



The Influence of Hellenic Philosophy on the Contemporary World

Edited by

John G. Dellis and Stephanos A. Paipetis

The Influence of Hellenic Philosophy on the Contemporary World

The Influence of Hellenic Philosophy on the Contemporary World

Edited by

John G. Dellis and Stephanos A. Paipetis

**Cambridge
Scholars
Publishing**



The Influence of Hellenic Philosophy on the Contemporary World

Edited by John G. Dellis and Stephanos A. Paipetis

This book first published 2019

Cambridge Scholars Publishing

Lady Stephenson Library, Newcastle upon Tyne, NE6 2PA, UK

British Library Cataloguing in Publication Data

A catalogue record for this book is available from the British Library

**Copyright © 2019 by John G. Dellis, Stephanos A. Paipetis
and contributors**

**All rights for this book reserved. No part of this book may be reproduced,
stored in a retrieval system, or transmitted, in any form or by any means,
electronic, mechanical, photocopying, recording or otherwise, without
the prior permission of the copyright owner.**

ISBN (10): 1-5275-3073-6

ISBN (13): 978-1-5275-3073-7

«ἐτεῖν δέ οὐδέν ἴδμεν· ἐν βυθῷ γάρ ἡ ἀλήθεια»

“In reality we know nothing; for truth is in depths”

H. Diels – W. Ktanz, *Die Fragmente der Vorsokratiker*,
Wedmann² 1972, Vol. II, Δημόκριτος, 68 B117.

TABLE OF CONTENTS

Preface	xi
Introductory Essay.....	xiii
Prof. P. Pavlopoulos, President of the Hellenic Republic: The Contribution of the Ancient Greek Spirit to the Development of Contemporary Western Civilization	
1. Philosophy, History, Economy	
1.1	2
From the “Atoms” of Democritus and the “Homogeneous Parts” of Anaxagoras to the “Monads” of Leibniz John G. Dellis	
1.2	11
The Difference between Newton and Democritus: God as the Creator of Particles and Cause of their Motion John G. Dellis	
1.3	30
Is Aristotle Deviant? Emm. Mikrogiannakis	
1.4	38
Equality: Magic and Tragic Emm. Mikrogiannakis	
1.5	44
The Illiberal Democracy of Ancient Athens A. N. Hatzis	
1.6	56
The Ancient Athenian Economy: A Review N. C. Kyriazis and E. M. L. Economou	

1.7.....	68
The Contribution of Ancient Greece to Neuroscience G. Paxinos	
1.8.....	75
The Genetic Origin of the Greeks C. Triantafyllidis	
2. Art and Architecture	
2.1.....	92
From Ancient Greek Architecture to Neoclassical Facades: Types and Examples of Caryatids in Athenian Buildings M. Leni	
2.2.....	103
Olympian Bodies in Leni Riefenstahl's <i>Olympia: A Study on Memory and Identity</i> K. Zisimopoulou	
3. Mythology	
3.1.....	118
The Moleia of Nestani: A Most Ancient Ceremony Dedicated to Water and the Environment—A Geo-Mythological Approach I. D. Mariolakos	
3.2.....	127
The Way Back of the Argonauts According to <i>Argonautica Orphica</i> K. Kalachanis et al.	
3.3.....	143
The Orphic Cosmogonic Theory: Dialectics of All M. Sideri	
3.4.....	157
Deciphering the Myth of Theseus S. Christodoularis	

3.5 162
 Hephaestus: The Smith God with Two Lamé Legs
 E. Bazopoulou-Kyrkanidou

4. The Riddle of Tartessus

4.1 176
 Paleogeography of the Gulf of Cadiz in Southwestern Iberia during
 the Second Millennium BC
 A. Rodriguez-Ramirez and J. J. R. Villarias-Robles

4.2 204
 The Representation of the Kingdom of Tartessus by the Ancient Greeks
 Revisited: New Evidence for a Forgotten Cause
 J. J. R. Villarias-Robles and A. Rodriguez-Ramirez

5. Environmental Philosophy

5.1 218
 The Psychological Effects of Natural Disasters from Classical Antiquity
 up to the Present
 ● Georgiadou and S. A. Paipetis

5.2 225
 The Purple Dye Industry in Greece from Prehistory to the End
 of the Byzantine Empire
 L. Karali-Giamakopoulou

5.3 239
 Examples of Environmental Engineering Infrastructure Works
 from Greek Antiquity
 E. ● Valiantza

5.4 247
 The Knossos Palace and the Restoration of the Columns
 W. Nishiyama

5.5 251
 Natural Environment and Cultural Heritage
 P. Themelis

5.6..... 261
Ecological Conscience and Bioethics in the Greek Antiquity: Sybaris
Ch. Ch. Spyridis

PREFACE

The present volume is based on a selection of twenty-four papers on Ancient Greek Philosophy presented at the international conference “Ancient Greece and the Contemporary World,” held at Ancient Olympia, Greece, August 28–31, 2016, covering such areas as philosophy, history, economics, mythology, art and architecture, and environmental philosophy.

The conference was strongly interdisciplinary, also covering mathematics, physics, engineering analysis, astronomical methods and instruments, and environmental problems. It constituted the first attempt at a holistic approach to that great civilization and its lasting influence on the contemporary world. The conference was jointly organized by the University of Patras, members of which have developed a long tradition of research on matters of Ancient Greek civilization and culture, including four international conferences within the last twenty years, all in Ancient Olympia, and the International Centre for Sciences and Hellenic Values, a nonprofit institute for the advancement of sciences in relation to the accomplishments, principles, and values developed in Ancient Greece, and was put under the auspices of the President of the Hellenic Republic, whose address, an excellent essay on the influence of Hellenic Philosophy on the modern world, is the first paper presented here.

The present editors, as member and chairman of the organizing committee, respectively, found unique satisfaction in coordinating the common efforts of a great variety of distinguished scientists from many countries, working in many different disciplines—seeing philosophers discussing themes of common interest with engineers is not an everyday experience. It was also proof that ancient civilizations, especially Ancient Greece, cannot be investigated by the various disciplines separately, and only a holistic approach can produce reliable results.

The book consists of an introductory essay and five parts, as follows:

- Introductory essay by H. E. The President of the Hellenic Republic, “The Contribution of the Ancient Greek Spirit to the Development of Contemporary Western Civilization”

- Philosophy, History, Economy: eight papers dealing with Aristotle's works on particles, Aristotle's views on important philosophical matters, economics in ancient Athens, the contribution of Ancient Greece to Neuroscience, and the Genetic Origin of the Greeks
- Art and Architecture: two papers dealing with the influence of ancient art on modern Athenian architecture and the effect of the Olympic Spirit on modern art
- Mythology: five papers dealing with geo-mythological issues, Orphic Cosmogony and Argonautica, the myth of Theseus, and Hephaestus, the lame smith god
- The Riddle of Tartessus: two papers dealing with the Ancient Greek Kingdom of Tartessus in southwestern Iberia
- Environmental Philosophy: five papers dealing with the psychological effects of natural disasters from antiquity up to the present, the natural environment and cultural heritage, and ecological ethics and bioethics in Greek Antiquity

Many people gave the best of their efforts for the successful outcome of the conference and deserve thanks, but the editor wishes to express his grateful thanks to Professor Prokopios Pavlopoulos, President of the Hellenic Republic, for putting the conference under his auspices, declaring it open, and delivering a truly magnificent speech at the opening ceremony.

Sincere thanks go to Mrs. Aikaterini Panagopoulos, National Ambassador of Greece to the Council of Europe for Sports, Tolerance, and Fair Play, President of the International Centre for Sciences and Hellenic Values, whose constant inspiration and endless support made that important project a reality.

Finally, grateful thanks are due to the University of Patras and in particular to Professors Venetsana Kyriazopoulou, MD, Rector and Demosthenes Polyzos, Deputy Rector for Research and Development for their full support in the conference and also for financial support to the present publication.

John G. Dellis
Stephanos A. Paipetis
Editors

INTRODUCTORY ESSAY

THE CONTRIBUTION OF THE ANCIENT GREEK SPIRIT TO THE SHAPING OF MODERN WESTERN CIVILISATION

ADDRESS OF THE PRESIDENT
OF THE HELLENIC REPUBLIC
MR. PROKOPIS PAVLOPOULOS

OPENING SESSION OF THE INTERNATIONAL CONFERENCE ON
ANCIENT GREECE AND THE CONTEMPORARY WORLD

ANCIENT OLYMPIA, AUGUST 29, 2016

Foreword

It is with pleasure that I respond to your invitation—and this happens in this place, which is overwhelmed with History and, what is more, preserves in its very heart the immortal seed of the Olympic Spirit and its timeless significance—to salute your extremely important and multifaceted congress, the topic of which focuses on the relationship between “Ancient Greece and Contemporary World”; a Conference with the consequent and profound purpose of revealing the dimensions of the influence of Ancient Greek intellect upon the birth, subsequent evolution, and present existence of European and, in general, Western culture. Almost everything has been said about this unbreakable and inextricable connection between Ancient Greek intellect and our culture, but any reminder and documentation in this direction are imperative and instructive for us to be in complete readiness whenever the defense of this culture proves necessary in order to safeguard its perpetuation and defend it against its enemies. Therefore, I proceed, without a trace of national arrogance, but with the truth that no one can dispute on the basis of reliable scientific criteria to summarize in advance

what I am to expose in my salutation to follow. If it was not for Ancient Greek intellect, and its inventiveness and methodology, it is extremely doubtful whether science would have followed this rapid or vertiginous—of course, taking into account the time taken by the individual phases of evolution of humanity—rise and recognition, and consequently whether our culture would take the orientation and form by which we know and experience it. What is more, if our culture abandons the spiritual roots of its Ancient Greek origins, then its glow will fade and humans will again wreak havoc in a dark labyrinth of barbarity, without even being able to realize, especially in the early stages of its fall and due to a severe form of negative cultural “Mithridatism,” the irreparable consequences of such a shocking overthrow for the whole course of humanity. Here is why:

I. From information to knowledge and from knowledge to wisdom

Two texts, among many others in such a long history, summarize—admittedly, in my own opinion, and in consideration of all the arbitrariness of its inherent subjectivity—in a highly representative and inclusive way the decisive contribution of Ancient Greek intellect and its achievements in the shaping of modern European and, by extension, Western culture, especially through the channels of science and its “twin sister” technology.

(a) T. S. Eliot’s prophetic verses

The first text comprises the following verses of T. S. Eliot’s poem “Ten Choruses from ‘The Rock’” (First Chorus), prophetically composed in 1934 in the interwar whirlwind that many could not or did not want to realize:

*Where is the Life we **have** lost in living?
Where is the **wisdom** we **have** lost in **knowledge**?
Where is the **knowledge** we **have** lost in **information**?*

The value of these verses by T. S. Eliot, as far as the emergence of Ancient Greek intellect as the most critical vector of the creation of our culture is concerned, lies in the fact that they run through all the evolution stages of our culture by focusing on its main milestones, namely information, knowledge, and wisdom. That is to say that they virtually describe the path followed by Ancient Greek intellect by deploying information and experience to lay the foundations of science and, beyond this, culture. Consequently, the above verses by T. S. Eliot *e contrario* warn us about

what is currently putting our culture in danger. In other words, they emphatically describe what can—sometimes unwittingly—lead to its decay.

