_{116}O_{37}$	162
$C_{63}H_{102}O_{34}$	395	$C_{72}H_{106}O_{33}$	216
$C_{63}H_{104}O_{33}$	377, 378	$C_{72}H_{112}O_{37}$	198
$C_{63}H_{90}O_{21}$	451	$C_{72}H_{115}NO_{32}$	302
$C_{63}H_{92}O_{21}$	450	$C_{72}H_{118}O_{39}$	377
$C_{63}H_{98}O_{29}$	116	$C_{73}H_{114}O_{37}$	198
$C_{64}H_{100}O_{28}$	86	$C_{73}H_{120}O_{42}$	377
$C_{64}H_{102}O_{28}$	86	$C_{74}H_{110}O_{32}$	86
$C_{64}H_{102}O_{32}$	160	$C_{74}H_{110}O_{35}$	215
$C_{64}H_{102}O_{33}$	215, 320	$C_{74}H_{112}O_{34}$	162
$C_{64}H_{104}O_{30}$	161, 162	$C_{74}H_{116}O_{37}$	215
$C_{64}H_{104}O_{31}$	86	$C_{74}H_{116}O_{38}$	215
$C_{64}H_{104}O_{32}$	160, 161, 319	$C_{74}H_{118}O_{36}$	215
$C_{64}H_{104}O_{33}$	160	$C_{74}H_{120}O_{37}$	145
$C_{64}H_{104}O_{34}$	160	$C_{74}H_{120}O_{39}$	162
$C_{64}H_{94}O_{27}$	215	$C_{75}H_{112}O_{36}$	215, 216
$C_{65}H_{100}O_{28}$	86	$C_{76}H_{108}O_{32}$	86
$C_{65}H_{102}O_{32}$	246	$C_{76}H_{112}O_{33}$	86
$C_{65}H_{102}O_{33}$	246	$C_{76}H_{114}O_{37}$	215
$C_{65}H_{104}O_{29}$	161	$C_{77}H_{120}O_{41}$	199
$C_{65}H_{104}O_{33}$	310	$C_{77}H_{126}O_{43}$	377
$C_{65}H_{106}O_{30}$	146	$C_{78}H_{110}O_{33}$	86
$C_{65}H_{106}O_{31}$	145, 163	$C_{78}H_{116}O_{38}$	215
$C_{65}H_{106}O_{32}$	161, 162	$C_{78}H_{122}O_{41}$	199
$C_{65}H_{92}O_{21}$	451	$C_{80}H_{115}NO_{23}$	302
$C_{66}H_{102}O_{28}$	115	$C_{80}H_{132}O_{36}$	161
$C_{66}H_{102}O_{32}$	198	$C_{89}H_{142}O_{44}$	199
$C_{66}H_{102}O_{33}$	199	$C_{90}H_{144}O_{44}$	199
$C_{66}H_{104}O_{31}$	233	$C_{94}H_{150}O_{48}$	199
$C_{66}H_{108}O_{34}$	377	$C_{95}H_{152}O_{48}$	199
$C_{66}H_{108}O_{35}$	377	$C_{98}H_{152}O_{47}$	199
$C_{67}H_{104}O_{33}$	198	$C_{98}H_{152}O_{51}$	199
$C_{67}H_{110}O_{37}$	377	$C_{98}H_{158}O_{47}$	199
$C_{68}H_{108}O_{32}$	215	$C_{98}H_{158}O_{51}$	199
$C_{68}H_{110}O_{35}$	161		