(b) The visionary speech of André Malraux

The second text is an abstract from André Malraux's monumental speech of May 28, 1959 on the occasion of the first illumination of the Acropolis:

We will never cease proclaiming what the obscure word education means to us, namely a total of artistic and intellectual works, which has been turned by Greece, to its glory, into a major means of educating humans. It is the first culture without a sacred book, where the word intelligence meant to ask questions; one's intention to bring about the conquest of the world by the intellect, of the fate by tragedy, of the divine by art and man. Ancient Greece will soon tell you: "I searched for the truth and found justice and freedom. I devised the independence of art and intellect. I raised the humankind and had it confront its own gods, the humankind, which had bowed its head everywhere for four millennia; and at the same time I pitted them against their despots."

These are the thoughts that led André Malraux, in the same speech and in order to declare the dominant role of Ancient Greek intellect in the evolution of our culture, to allegorically assert that a "hidden Greece exists in the heart of all the people of the West." This "hidden Greece" is its ancient spirit, and the "heart" of Western people is their culture as an edifice with common roots and an uninterrupted continuity through the ages.

II. The Promethean course of Ancient Greek intellect

The course of Ancient Greek intellect towards the establishment of science and philosophy greatly reminds us of the Prometheus myth in its Aeschylus version. In particular, it relates to the demigod who placed himself at the service of humans in order to set them free from any kind bonds that hindered the free development of human personality, even if this cost Prometheus in the conflict with Zeus himself, a conflict "sealed" with the punishment of ancient tragedy.

(a) Ionic and Presocratic philosophers: the pioneers

In particular, through this quasi-Promethean course, the Ancient Greek spirit gave birth to science and philosophy at almost the same time. As of the latter, it was born in the form of the culmination and focus of the scientific method as a fundamental "tool" of seeking and processing

knowledge that ultimately aims at an interdisciplinary approach which is as holistic as possible.

(1) The “eulogizing” conception and gestation of science—which equals the Big Bang in the creation of the universe, since humans shape their own cosmos in order to perceive that of their creator—is the biggest part of the work of Ionic, Presocratic philosophers, as well as Sophists who were influenced by the latter, mainly Protagoras and Hippias, according to the existing and unfortunately scant historic evidence. This is because they were the first who attempted, and actually achieved, to set human intellect free from the “original” bondage of myth and gradually prompt it to interpret and explain the world in its real and natural dimensions. At the same time, this radical, yet creative, heritage of Ionic and pre-Socratic schools provided, as the intellect gradually evolved through time, the main tool to overcome impediments placed by all sorts of any kind of occasionally occurring dogmatism. It was much later when Max Weber, in his tractate *Science as a Profession*, “discovered” that science meant the “disenchantment of the world” [“*die Entzauberung der Welt*”], in the sense that, in the process of studying the world, human thinking must be free from all sorts of myth-originating “enchantments”! For us, “to give Caesar what belongs to Caesar and to God what belongs to God,” we should, however, keep in mind that Leibniz’s thought had preceded, especially his “principle of sufficient reason,” according to which there are no miracles and nothing happens without a reason. On the contrary, every phenomenon has its cause, hence the progress of science can only be interpreted in terms of cause and effect, where cause means anything that allows an effect to occur under conditions of scientific provability, always subject to a constant falsifiability.

(2) By observing the natural world, Ionic and Presocratic philosophers obtained the experience and its derivative information, and transformed it into substantial, evolutionarily reproducible knowledge and, mainly by applying the methodical substantiation process, produced wisdom; in other words, science. Their basic weapon was “real thinking,” a notion recently codified by Cornelius Castoriades as a method that consecutively allows for:

- (a) initially, “explanation,” which means breaking down a phenomenon to its cause
- (b) then, “comprehension,” which means creating notions to conceive the meaning of explanation

(c) and, finally, “clarification,” which denotes the holistic perception of knowledge by means of explanation and comprehension. This is how the intellect reaches philosophy, the final outpost of the voyage called “scientific creation”

(3) Finally, one should not take lightly the fact that Ionic and pre-Socratic philosophers never provided their work with any kind of scientific “solipsism,” because they had always been consistent opponents of the intellectual “bondage” of myth and dogma. On the very contrary, starting from quotations such as Heraclitus’s “πάντα χωρεῖ καὶ οὐδὲν μένει” [“everything flows and nothing remains still”] and Protagoras’s “πάντων χρημάτων μέτρον ἄνθρωπος” [“human is the measure of all things”], they were the first to place the cornerstone of relativity in the field of science; hence—even if only indirectly—also the concept of falsifiability (επιλέθευσις), which, by taking nothing for granted and paving the way for the recognition of errors to let scientific research evolve to its ultimate, borderline origins, constitutes the cornerstone of the scientific method. Judging from the results, the Ionic and pre-Socratic philosophers were the ones who inspired Karl Popper, while writing on the “open society and its enemies,” a fact that he directly admits to in his work *The World of Parmenides, Essays on the Pre-Socratic Enlightenment* [*Ο κόσμος του Παρμενίδη, Δοκίμια για τον προσωκρατικό διαφωτισμό*] (2002), and which also inspired Thomas Coon in formulating his theory on “the structure of scientific revolutions.” Using Coon’s classification of “scientific revolutions,” we should ask ourselves—weren’t they who established the first real “scientific community,” which in turn shaped the first genuine “scientific paradigm” and left space to be later questioned and replaced by a younger “scientific paradigm,” grown inside a respectively new “scientific community”?

(b) The “disenchantment of thought”

This “disenchantment” of the world by means of the scientific method means, as stressed, the liberation of thought from the “spells” of myth. Deep down, it is a real “explosion” of freedom of thought, which translates humans from the state of metaphysical dependence into another of ontological understanding of autonomy that, however painful it may seem due to the uncertainty of randomness, does not fail to prove redemptory with respect to the quintessence of the relationship between humans and the world that surrounds them. However, this understanding, in terms of ontology, of human freedom and autonomy, is the “royal path” of philosophy.

(1) The aforementioned close dialectic relationship between science and philosophy has found its first, and perhaps historical, peak in the phenomenon called Aristotle. Aristotle was the greatest of philosophers and a real *generalist*. In particular, the amplitude of Aristotle's scientific interests has no equal in the history of world thinking. We usually stress that Aristotle was interested in a field of cognitive objectives of unique amplitude and, perhaps, we do not stress as much the fact that he practically laid the scientific foundations of politics, ethics, sociology, aesthetics, literature, logic, philosophy, mathematics, ontology, psychology, biology, meteorology, astronomy, and many more. Especially as far as the constantly and rapidly evolving field of biology is concerned, some argue that the twenty-first century is the age of Aristotelian thought, despite being centuries old, as it continues to exert more influence than any other philosopher's thinking.

(2) To understand the magnitude of Aristotle's influence on and contribution to the creative course of Ancient Greek intellect, one has just to realize that he was the first to discern and determine—even if only roughly—the mutual relations between science and philosophy after a long period of “conflict.” In particular, Aristotle, throughout his works, directly or indirectly distinguished between the natural world and philosophical issues. A palpable instance of his scientific-philosophical mentality was his work “On Soul” [“Περὶ ψυχῆς”], within which he directly raises the question of whether the discourse on the soul falls within the field of natural theory or philosophical reflection. I dare to suggest that this is both the best and the safest way to understand the essence of Aristotle's entire work entitled “Beyond Natural” [“Μετὰ τὰ φυσικά”], a work that, as I had the opportunity to remind a conference dedicated to the 2,400 years since the death of the Stageirite philosopher, is still “haunting” philosophy in its attempt to capture the real dimensions of this work.

III. Ancient Greek intellect under the “auspices” of our civilization

As pointed out, the decisive contribution of Ancient Greek intellect to the outcome of the European and overall Western civilization, primarily through the literal foundation of science and philosophy, also provides the means to defend this civilization from the risks currently undermining its foundations. In other words, it is enough to bear in mind how Ancient Greek intellect led to the creation of our civilization in order to produce the

appropriate antibodies against the “virus” that “besieges” its intellectual immunity armor. Thus, I take the liberty to make this point clearer.

(a) Our civilization in danger

Starting from the above verses of T. S. Eliot, one could legitimately claim that our civilization becomes endangered when the vector of its creation, consisting in—allow me this schematic, which, however, is not unfounded and arbitrary—converting information into knowledge and knowledge into wisdom, begins to reverse. In other words, when, contrary to the guiding principles of Ancient Greek intellect, wisdom tends towards the level of knowledge, and, ultimately, knowledge tends towards being limited to the state of mere collection, or at least the systematization of information. Let us not forget that, as a rule constantly confirmed by history, every conquest of humans towards their ultimate distinction, from the subtlest to the most decisive, is put in danger whenever the buttresses on which it rests lose their static dynamicity, usually due to human imbecility, especially the underestimation of the chronic vibrations that are present in the subsoil of those buttresses.

(b) The “signs” of decline

I wonder if there are currently any signs to evince such a reversal, which not only prevents our civilization from making a decisive step in overcoming its already great achievements, but also literally undermines its foundations that were based on the insurmountable buttresses of Ancient Greek intellect. I think there are. And it is absolutely necessary to understand, as soon as possible and without pretexts, the causes of such an ominous prospect in order to thwart it as long, as there is time.

(1) No one can question by convincing arguments the fact that the recent evolution of technology, while having multiple beneficial effects with respect to the conception of the essence of our world, has also produced significant side effects when certain aspects of it have “swerved” from its real destination.

(2) Allow me to mention two of these side effects, which I also consider the most critical:

(a) The first concerns the rapid expansion and prevalence of absolute specialization of scientific knowledge at all levels of knowledge construction: from the “apprenticeship” period to the final stage of more sophisticated research. This self-limitation of the scientific field under the

sugarcoating of some sort of “splendid isolation,” combined with the obvious or even blatant lack of mechanisms of effective communication among scientists—the representatives of related branches—deprives real scientists of the possibility of holistically conceptualizing their science and its subject as a wider set consisting of interconnected individual subsets. Thus, however, “wisdom” becomes impossible, and even simple knowledge tends to shift to the level of mere collection and classification of information, which is not far from some form of disguise—under the “lionskin” of an alleged imperative of modern scientific ethics or “empiricism.” At this point, to avoid any misunderstanding, I clarify this—no one can ever underestimate the value of empiricism as an important methodological supplement in order that information becomes knowledge and knowledge becomes wisdom; and not, of course, in order to lead to the consolidation of even fully systematized information as a quasi-final stage of scientific research in all of its instances.

(b) The second concerns the consolidation of an economic globalization without the institutional and *sensu stricto* economic mechanisms that would be able to deter the distortion forces of the capitalist economic system, which increasingly remove it from its roots and destination.

(i) Let us not forget that these roots and a consequent destination were the factors that, for centuries, allowed capitalism to evolve into the economic system that allows humans to defend their values and freely develop their personality in the best and most productive way possible; in any event, better than the one available within the great “rival” of capitalism, i.e. Marxism, a fact testified in the most “deafening” way by the collapse of the latter, at least under the version of “actual socialism.”

(ii) This distortive tendency of globalization under the abovementioned conditions, due to its negative influence in scientific domains far beyond the economy—more typical of which being *sensu stricto* technology as previously mentioned—ultimately acts as a deterrent with respect to the tendency of modern scientists to gain a more comprehensive understanding of the impact of their research. Thus, combined with the abovementioned trend towards specialization, this globalization enhances the tendency to reduce wisdom to simple knowledge, and knowledge into information, and, in fact, into information intended to support a particularly dogmatic view of the inevitable “self-regulation” of the economy, resulting in the “demonization” of any shred of state interventionism, and the respective “deification” of total “deregulation,” i.e. essentially annulling the power of the state to intervene.

(iii) Moreover, this kind of globalization cultivates, by its very nature, a peculiar mentality of materialism in the sense of a forced attachment to the “living” that globalization itself implies by critically determining peoples’ needs, completely contrary to any “visionary” prospect, which is a prerequisite for overcoming the triviality of everyday life, as is inherent in the transition from information to knowledge and from knowledge to wisdom. Perhaps this is implied by T. S. Eliot when he continued his abovementioned verses as follows:

*The cycles of Heaven in twenty centuries
Bring us farther from God and nearer to the Dust.*

I recall that, as already explained, these verses by Eliot were written shortly after the first third of the century that Eric Hobsbawm called “the short century” (in *The Age of Extremes: the Short Twentieth Century, 1914–1991* [London: Michael Joseph, 1994]), since he thought that the twentieth century had “began” in 1914 with the First World War and “ended” in 1991 with the dissolution of the USSR and the fall of the Berlin Wall.

(c) Ultimately, specialization and globalization in the sense set forth above, directly or indirectly, lead, through dogmatism and the subsequent obsessions they cultivate in order to perpetuate the sovereignty of their purposes and their respective “materialism,” to the revival of a mentality of scientific “solipsism,” subjugated to the domination of everyday life; a mentality that is totally contrary to the true destination of scientific creation, since, as stated above, a prerequisite for scientific advancement is the *a priori* recognition of the relativity of the scientific conclusions and the resulting acceptance of the possibility of their falsifiability, and the overcoming of any form of compromise with a given daily routine. But, on the basis of these facts, we may have to attempt a “re-enchantment” of our own world, not in the sense of a return to the captivity of myth and doctrine, but rather in the form of creating some sort of rational humanitarian “totem” in front of which science must “bow down” in order to play its natural role; that is, its subordination to the service of humans on their way to the final destination. And this should be done even if such an endeavor appears to be marginal, given that it leads humans to the incompatible defense of their value and the free development of their personality with the ultimate goal of completing their majestic path that seeks to convert every human into the image and likeness of their creator.

Epilogue

To sum up what has been said, one can admissibly argue that the contribution of Ancient Greek intellect to our civilization, i.e. the contemporary European and overall Western civilization is at least twofold. ●n the one hand, Ancient Greek intellect shaped this civilization by setting the foundations of science, and ultimately philosophy, by liberating intellect from myth. ●ne could say that our civilization was born from the ancient spirit just as, according to mythology, Athena came out of Zeus's head, in full armor, wearing a helmet and holding a shield. And, on the other hand, it currently shows us the way of defending our civilization, mainly by preventing the transition of science and philosophy into barren empirical fields of accumulation of plain knowledge and the collection of infinite, yet futile, information. Through this double contribution, Ancient Greek intellect is still alive and timely, both as a primogenitor and a permanent pillar of our civilization, and urges the latter, in the current gloomy circumstance, with the words that ●dysseas Elytis puts in Antifonitis's mouth when addressing Maria Nefeli: "Make a leap faster than decay"; since, without such a leap, our culture will very soon look like a "supernova," a "megalithic" star that quickly turns off because it brings, to recall T. S. Eliot in his poem, "knowledge of words and ignorance of the Word." And to find out what "the Word" means, let us go back to Heraclitus, who described it almost as the constant and unwavering regulatory principle that ensures the unity of the world: "And although this word has always existed" ["Του δε λόγου τουδ' εόντος αεί"]. Later, but always in a continuous line, in the Gospel of John: "In the beginning was the Word, and the Word was with God, and the Word was God" ["Εν αρχή ήν ο Λόγος και ο Λόγος ήν προς τον ●εόν και ●εός ήν ο Λόγος"]. As to which the true position of humans against this Word is, Kostas Axelos, in *Why Do We Think What We Do: Two Lectures-Essays* [*Γιατί σκεφτόμαστε; Τι να πράζουμε: Δύο διαλέξεις-δοκίμια*] (Athens: Nefeli, 1993), states that the Word is the: "●pen Game of Time, where the Human Being is at the same time the player and the game." Sophocles, in a unique way in the history of Ancient Greek tragedy, describes in *●edipus Rex* a fatal and emblematic leader who defends the city [Πόλις], and in *●edipus at Colonus* one who defends himself against Fate [Ειμ●ρμένη] and those who take advantage of his ruthless destiny to their own benefit, in a superbly tragic expression of cynicism – the timeless plague of politics.

1.

PHILOSOPHY, HISTORY, ECONOMY

1.1

FROM THE “ATOMS” OF DEMOCRITUS AND THE “HOMOGENEOUS PARTS” OF ANAXAGORAS TO THE “MONADS” OF LEIBNIZ

JOHN G. DELLIS

PROFESSOR EMERITUS, UNIVERSITY OF PATRAS

Abstract

The development of “natural philosophy” or “corpuscular philosophy” in the seventeenth to sixteenth centuries BC has its origin in the atomic theory of Democritus. Many thinkers, from P. Gassendi to Newton, considered Democritus’s theory to be very effective and made use of it.

Democritus (460-390 BC) proposed two ontological principles: “atoms” and “empty space,” of which everything consists. There are an infinite number of atoms and kinds of atoms differing in shape and size. Anaxagoras (fifth century BC), a contemporary natural philosopher of Democritus, maintained that “everything consists of homogeneous particles” (DK, 59A1), while Wilhelm Leibnitz (1646–1716), based on Democritus’s views, proposed that all *prima minima* are “the monads,” the accumulation of which constitutes everything that exists.

Here, we will emphasize that all seventeenth-century thinkers, as well as Leibnitz, replaced the Democritean term “atoms” with other terms, such as “corpuscular” particles, without really meaning something different, just avoiding the accusation of “atheism.” This is justified since Democritus was considered an “atheist” because “God’s Providence” and “God’s Intervention” were not prerequisites of his theory of creation and the motion of “atoms.” For this reason, we suggest the term “theistic individualization.”

Introduction

The atomic theory of Democritus is the most persuasive explanation of natural bodies and phenomena formulated during the period of pre-Socratic philosophers. All physicists believed that the minimal point of matter is the “atom” until atomic fission and the emergence of modern “particle physics.” The omniscient philosopher from Abdera, Thrace, on the one hand, is characterized as “Gelasinos” due to his optimistic attitude toward the world, and as being “Aristotle” before Aristotle due to his involvement in many philosophical fields and numerous works, just like the Stageirean philosopher, whose birth 2,400 years ago we celebrated in 2016 with conferences and similar events.

Thrasilus classified Democritus’s works into quadrilogies of thirteen, i.e. a total of fifty-two works. Unfortunately, the tradition was not favorable to Democritus’s works for many reasons. One of them is a testimony that “Plato ordered them to get burnt.”

From all of them, according to the classical compilation of H. Diels and W. Kranz, “Die Fragmente der Vorsokratiker” [“The Fragments of the Pre-Socratics”], 297 fragments of moral, political, and conceptual content are extant. According to research, the fragments [“fragmenta”] are conceded as the opinions of Democritus himself about his atomic theory. We recognize such testimonials in Aristotle’s texts, who perhaps was aware of the works of Democritus and Simplicius, the commentator of Aristotle. These witness statements are the basis for the atomic theory of Democritus.

We will mention in brief three points of the Democritean theory, based on the texts used here in translation:

- (a) atoms—empty space
- (b) atom behavior: weight—movement
- (c) formation of bodies

We derive information relating to atoms—empty space from a text of Aristotle (DK 67a, 6). Democritus maintained that the elements (ontological principles) are two: the full and the empty one, called “being” and “non-being,” respectively. “Being” is full and solid, whereas “non-being” is empty and sparse. The “empty” one exists as much as the body, and for this reason the “non-being” exists as much as the being. These two elements together are the material reasons of everything existing in nature.

The underlying essence, that is the atoms, is one. All things are produced by *its* variations. These variations refer to the “thinning” and the “thickening” (the sparse and the thick). The differences of the atoms are shape, arrangement, and position. Whatever is physical or solid is regarded as real and is equal to the full.

Another statement given by Simplicius (DK 67A, 14) mentions that Democritus and Epicurus maintained on the one hand that the origins of beings are infinite in number, undivided and apathetic atoms, since they are solid and do not have any space in-between. Descartes refuted this theory because the division, as he said, is due to the space which is in the bodies. The atoms are differentiated in empty space.

Testimonials do not agree on whether Democritus maintained that the atoms possess weight. Some ancient writers, like Aetius, write that Democritus admitted that the atoms have “size and shape,” and that Epicurus was the one who added a third property, “weight.”

Atoms move in the infinite empty space. Aristotle attributes to Democritus the omission of not defining the form of the motion of atoms. Simplicius, in his comments of the book of Aristotle “Physics” (DK 68^A58), notices that, according to Democritus, atoms move with mutual collisions and impacts (αλληλοτυπούμενος και κρούμενος προς αλλήλους κινείσθαι τας ατόμους). The regular movement of the atoms is due to their bouncing after collision. The character of the motion thus produced is undoubtedly defined from the weight, shape, and previous movements of the colliding atoms. The collisions between the atoms end up in their mingling (*symplokē*, according to Democritus), a term also used by Leibnitz, and we see if the atoms match in shape or otherwise in their dispersing, and if they do not match that is “peripalaxis.” In their bouncing, that is “peripalaxis,” they take one or another direction. Baley interpreted the term “peripalaxis” in the “Greek Atomists and Epicurus” as pulse, but this is not a persuasive interpretation.

The third point of the Democritean theory we are going to mention is the “formation of bodies,” that is how Democritus explains that bodies and phenomena are created by atoms. Also, according to Simplicius’s comments on Aristotle’s “About Uranus” (DK 68a37), we get to know that “while the atoms move, they collide and intertwine in such a way by attaching to each other closely without forming any homogeneous substance, since it is very simplistic to think that one or more things can ever become one.” The atoms, according to Democritus, stay together for a

while because of their mingling and mutual containment. Some of them are uneven, others are U-shaped, others are concave, others convex, and others have endless differences.

Democritus thus believes that they attach to each other and stay together until a stronger force comes from the environment to shake and spread them. This is the Democritean theory based on the texts without any detail. Besides, the terms in Democritus’s theory, such as *ρυσμός*, *περιπάλαξις*, and *διαθιγή*, have become the object of detailed study by many modern researchers such as Jonathan Burnes, W. Guthrie, A. Long, and D. Sedley et al., who have studied Presocratic philosophy. Of course, there is not sufficient space here analyze the various views that have been put forward.

We shall now examine the “homogeneous parts” of Anaxagoras according to the main thought of the title of the present. The connection of the atomic theory of Democritus with that of Anaxagoras has been accepted since antiquity.

Pierre Bayle (1647–1706), a French philosopher, in his book *A Dictionary of History*, considered the crucible of the ideas of the Enlightenment of the eighteenth century throughout Europe, writes: “it is a pity that Democritus and Anaxagoras did not know each other and that these two bright minds did not cooperate. In that case, the result would be more complete because some points of the one approach (Democritus’s one, so to say) would be completed by points of Anaxagoras’s approach.”

Anaxagoras of Clazomenae, Ionia (500–408 BC) was a friend of Pericles of Athens. He was charged of impiety “because he called the sun a fiery mass.” With Pericles’s help, he escaped capital punishment. This is the fate of any innovation considered dangerous. He was forced to retire in Lampsacus, where he founded a school and taught. He wrote a book entitled *On Nature*, similarly to most of the pre-Socratic philosophers who composed books discussing issues of nature. According to the collection of Diels-Kranz, twenty-two fragments have been bequeathed from this and many witness statements of questionable reliability in terms of the information they give. For example, Anaxagoras came to Olympia and foretold that it would rain, as indeed happened, and for this reason he had wrapped himself in leather. He was older than Democritus and that is why the Abdeirean (i.e. Aristotle) criticized him for his ideas “about the sun and the moon,” claiming that they were ancient and not of his own. It seems, though, that Democritus was influenced by Anaxagoras’s ideas.

We will analyze the two ontological principles of Anaxagorean theory based on the following texts.

“The sperms” which according to Aristotle were also called “homogeneous parts.” We point out this term in the seventeenth century in the texts of French philosopher P. Gassendi as well as F. Bacon. The “sperms” are material elements existing in nature. They are an endless number of infinitesimally small fragments, like the atoms of Democritus (DL, X44), which can be classified in groups on the grounds of the same quality. Anaxagoras believed that matter does not consist of four simple elements, as Empedocles admitted, i.e. air, fire, soil, and water, but small fragments which have various manifestations. We could say that Clazomenean’s theory approaches the principles of modern chemistry, which admits that there are chemical elements each having its own qualities. Anaxagoras maintained that material elements are infinite in number and smallness. He also accepted the unlimited divisibility of matter. The atomic philosophers Democritus and Leucippus vehemently rejected this idea and used ad hoc the term “atoms” (uncuttable or indivisible things). Birth from zero cannot occur—*nihil ex nihilo non fiat*. No matter how much we divide matter, Anaxagoras maintained, we will never reach the infinitesimal because nature is given in intermixture. Everything consists of a part of all original sperms, and we get to know this on account of the preponderance of the element that prevails—πάντων μὲν ἐν πᾶσιν ὄντων, ἐκάστου δὲ κατὰ τὸ επικρατοῦν ἐν αὐτῷ χαρακτηριζομένου, i.e. each thing contains in itself parts of other things of heterogeneous elements, and is what it is only on account of the preponderance of certain homogeneous parts which constitute its character.

It is obvious that the Clazomenean sage supported that whatever exists is the intermixture of sperms of the same quality.

Based on this assumption, the following question arises: what is the cause that leads the sperms to get out of this intermixture and confusion and make aggregates arranged according to certain qualities?

Anaxagoras maintained that the ordering force is Νους [Mind]. *On Nature* started with the statement “πάντα χρήματα ἦν ὁμοῦ εἴτε νους ἐλθὼν αὐτὰ διεκόμησεν” (Diogenes Laertius). That is, the Mind moved and separated out the original mixture, which was homogeneous.

Aristotle writes in a comment in his *On Genesis and Decay* that: “Anaxagoras named the homogeneous parts of beings homogeneous

matter and their underlying ordering cause *Nous*.” This may be a reference to the first book of Genesis. I am satisfied with this hint, since my theological knowledge does not suffice for further analysis and comparison of the two texts.

At any rate, Anaxagorean *Nous* was identified as God in ancient writings. Aetius writes characteristically: “Anaxagoras said God made the cosmos.” We will find that this idea of God creating the world is also expressed in Leibniz’s text, who writes that God is the creator and the one who puts the “units” in order.

The *Nous* of Anaxagoras enforces a definite order in the universe, “decoration.” Leibniz calls this “Pre-established harmony.” The qualities of the Anaxagorean *Nous* are not material “ἔστι γὰρ (ο *Nous*) λεπτότατον τε πάντων χρημάτων και καθαρώτατον και γνώμην (γνώση) γε περί παντός ίσχει και ισχύει μέγιστον και τα συμμίσγόμενα τε και αποκρινόμενα και διακρινόμενα πάντα. έγνω nous και οποία έμελλεν έσεισθαι και οποία ην άσσα νυν μη έστι και οποία έστι πάντα διεκόσμησε” [“*Nous* is the purest thing of the finest texture and possesses all knowledge and power and intermixes and separates all these. *Nous* puts everything in order, defined the way they would happen (Providence) and the form of the existence of what was and is not anymore as well as of whatever exists now and all of which has decorated”].

These ideas of Anaxagoras reveal a teleological assumption of the world. We do not find such ideas about *Nous* in Democritus, as creator, maker of the cosmos, or anticipator. The Abdeirian sage rejects these ideas. Democritean theories are characterized by scientific views in modern terms. Everything happens because of a certain cause which we must find. An excerpt mentions: “ουδέν χρήμα μάτην γίνεται αλλά πάντα τε εκ λόγου τε και υπ’ ανάγκης” (frag. 2). That is, nothing happens in vain but there is always a reason and necessity, while another excerpt states: “I would rather find the reason that something happens than the Persian Kingdom be donated to me.”

Now, we shall briefly examine Leibniz’s ideas which seem to be between those of Democritus and Anaxagoras. Diderot characterized Gottfried Wilhelm Leibniz (1646–1716) as a thinking machine, because he dealt with many scientific areas and produced significant work. One could confute Diderot’s point of view and characterize Leibniz as the last *Homo Universalis* of the waning Renaissance and the beginning of New Epistemology.

Leibnitz is classified along with Descartes and Spinoza as one of the leading exponents of rationalism in the conflict between rationalism and empiricism, which reached a climax during the seventeenth century. J. Locke, L. Berkley, and D. Hume, on the other hand, were ardent proponents of empiricism in the same period.

In many cases, Leibnitz admits that he borrows from and is influenced by ancient philosophy. In a letter to his friend Michael Gottfried Hansch (1683–1752) he confesses his admiration for Ancient Greek philosophy, and on the other hand the eclectic method that he was going to follow: “I consider that for philosophizing in the right way it is useful to combine Aristotle, Plato and Democritus.” Leibnitz’s eclecticism is affirmed by Nicholas Jolley of the University of California, known for his studies on Leibnitz’s work. Leibnitz’s as well as Bacon’s attitudes were not always consistent towards decaying Aristotlism. Leibnitz acknowledges that he had studied Aristotle’s work. Bacon, the architect of “modern science” and ardent proponent of the Democritean theory, characteristically points out that “Democritus’s theory about atoms is either real or useful to prove.”

Bacon claimed that philosophy and religion are separate and coexistent, whereas Leibnitz thought that “neither philosophy is acceptable if it does not agree with religion, nor religion is real if it disagrees with proved truths.” One can discern two phases regarding the ancient atomic theory by studying Leibnitz’s attitude. He seems to flirt with Democritean and Epicurean natural philosophy in his first one, according to his texts, and he detaches in his second since the “units” are not material points or elements. He gives a boost to natural philosophy in the first phase with the revival of the two basic philosophical schools of the Hellenistic period: Epicureanism, which continues Democritus’s thought, and Stoicism.

Epicurus as well as Hobbes, a contemporary of Leibnitz, support that all things are material and the change is not due to divine prudence in any case. Leibnitz criticizes the views of both Epicurus and Hobbes, claiming that the soul as well as God are synthesis of extended matter. If this holds true, then God cannot be onnipotent and onmiscient, and consequently does not have the quality of providence, and is not just. Such ideas were contrary to the climate of the time, although atheism or natural religion as ideas were widespread in his time, and led Leibnitz to a metaphysical idealistic explanation of the world. Leibnitz adopted such a view despite the fact that from the end of the sixteenth and beginning of the seventeenth centuries, the atomic theory had prevailed in the context of natural philosophy. Bacon, in another discourse (*Cogitationes de natura rerum*),

clearly declares that “Leucippus’s and Democritus’s atoms are more useful for natural philosophy than Aristotle’s theories about nature,” although he insisted on a scientific utilitarianism with his consolidated view that the explanation of nature provides us with useful and applicable knowledge. This aspect is not found in Leibniz, who turned to metaphysical concepts for the explanation of nature, although he knew of Bacon’s philosophical thought.

Leibniz knew that Gassendi and other natural seventeenth-century philosophers maintained that God moves the atoms in order to avoid Democritus’s atheism, something that Newton supported in the “General Scholium” of *Principia*. One could name this venture “theistic individualism.”

Leibniz did not adopt theistic individualism but a completely different course that is totally metaphysical in order to explain the world. He analyzes the topic we are dealing with here in *Monadology* (1714), written towards the end of his life. He condensed and simplified his philosophy in the ninety numbered paragraphs of his work. In the first thirty paragraphs, he analyzes his theory about units or entities that for him constitute the fundamental ontological principle.

In paragraph three he writes “Monads are the real atoms of nature—in one word the elements of things ... they are a simple substance which enters the compound ones, simple, that is without parts.” The compound consists of the aggregation of “monads.” The simple substance, that is the Monad, does not have any parts, whereas the compound ones do. Leibniz, in the first three paragraphs, uses three Democritean terms: “atoms,” “aggregation” which is called *symplokē*, and “part-less.” Our ascertainment refers to the original view of Leibniz on matter because he had acknowledged that he “initially agreed with the philosophers of my time like Galileo, Bacon, Gassendi, Descartes, Hobbes and Digby.” All of the above, including myself, have supported that atoms are material points. All introduced “atheist individualism” so as not to be blamed for atheism. Leibniz changes course and supports that units are real spiritual, immaterial, psychological entities that constitute a system, from the simplest to the most perfect. The “unit” is the first element of the substance and is a “metaphysical point.” It does not have extent but only tendency, “drive,” and representational ability that is “mood” and “awareness,” which are Aristotelean terms. Ad hoc researchers of Leibniz regarded that the “units” may be “energy units.” The units do not have “external” properties, just like the atoms of Democritus, but “internal” ones. They do not receive any external influence because, according to Leibniz, do not have

openings through which something can enter or exit. God's will is that which arranged everything in harmony and defined the situations that correspond to each case.

Thus, Leibnitz ends up talking about pantheism, recalling Plotinus's theory which surpassed the excessive zeal his contemporaries who talked about material individualism.

The initial unit is the God, the unit of units, and all the other units stem from it. The representations of the "units" do not have the same energy. ● Only God has perfect representation. People's souls which are "units" sometimes have more-or-less perfect representations. The "units" do not mutually interact but are connected with each other and act in prearranged harmony, which has God as the initial force. The "genesis" and the "decay" of the "units" are possible only with the direct energy of divine omnipotence.

I will finish with a concluding ascertainment. Leibnitz, on the one hand, immaterializes the "atoms" of Democritus and makes them "immaterial units," and on the other he bluntly aggrandizes the "Νοῦς" of Anaxagoras. Because of this, d'Alembert wrote in his pre-introductory speech in Diderot's Encyclopaedia: "Leibnitz's units were not capable of helping us to explain nature."

1.2

THE DIFFERENCE BETWEEN NEWTON AND DEMOCRITUS: GOD AS THE CREATOR OF PARTICLES AND CAUSE OF THEIR MOTION

JOHN G DELLIS

PROFESSOR EMERITUS, UNIVERSITY OF PATRAS

Abstract

This paper brings to the foreground the relevancy of Isaac Newton's atomism and Democritus's atomic theory. However, its focal point is the different approaches adopted by both Newton and Democritus as far as the creation of atoms is concerned. Whereas Newton proves to be aware of Democritus's theories, he himself abides by some kind of theistic atomism. Out of deep religious faith, he maintains that God is the creator and instructor of atoms.

Hence, this paper embarks upon researching the revival of the atomic theory between 1600 and 1650, confirming its two aspects, namely the theistic and the atheistic. Within this context, it aims at examining the extent of Newton's awareness of the ancient atomism through the Ancient Greek and Latin texts, and especially Diogenes Laertius's *Vitae* and Lucretius's *Poem*. Furthermore, it will be shown that the revival of the atomic theory manifests a deep influence on contemporary writers who were more than familiar with the ancient texts. Furthermore, this paper explores Newton's sources extensively, ranging from Descartes and W. Charleton's *Physiologia* to R. Boyle's views and those of his teacher, Isaac Barrow. It aims at showing that Newton was aware of Diogenes Laertius's work. Lastly, based on reports on "Principia" and "Optics," on the one hand this work attempts to prove that Newton was aware of

Democritus's theories, and on the other points out their opposing views. Finally, it investigates the so-called "theistic atomism" as expressed by Newton himself. As a firm believer in God, he attributes the creation of atoms to Him, supporting the theological context of his time.

I. The revival of "atomism" at the beginning of the seventeenth century as a forerunner of Newtonian views

One does not need to consider research results¹ relating Newton's theory over the "atomic theory," since even a superficial assumption of his works *Principia* and *Opticks* is enough to provide persuasive proof.

However, what is still under research are the sources that Newton derived his knowledge from since, throughout the seventeenth century and especially in its first half, the atomic theory, in its Democritean or the Epicurean form, was greatly revived without meaning that it was in oblivion in the previous centuries. An abundance of publications and translations of Ancient Greek sources in Latin and English as well as the poem of Lucretius were printed and drew the attention of scholars in the context of the birth of "new science" and of "natural philosophy".

S. I. Vavilov,² the Russian translator of Newton's *Lectiones Opticae*, which he finished in 1669 and remained unpublished until 1729, writes: "There is no doubt that Newton had studied and was very much aware of the works of Democritus, Epicurus and Lucretius," in one of his older works without using specific evidence, after he has pointed out that Newton knew the theories of the three. Vavilov also mentions that Newton must have known the points of view of Galileo, Gassendi, and Descartes without elaborating exhaustively on the topics those philosophers had touched upon.

R. Villamil,³ in one of his old monographs about Newton, writes that there was a copy of the works of Lucretius⁴ in Newton's personal library. Newton surely had access to the sources and knew not only the poem of Lucretius *De natura rerum* but also the *Lives of Philosophers of Diogenes Laertius*.

J. E. McGuire and Martin Tammy,⁵ publishers of part of the notebook in which Newton wrote while a student at Trinity College, mention that Newton knew book X of Diogenes Laertius from a Greek-Latin publication of *Lives of Philosophers* of Gilles Ménage (1664).

Laertius, in book X, is known to refer to Epicurus, analyzing the philosopher's thought to such a degree that the book is extensively compared to other "lives."⁶

This can be ascertained by the fact that Epicurean views might have been widespread and popular during the time that Laertius lived.

Apart from Newton's contact with ancient texts,^{6a} from which he derived information in order to conclude with acceptance of the Democritean atomic theory, he must have surely known the views on this matter of previous and contemporary thinkers. These views, from our point of view, must have played a catalytic role in Newton's familiarization with ancient atomism. Indeed, very informative studies had been printed from the beginning of the seventeenth century by various scholars as well as researchers of the rising science of physics, who, although they had interpretative differences regarding the basic points of the atomic theory, made this problem well known and created the prerequisites for an intense spiritual work. Many of these studies were written in English as well as Latin, and were used by the scholars at the time. All this should not have left Newton unaffected, as can be seen in his already-mentioned notebook called *Quaestiones quaedam philosophicae*.

It is worth mentioning works that became known a little before Newton was born, and especially from the beginning of the century (1600), since we believe that they made him concerned to a great extent, showing the great contrast of atheist atomism with theistic atomism. This contrast had already appeared in antiquity.

I. Robert Burton's work with the impressive title *The Anatomy of Melancholy* (1621) was very well known and popular. Burton's proves that not only Aristotle, Plutarch, Cicero, and Seneca were to the same extent known during the English Renaissance, but so were Hippocrates, Suidas, Stoveo, and Athineos.⁷ Burton calls himself "Democritus junior," since, he confesses, apart from anything else, he lived a monastic life, imitating Democritus, as described in the testaments related to the disputed meeting of Hippocrates and Democritus.⁸ In this work, it is clearly shown that Burton knew Lucretius's views but is also repeatedly using epicurean phraseology. Especially in the "Digression of Air" chapter, he refers on many occasions to the theories of Democritus and Epicurus as well as Lucretius, while at the same time detecting their influence on Kepler and Copernicus. Even though Burton uses the name "Epicure" exclusively in the popular sense, Ch. Harisson⁹ believes that Burton is using it as being

synonymous with atheism. Still, he repeatedly praises modest Epicurus while accusing Lucretius of his doubts of immortality of soul and invoking the views of Hieronymus and Saint Augustine to correct this false view. A diffused perception can be seen, true though it may be,¹⁰ that atomism is an atheist theory, and while there is a need to study it, there is also a need to be reserved toward it, which is almost enforced by the intense religiosity of the era.

II. Two years before Burton's publication of his work in 1619, another book of the same mentality and motivations became famous in its second edition, written by the Oxfordian Nicholas Hill (1570–1610), with the title *Philosophia Epicurea, Democritiana, Thephrastica, proposita simpliciter, non edocta*.¹¹

Hill adopts the Democritean views “over particles” completely, and ends up as a great supporter of corpuscular philosophy. His work does not have, as he himself declares in his introduction, a systemic character. One finds elements of occultism in it, whereas the image of materialistic atomism is obvious. Hill covers in a pre-scientific way a wide spectrum of physics and astronomy issues, such as fire, magnetism, and celestial phenomena, but does not omit mentioning the ethics and destination of the human. Nevertheless, his references to atomic theory are many. It could be considered sparingly as one of the important revivers of atomism, despite the lack of method in the presentation of his material.

III. A very well-written and detailed work of the Italian Jean Chrysostome Magnen (1590–1679) seems to be known in the circle of the Royal Society of London having the characteristic title, *Democritus sive de atomis* (Pavia, 1646). It is written in Latin and it is obvious even by its title that the atomic theory is identified with Democritus, who is its first official proponent. C. Stones¹² writes that the book “showed the great interest in the atomic thought of the time.” Magnen, in the prologue, extensively refers to the life and character of Democritus and gives a short summary of his views on the atomic teachings. He heralds the fundamental principle that “all things are made of atoms.” One of his initial statements of particular value is that a “continuum consists of atoms or of an indefinite number of particles which are adequately separated and have a certain size.”¹³ He deals extensively with the qualities of the atoms, deeply influenced by Democritus, stating that they are material, simple, homogenous, and by nature indivisible. He also deals with the various assumptions of the size of the atoms.

Magnen also mentions atoms of fire, water, and earth. The atoms make triple movement, without defining the form of the movements, while he maintains that there is “sympathy” among them.

All of the above works had been published after 1600 before Newton was born, and had induced an intense interest in the field of “natural philosophy.” The influence of these works on Newton’s reflections was indirect and weak. We believe that those who had the strongest impact in the configuration of Newton’s scientific thought were: (a) his teacher and friend Isaac Barrow (1630–77), (b) the views of his friend R. Boyle in the Royal Society, and (c) the widely read book by Walter Charleton (1619–1707), *Physiologia Epicuro-Gassenda-Charletiana*, first published in 1654,¹⁴ whose title even denotes the direct relation with Gassendi’s philosophy. I believe that with Charleton’s work the atomic theory became known in England in the middle of the seventeenth century after other works had appeared, as mentioned above.

IV. Walter Charleton (1620–1707) was a physician favored by King Charles II and one of the first members of the Royal Society, whose works reflect the effort to explain the world scientifically in that era. This work, however, cannot be regarded as a physics manual but more as a dissertation on natural philosophy which has many common elements with the works of the pre-Socratics *About Nature* [*Περὶ φύσεως*]. Charleton’s work is divided into four books. Each one is divided into chapters, parts, and articles. Here, it is worth mentioning that Charleton’s themes remind us of the titles of Democritus’s works, as mentioned by Diogenes Laertius¹⁵, while the latter were never saved which have not been saved. One only knows the titles of Democritus’s works. The first chapter of the second book is titled “The Existence of Atoms.” The atoms have the qualities of the “First Matter.” Charleton wrote: “Nothing can be the Root or the beginning of Material or Physical Extension, but τί ἀδιόλητον [Aliquid indissolubile], something so minute and solid, that nothing can be conceived more exiguous and incompatible in Nature ... such as are the Atoms of Democritus and Epicurus ...”¹⁶

Charleton notices: “there are such things, as Atoms, or insectile Bodies in Rerum Natura, that cannot be long doubted by any judicious man, who shall reason with himself. Nature cannot produce Nothing out of Nothing,¹⁷ nor reduce anything to Nothing, is a Principle, whose tranquility was never yet disturbed.”¹⁸

Charleton also supports that nature, while decomposing the “concretions”¹⁹ [συγκρίματα], reaches to barely noticeable particles which are its limit.²⁰ Charleton also deals with the qualities of the atoms extensively and in detail. In his analyses, one can see his knowledge of antiquity and how much he has been influenced by the Ancient Greek atomic philosophers in the formation of his beliefs. The qualities of the atoms are: shape, size, weight, and volume. Charleton’s interest focuses on the size of the atoms. It becomes clear from his analyses that size is a fundamental quality of the atoms. Certainly, they have no noticeable volume, but “are Entities, quantities, i.e. Realities endowed with certain corporeal dimensions and they are not mathematical points.”²¹

In the last part of the second book of *Physiologia*, Charleton deals with an important problem of the atomic theory concerning the motion and principle of the atom’s movement. The problem of the principle of motion was not dealt with by Democritus, and there is a gap in his atomic theory. Thus, Aristotle²² criticizes him (Democritum) for his omission. Charleton²³ solves the problem by replacing the materialistic Epicurean view with the idea that the atoms are created by God, and He has given them “an inner energy or faculty motive ability enable[ing] the continuous turbulence²⁴ that happens among them.” This idea of Charleton deeply influenced R. Boyle, Newton’s friend, who mentions him in his works *Opticks* and *Principia*.²⁵ Boyle, who detested the scholastic natural philosophy, accepted all the basic natural principles and formed his own scientific experiments as well as his reflections. Boyle could be characterized as epicurean in the narrow sense of the term, as he had enough reservation toward atomism as a Christian Orthodox.²⁶ Boyle considered God as the prime cause of entities and the guide of the movement of atoms which play the role of the second cause. The basic problem of Boyle’s work “The Origins of Forms and Qualities” (1666), is the domination of science by the particle through the strong influence of Descartes. The atomic theory being in exile²⁷ comes back with Boyle as particulate, whereas the “atom” is replaced by the “particle.”

An approach favorable to the atomic theory appeared during this era, and the “anti-atomism,” whose reasons we will discuss later, becomes milder. Boyle agreed with the Cartesians that the “matter” did not have the motion from itself but from God, which was accepted by the Epicureans.²⁸ It differentiates from them, however, in the issue of God’s interference in the function of the universe. According to the Cartesians, God set in motion the world, defined its laws, and subsequently left the world on its own course.

Boyle, on the one hand, accepted that God regulated and guided the first movements of the “small parts of universal matter,”²⁹ and on the other maintained that God interferes according to the circumstances, whereas there can be interference also by other “incorporeal agents.” Boyle’s atomism can be characterized with some reservations as “theistic atomism.”

V. P. Gassendi (1592–1655) had formulated a similar view of theistic atomism before Boyle, whose teaching greatly influenced Charleton and others. Stones wrote about Charleton something that goes without saying, which is that his *Physiologia* is based on Gassendi’s work (Lyons 1649). *Syntagma Philosophiae Epicuri* had been published just six years before *Physiologia*, a fact revealing that Gassendi’s views were very recent and modern. The work is divided into three parts: *Logic*, *Physics*, and *Ethics*.³⁰

In the first part of *Physics*, he deals with space, time, motion, *prima materia*, qualities of things, genesis, and decay. The *prima materia* is the atoms. Gassendi accepts and analyzes the fundamental qualities of atoms following the epicurean point of view, maintaining that the atoms cannot be created or destroyed.³¹ They are solid on the one hand and cannot be divided into smaller parts on the other. This makes it clear that the indivisibility of the atoms does not mean that they have no size like geometrical points,³² but that they are real entities of infinitesimal dimensions and should not be conceived of as conceptual ideas. His argumentation refers to the confusion that exists between “*punctum physicum*” and “*punctum mathematicum*” according to the terminology that he himself defines. He emphasizes the discussion of the atom’s qualities. It was known to him that Democritus gave the atoms size and shape only, whereas Epicurus added weight.³³ He accepts all three qualities: “size-shape-weight.” Gassendi extensively dealt with the quality of “weight” in order to state his opposition to Epicurus’s views without reservation. He rejects the Epicurean view that atoms are eternal, not created and more in the “vacuum” by themselves. He believes that the world is an organized totality. He explicitly declares his position. God is the creator and the first cause above and beyond the natural world. The atoms do not move by themselves (*a se ipsis*) but only “*Dei gratia*.” In this way, Gassendi is shown as the introducer and teacher of “theistic atomism.”

This short review of the approaches of philosophers contemporary to Newton, as well as those before him, is useful because: (a) it is shown that the “surrounding” atmosphere of the era was deeply imprinted by the revived theory of atomism with its various shades; (b) it seems that every

effort of scientific research and especially every step of “natural philosophy” were orientated to and involved in the atom theory, the views over time and space always with specific attention and reservation; and (c) it becomes clear that in this time there was strong opposition between “atheistic atomism” and “theistic atomism.”³⁴

Considering all of the above, it is possible to both detect Newton’s sources regarding the acceptance of the atomic theory in the form of particles and justify his fundamental view that the creation and motion of the particles, of which everything consists, are God’s work. The latter view by Newton is the one which differentiates him from Democritus, who does not introduce God³⁵ in order to solve the problem of the creation and motion of atoms.

II. Sources of Newton’s theory “over particles”

In the *Principia* and *Opticks*, it is not possible to detect who of the above affected the formation of Newton’s particulate theory deeper, despite the fact that in these works he frequently refers to ancient philosophers as well as contemporary ones, and to “terms” of the atomic theory. The detection of the “sources” can be done by studying the *Quaestiones quaedam Philosophicae*,³⁶ where Newton for the first time deals with problems of the “philosophy of nature,” as R. Westfall states.³⁷

Westfall not only aims to define but also mentions that Newton had abundant information from the ancient works³⁸ as well as modern inflection, either from his personal involvement with the texts themselves or by reading epitomes. Westfall, who had dealt with Newton many times, writes in many of his works that Newton had studied a lot of works by Descartes, Galileo, Boyle, Hobbes, Granvill, and Henry More.³⁹ When Newton started writing his first entries in the his *Notebook*,⁴⁰ he had no time to read the texts of all those writers, perhaps only those which had recently been published and were high in demand on release.

After comparing texts, Westfall⁴¹ notes that the writing of the first *Quaestio* was based entirely on the second section of the third chapter of W. Charleton’s *Physiologia*. Newton was so much influenced by this book that at some points he repeats words and phrases of Charleton. The publishers of *Quaestiones*, J. E. Mc Gire and M. Tamny,⁴² observe that eighteen chapters out of the thirty-seven of Newton’s *Notebook* are borrowed in *Physiologia*. If someone takes into consideration that Charleton does not formulate original ideas but reproduces Gassendi’s

views almost unchanged, as already mentioned, then one must accept that Gassendi's views impregnate Newton's thought and that Charleton is just the go-between who brings the latter into contact with the reflection of the former. It should not be ignored that Newton was deeply affected by the similar views of Boyle.⁴³ It is essential to mention that later Newton got to know Descartes's views, with which he disagreed on many points.⁴⁴ Also, Newton must not have remained indifferent toward the atomism of his friend and teacher Isaac Barrow as well as the views of Henry More, the Platonist of Cambridge. The former was deeply religious.⁴⁵ Newton succeeded him in Trinity College in 1669. The latter, according to Westfall's view, spoke about *minima naturalia*, which are the particles, according to Newton.

The thing that one ascertains after insistent involvement in the problem of Newton's sources is that defining only one source from which Newton derived information is very difficult, because the atomic theory was formulated in various versions and was accepted by Newton's contemporaries with many differentiations. One could infer with many reservations that Newton was in the first place and to a great extent influenced by Gassendi and Barrow, because in this way we can justify his view that God is the creator of the particles and regulator of their motions, as we are going to analyze in the following. It must be also accepted, though, that Newton, "qui genus humanum ingenio superavit" ["who elevated the human gender as far as the intellect is concerned"], would not ignore the history of the atomic theory over fifty years, as previously noted.

III. Newton's assumption: God as "creator of the particles" and "cause of their motion"

First, it is known and clear that Newton knows Democritus theory directly or indirectly and refers to the Abderitem with enthusiasm. Newton calls on Democritean theory in order to reject the Cartesian position of the "aethereal medium." Whittaker, in the introduction of *Optics*, comments on this subparagraph of Newton and writes: "Newton placed himself in the succession of Leukippus and Democritus in this way."⁴⁶ Newton mentions Democritus by name in *Principia*,⁴⁷ pinpointing relations between the cosmology of Democritus and the Egyptians.

Newton formulates the view that everything consists of "hard particles."⁴⁸ Even the sun's rays seem to be made of "hard bodies."⁴⁹ Answering which is the first principle of particles and especially in which way they were

formed, Newton says, perhaps with a slight reservation, that God created everything, giving them motion and guiding them. He writes clearly:

All these things being considered, it seems probable to me, that God in the Beginning form'd Matter in Solid, Massy, hard impenetrable, moveable Particles, of Sizes and Figures, and with such other Properties, and in such Proportion to Space, as most conduc'd to the End for which he form'd them ... even so very hard, as never to wear or break in pieces; no ordinary Power being able to divide what of corporeal Things are to be placed only in the various Separations and new associations and Motions of these not in the midst of Solid particles, but where those Particles are laid together ...⁵¹

The above extract is important and protean. Many basic positions of Newton are included which are of interest to the problem under study. It allows us to associate and compare it to similar Democritean views, as they are also quoted from statements. First, in Democritus theory, we locate the invisibility of the atoms: “ἔχειν μέρη εἰς ἃ ὄν διαίρεθῆ” (L. 212) and “ὑπὸ σμικρότητος ἀδιαίρετα” (DK 68A49); second, Newton supports that the atoms do not break, and Democritus teaches the same: “ὑπὸ σκληρότητος ἄθραυστα” (68A49; Galenius De elem. Sec Hipp I,2); and third, the distinction and multi-shaped union of particles lead to the creation of entities, according to Newton. According to Aristotle’s statement on Generation and Corruption, 315b15: “δοκεῖ σχεδόν πᾶσιν ἕτερον εἶναι γένεσις καὶ ἀλλοίωσις καὶ γίνεσθαι μὲν καὶ φθείρεσθαι συγκρινόμενα καὶ διακρινόμενα. ἀλλοιοῦσθαι δὲ μεταβαλλόντων τῶν παθημάτων περὶ τούτων ἐπιστήσασι θεωρητέον”⁵¹ [“Since almost all philosophers consider generation and corruption as two separate concepts and things are born and worn out compounding together and disuniting respectively, while corruption comes in when their qualities change, we ought to examine these views by studying them given they contain several reasonable questions”]. Apparently, Democritus has the same view.

Newton states another Democritean view with the difference again that God creates and guides everything he writes: “it may be also allowed that God, is able to Create Particles of Matter of several Sizes and Figures, and in several proportions to space, and perhaps of different densities and forces, and thereby to vary the Laws of Nature, and make worlds of several sorts in several parts of the Universe. At least, I see nothing of Contradiction in all this.”⁵²

Democritus teaches about the existence of “infinite worlds”: “Ἀπείρους τε κόσμους καὶ γεννητούς καὶ φθαρτούς ... καὶ τὰς ἀτόμους δὲ ἀπείρους

εἶναι κατὰ μέγεθος καὶ πλῆθος, φέρεσθαι δ' ἐν τῷ ὅλῳ δινουμένους⁵³
 [“The worlds are unlimited; they come into being and perish ... Further, the atoms are unlimited in size and number, and they are born along in the whole universe in a vortex”].

Democritus, though, does not seem to search for another cause for the genesis of the worlds except for the motions which lead to the “comparison” and dissolution of the atoms.

Newton, at another point of *Opticks* (p. 402), seems consumed by his opinions, and writes: “now with the help of these principles, all material things seem to have been composed of hard and solid particles ... variously associated in the first Creation by the Counsel of the intelligent Agent. For it became him who created them to set them in order ...”

He insistently states the same views in *Principia* about an omnipotent, omnivisor, and totally controlling God.

In *General Scholium* he analyzes his faith in a dense meaningful way and refers to the qualities of God. This comment is a hymn to God and contains Newton’s theological views.⁵⁴ Choosing some extracts is useful because in this way one can interpret the Newtonian theistic atomism.

Thus, according to Newton, everything is explained by a God creator, governor, protector: “This Being (God) governs all things, not as the soul of the world, but as Lord over all; and on account of his domination he is wont to be called Lord God *παντοκράτωρ*, or Universal Ruler; for God is a relative word, the Supreme God is a Being, infinite, absolutely perfect; ... that the true God is a living, intelligent and powerful being ... omnipotent and omniscient; ... God is the same God, always and everywhere. He is omnipresent ... we have ideas of his attributes, but what the real substance of anything is we know not ... We know him only by his most wise and excellent contrivances of things, and final causes; we admire him for his perfections; but we reverence and adore him on account of his dominion: for we adore him as his servants ...”⁵⁵

Democritean teachings do not have such views. God is neither the creator, regulator, or governor according to the Abderites philosopher.⁵⁶ Newton solves the problem of the principles of particle motion with God’s intervention. In contrast, Democritus leaves it unsolved and is blamed for this by Aristotle.⁵⁷ This, of course, is the big difference between Democritean teaching and Newton’s theory on atoms and particles, respectively.

IV. The reason for Newton's theistic atomism

It is not verified or perhaps not studied at all if Newton's view, as analyzed above, is the result of deep piety or just compromise, since the Democritean and Epicurean atomism were atheistic and were not accepted by Christianity, and thus should be questioned or rejected. One cannot exclude beforehand one or the other version. It is necessary to examine each one separately. It seems that Newton had a lot of theological knowledge and was an advocate and defender of Christian faith at the same time. We can clearly see the latter in *General Scholium*, whereas the former is seen in his theological writings. It has been mentioned that atomism was accepted with reservations and was considered suspicious.

Harrison⁵⁸ writes: "Democritus's Philosophy, a philosophical system which would be considered very modern, had not such a good reputation compared to the peripatetic, academic or stoic philosophers. The atomic philosophers were considered bad in the common thought."

A theological treatise with the title *Against the Atheists, Epicureans, Aegyptians, Jews and other Faithless*, published in 1604, had four reprints in twelve years. This denotes the spiritual attitude of the era. Epicurus's name in the subtitle is not used by the writer without mentioning its historical importance, but its association with Lucretius's verses aims at giving it the characterization of "faithless."

Democritus is included among the atheists because he does not believe that God created and governs the world. The skeptical attitude toward atomism had another reason of ethical content—the hedonism which in Democritus's ethics has more a spiritual character in comparison with Epicurean hedonism. Roller⁵⁹ writes "Epicurism was detested by Christian theologians not only for the mechanistic atomism which it showed but also for its hedonistic character." Christianity preaches ascetic and modest living and also reaches for the immortality of the soul, which is its fundamental principle. Democritean and Epicurean atomism claims that the soul consists of "concretions" of atoms which are dissolved by death. Newton could not be affected by these approaches. It does not seem that Newton was led to believe that God creates, interferes, and directs everything out of fear of the official position of the church, which condemned the atheism of the atomic philosophers of antiquity. If this Newtonian view was the result of a compromising position toward the establishment, then Newton should remain a simple "dualist," meaning that he believed in God only as creator. This would protect him from the

arrows of any attack as it would be a persuasive position. Whatever he writes in *General Scholium* allows us to consider him as theistic, a position which is the result of deep religious faith. He lets us believe that the first may happen as his position hides his motivation to not question the obvious detestation that everybody showed toward atheist atomism. In a letter to his friend Richard Bentley⁶⁰ he wrote “when I was writing my treatise about our system, I had one eye turned to what people can accept.”

Nevertheless, Newton wrote a lot of texts of theological content, which denotes both his interest in theological problems and his deep faith. Westfall notes: “Newton was a religious rationalist, who remained faithful to his secret, spiritual association with God.” Apart from the chapter “Over Theology” included in *Quaestiones*, Newton wrote an important work with the title “Observations upon the Prophecies of Daniel and the Apocalypse of St. John” (1733), which has a direct relation with similar views of his religious teacher Henry More.⁶¹ Anyway, what is indeed obvious is that Newton knows very well the atomic theory as formulated by the Ancient Greek philosophers. He clearly differentiates, however, the crucial point of the principle of motion, attributing everything to God, forming in this way a metaphysical theistic kind of atomism, which, besides anything else, is the difference separating him from the ancient atomists. “In the eyes of Newton’s successors, though, the idea he proposes that the world was planned and created by God, did not play any role in the successful application of his Mechanics which, out of deep historic irony, ended up representing the epitome of mechanistic materialism.”⁶²

V. Conclusions

Considering what was mentioned above, we can draw the following conclusions. First, Newton knows very well the atomic theory either from the ancient sources, mainly Diogenes Laertius and Lucretius, or indirectly from the texts of contemporary writers, especially Gassendi, Charleton, and Boyle. This can be easily concluded by studying his philosophical diary *Quaestiones quaedam Philosophicae*.

Second, Newton talks about “particles” and not atoms, like Democritus, Epicurus, and Lucretius.

Third, he rejects atheistic atomism and interprets the creation and motion of particles with the interference of the omnipotent God, who directs and oversees everything.

Finally, we believe that Newton's position is more the expression of his deep piety than his intention to compromise in relating the general denial of ancient atomism, because it rejected the involvement of God as the entity which created and directs the world, continuously caring about it. Newton showed that the mechanistic universe was an argument against atheism. Newton's God resides in the mind rather than the heart, for he is the god of law and certainty, and not of hope, fear, punishment, and reward.⁶³

The study of the spiritual atmosphere of that time during which a dispute between atheistic atomism and theistic atomism is revived, at times openly and at other times not, convinced us that it was not "about judgment" but an effort of a new regard of the world, which was taking the form of a "clash" between two spiritual trends. The first is the science which seeks to study nature through observation and experiment without being suddenly cut off from religion, which had important cosmic power. This second trend was openly taking place with the effort of religion to not be cut off and become isolated from the new developments and birth of science. A happy medium of the two trends should be found in mutual compromise. It is the herald of the Enlightenment, during which the clash became inevitable, resulting in their autonomy but not their opposition.

Notes

1. See Henri Guarlaric, *Newton et Epicure* (Paris: Université de Paris, 1963); R. Kargon, *Atomism in England from Harriot to Newton* (Oxford: Clarendon, 1966), 118-32.
2. S. Vavilov, "Newton and the Atomic Theory," in *Newton Tricentenary Celebrations* (July 15-19, 1946) (Cambridge Royal Society, 1957), 44-5.
3. R. de Villamil, *Newton the Man* (London, 1931).
4. The full text of Lucretius was discovered in 1417 in a monastery by the humanist scholar Gian Francesco Poggio Bracciolini (1380-1459). One of his teachers was one of the Chrisolora brothers, probably Emmanuel, and he dedicated his life to the collection and distribution of manuscripts of antiquity. See Duane H. D. Roller, "Greek Atomic Theory," *American Journal of Physics* 49 (3) (1981): 206-210, especially 209. Lucretius's ideas were not of course unknown before this date as they can be found in many texts, such as Hrabanus Maurus (776-856), William of Conches (1080-1154), and Nicolas de Autrecourt (ca. 1300-1350). See especially Antonio Tine, Democritus, and Nicholas of Autrecourt, *Proceedings of First International Congress on Democritus*, Xanthi, October 6-9, Vol. II, 279-303; Ch. Trawick Harrison, "The Ancient Atomists and English Literature of the Seventeenth Century," *Harvard Studies in Classical*

- Philology* 45 (1994): 1–79, especially 1, which states that the first edition of Lucretius's *De natura rerum* was in 1473.
5. J. E. McGuire and Martin Tammy, *Certain Philosophical Questions: Newton's Trinity Notebook* (Cambridge: Cambridge University Press, 1983), 20, 42–3.
 6. Harrison (in "The Ancient Atomists," 1) writes that Diogenes Laertius's edition was released in 1533. Lym S. Joy, in *Gassendi the Atomist* (Cambridge: Cambridge University Press, 1987), 69, mentions the story of deriving Diogenes Laertius's text, and writes that "printed publications in Greek and in Latin were extensively used in the last period of the 15th Century." Marc Meibom counts no less than twenty-two publications of Laertius in his Greek Latin publication with comments in 1692, and which had been published in Europe in 1615. He has, as a starting point, Brognolius's (1475) corrections in Traversarius's undated translation. About the story of the text see also Richard Hope, *The Book of Diogenes Laertius* (New York: Columbia University Press, 1930); McGuire and Tammy's notes are very enlightening on this. See *Certain Philosophical Questions*, 15–25.
 7. See Harrison, "The Ancient Atomists," 1.
 8. See scheme D-K,¹² A21 Hippocr. *Letters* 14, 17, 18 (according to the D. Sakalis edition, Ioannina, 1989). See Louvenalis 10, 28–35 about the relationship and possible interaction between Democritus and Hippocrates. See I. G. Dellis, *The Problem of Moral Consciousness in Democritus*, dissertation (Patras, 1985), 208–9, where there is a special bibliography.
 9. Harrison, "The Ancient Atomists," 10.
 10. See D. Furley, *Cosmic Problems: Essays on Greek and Roman Philosophy of Nature* (Cambridge: Cambridge University Press, 1989), 225–7.
 11. Harrison, "The Ancient Atomists," 5. See also Hill (gen. about 1570), which also mentions R. Kargon, *Atomism in England*, 14–15.
 12. C. B. Stones, "The Atomic View of Matter in the Fifteenth, Sixteenth and Seventeenth Centuries," *ISIS* 10 (1928): 445–65, especially 458. See also Christoph Meinel, "Early Seventeenth-century Atomism: Theory, Epistemology, and the Insufficiency of Experiment," *ISIS* 79 (1988): 68–103.
 13. See Stones, "The Atomic View of Matter," 458.
 14. The full title of this work is Walter Charleton, *Physiologia Epicuro-Gassendi-Charletoniana: a Fabrick of Science Natural upon the Hypothesis of Atoms, founded by Epicurus, repaired by Petrus Gassendus, argued by Walter Charleton*. This work was reprinted by Johnson Reprint Corporation (New York, 1966). Harrison ("The Ancient Atomists," 21) notes that Charleton had published a work on Epicurus whose full title is: *Epicurus's Morals, collected partly out of his own Greek text in Diogenes Laertius and partly out of the Rhapsodie of Marcus Antonimus, Plutarch, Seneca and Cicero* (London, 1656). Lindsay Sharp presents the work of Charleton in his informative study "Walter Charleton's early life 1620–1659 and Relationship to Natural Philosophy

- in Mid-Seventeenth Century in England,” *Annals of Science* 30 (1973): 311-40. Sharp writes (331) about *Physiologia* that it was the first important attempt in the English language to present the Epicurean theories without atheistic hints. Sharp notes (332) that *Epicurus’s Morals* contains Charleton’s apology for the Epicurean ideas.
15. *Diog. Laert.* IX, 45-9.
 16. Charleton, *Physiologia Epicuro-Gassendi-Charletoniana*, book II, art 3, 85.
 17. Compare Democritus’s similar view: “μηδὲν τε ἐκ τοῦ μὴ ὄντος γίνεσθαι μηδὲ εἰς τὸ μὴ ὄν φθίρεσθαι” [“Nothing can come into being from that which is not nor pass away into that which is not”]. *Diog. Laertius*, IX, 44.
 18. Charleton, *Physiologia Epicuro-Gassendi-Charletoniana*, book II, art. 7, 87.
 19. “Concretions” means “a mass formed by the union of separate particles.” Charleton, we believe, uses this term to present the Democritean term συγκρίματα [“composite thing”]. See *Diog. Laert.* IX, 44; D-K, 68A37, A58.
 20. Charleton, *Physiologia Epicuro-Gassendi-Charletoniana*, Book II, Arts 8, 9, 10, 88 and 89.
 21. Charleton, *Physiologia Epicuro-Gassendi-Charletoniana*, Book II, ch. IV, Sect. II, art. I, 113.
 22. See Aristotle, *Metaphysics*, 6, 1071b32, *Physika* 01, 252a34, *Generation of Animals*: 742b17, DK 68A50.
 23. Charleton, *Physiologia Epicuro-Gassendi-Charletoniana*, Book II, chap. IV, sect. IV, 126.
 24. We believe that Charleton had in mind the Democritean term “ἄποικαλμόν” at this point. See D-K 68A49.
 25. Newton mentions Boyle in *Opticks* as well as in *Principia*. See Michael Barfoot, “Hume and the Culture of Science in the Early Eighteenth Century,” in *Studies in the Philosophy of the Scottish Enlightenment*, edited by M. A. Stewart (Oxford: Clarendon, 1991), 160-5. Rupert Hall mentions Newton’s and Boyle’s relation in *From Galileo to Newton* (New York: Dover, 1981), 237.
 26. Harrison mentions this in “The Ancient Atomists,” 3.
 27. See Joshua C. Gregory, *A Short History of Atomism* (London: A. & C. Black, 1931), 22-4; A. Rupert Hall mentions the scientific achievements of R. Boyle in *From Galileo to Newton*, 228-42.
 28. See A. J. Festugiere, *Epicurus and His Gods*, translated by C. W. Chilton (Oxford: Blackwell, 1955).
 29. Gregory, *A Short History of Atomism*, 34.
 30. Joy makes an extensive and complete analysis of Gassendi’s teaching of the atomic theory in *Gassendi the Atomist*, 130-94. He also presents a detailed bibliography as well as the history of the editions of the various ancient Doxographical sources.
 31. Book III, Sect. I, chap. 5, 259.
 32. Book III, Sect. I, chap. 5, 263 and on.

33. Book III, Sect. I, chap. 6 7, 266 79.
34. A similar dispute and reserved attitude toward the theory of atomism had also arisen in antiquity. M. Aurelius characteristically states: “Ἦτοι κκεκόν και άντεμπλοκή και σκεδασμός ή ένωσις και τάξις και πρόνοια. Ει μέν οὖν τά πρότερα, τί και οὖν έπιθυμώ είκαίω συγκρίματα και φυρμῶ τοιούτω ένδιωτριβειν; Τί δέ μοί και μέλει άλλου τινός ή του έπως ποτέ οίω γίνεσθαι; Τί δέ και ταρασσομαι; Ἦξει γάρ έπ’ έμέ ό σκεδασμός, ό,τι άν ποιῶ. Ει δέ θάτερα έστιν σέβω και εϋσταθῶ και θαρρῶ τῶ διοικουντι” [“Either a medley and a tangled web and a dispersion abroad, or a unity and a plan and a providence. If the former, why should I even wish to abide in such a random welter and chaos? Why care for anything else than to turn again to dust at last. Why be disquieted? For, do what I will, the dispersion must overtake me. But if the latter, I bow in reverence, my feet are on the rock, and I put my trust in the Power that rules”]. See *Meditationes*, VI, 10. It is obvious from this text that the positions expressed with the two teams of words (a) “κκεκόν και άντεμπλοκή και σκεδασμός” and (b) “ένωσις και τάξις και πρόνοια” are opposed. The second team leads to the “administrator.” See D. Furley, *Cosmic Problems* (Cambridge: Cambridge University Press, 1989), 223 35. Furley schematically attributes the difference between atomists and aristoteleians on p. 225.
35. One can have in mind the following studies about Democritus’s theology, despite the fact that the ancient testimonies do not give an explicit image: (a) H. Eisenberger, “Demokrits Vorstellung von Sein und Wirken der Götter,” *Rheinisches Museum für Philologie*, ex III, 141 58; (b) Donald McGibbon, “The Religious Thought of Democritus,” *Hermes* 93 (1965): 385 95; (c) Albert Henrichs, “Two Doxographical Notes: Democritus and Prodicus on Religion,” *Harvard Studies in Classical Studies* LXXIX (1975): 93 123; (d) W. Jaeger, *The Theology of the Early Greek Philosophers* (Oxford: Oxford University Press, 1947), 180 6; (e) the analysis of W. K. C. Guthrie, *History of Greek Philosophy* (Cambridge: Cambridge University Press, 1971), vol. II, 478 82 is explicit and short.
36. It is the title that Newton had given to a part of his diary written during his studies in Cambridge (1661 5) in which he was writing down notes about mathematics, theology, and chemistry. McCuire and Tammy have recently published *Questiones*.
37. R. Westfall, “The Foundations of Newton’s Philosophy of Nature,” *The British Journal of the History of Science* I (2) (1962): 171 82.
38. Apart from book X of “Lives” of Diogenes Laertius that we mentioned, Westfall (*ibid.*, 171) writes that Newton starts the Philosophical Notebook with notes in Greek from Aristotle and mainly from “Logic” and “Ethics.” A. Rupert Hall, in *From Galileo to Newton* (277), writes that Newton had studied Greek during his first years in Cambridge.
39. Westfall, “The Foundations of Newton’s Philosophy of Nature,” 172.
40. *Ibid.*, 173 refers synoptically to the content of *Questiones*. They are divided into forty-five chapters. Newton does not write much in some

chapters, whereas he writes a lot of pages in others. Newton starts with a series of general themes about the nature of material, space, time, and motion. Notes about cosmic order, the particular qualities, the rigid motion, the secret (occult) qualities, light, vision, colors, and senses follow. Finally, he writes about a series of various themes which do not seem to be written by him but added by others.

41. Westfall, "The Foundations of Newton's Philosophy of Nature," 173, note 5.
42. McCuire and Tamny, *Certain Philosophical Questions*, 6, 26-43.
43. The well-known historian of science A. Koyre notes, referring to Boyle's views (*Western Civilization*, translated by B. Kalfa and Z. Saraka [Athens, 1991], 55), that "the book of Nature Boyle believes, is surely a well-planned scenario, every part of it is well-written by the omnipotent hand of God and it depends on all the others, but it is not written with geometrical characters but with particulates." A. Rupert Hall, who published extracts of the Newtonian Notebook (as "Notes and Communications: Sir Isaac Newton's Note-Book, 1661-5," *Cambridge History Journal* 9 [1948]: 239-50), believes that one of the two writers who greatly influenced Newton's thought at this time was Boyle, the other being Descartes.
44. Newton rejects the Cartesian view about "whirls." See Joy, *Gassend the Atomist*, 213-17; Westfall, "The Foundations of Newton's Philosophy of Nature," 174. Descartes' world comprises two principles (stretch and motion), while Newton's world comprises three elements: (a) "material" infinite particulates; (b) "motion" transferring the particulates in the infinity and homogeneous vacuum; (c) "space," the vacuum itself where the particulates materialize their motions.
45. See Harrison, "The Ancient Atomists," 23.
46. *Opticks*, Introduction, LXX, III.
47. Newton, *Principia*, translated by A. Motte, with notes by F. Cajori (London: University of California Press, 1962), vol. II, 549.
48. *Opticks*, 389.
49. *Ibid.* See also Query 29, 370.
50. *Ibid.*, 400.
51. About the same views see also Aristotle, *On Generation and Corruption* 315b6, *Physics* 187a12-265b17.
52. *Opticks*, 403-4.
53. *Diog.* Laert. IX, 44. "The worlds are unlimited; they come into being and perish," IX31; "Out of them arise the worlds unlimited in number and into them they are dissolved," D-K 68A82; Aristotle, *Phys.* 250b18 "ἀλλ' ἔσται μὲν ἀπείρους τε κόσμους εἶναι φασίν, καὶ τοὺς μὲν γίνεσθαι τοὺς δὲ φθεῖρεσθαι τῶν κόσμων, ἀεὶ φασίν εἶναι κίνησιν" ["But whereas those who believe in innumerable cosmosi, some coming into being and others passing out of it, say that motion is ever-existing"].
54. *Principia*, 544-6.
55. *Ibid.*, note 54.

56. See Dellis, "The Problem of Moral Conscience in Democritus," 37, 169-82.
57. Arist., *De Cael* 300b8, *Metaphysics* 985b19, 1071b31, "Ἀλλὰ διὰ τί καὶ τίνα (κίνησιν) οὐ λέγουσιν, οὐδέ ὡδί, οὐδέ τὴν αἰτίαν" ["but why there is, and what it is, they do not say, nor, if it moves in this or that way, what the cause is"]. See also *Phys.* 252s32. The problem of the cause of motion in the Democritean atomic theory is the "ἄεὶ ζητούμενον" and "ἄεὶ ἀπορούμενον." For this reason, it has drawn and still maintains the unfailing interest of many competent researchers. Furley, who deals with the issue in many of his texts, writes: "the confusion and the lack of evidence over this problem is lamentable. There is a dispute among the researchers over some points of the atomic theory." See *The Greek Cosmologies* (Cambridge: Cambridge University Press, 1967), vol. I, 146 and on. Guthrie, *History of Greek Philosophy*, vol. II, 396 and on, pinpoints that "every study of the cause and the nature of the motion in the atomic system must start from Aristotle's complaint that this motion has remained inexplicable." S. Luria, in *Democritea* (Leningrad: Academica Nauka, 1970), managed to present the most complete edition of Democritean extracts, and classifies the extracts and statements "over the motion of the atoms" into three teams: (a) *De primordialium atomorum motu* (288-313) (b) *De Primordialium atomorum celeritate* (315); and (c) *De attractione et repulsionis, De notione via* (315-23). Only one clarification, since we are not going to present this issue extensively, the perpetual motion of Democritean atoms, takes place in two phases: (a) precosmic (Luria 305); and (b) cosmomaking (Luria 395), with the appearance of "Dinos" (see J. Ferguson, "Dinos," *Phronesis* 16 [1971]: 97-115). We accordingly mention, from the extensive bibliography in English on the issue: (a) Furley, *Cosmic Problems*, 78-81, 84-102; and (b) J. Barnes, *The Pre-Socratic Philosophers* (London: Routledge and Kegan Paul, 1979), vol. II, 63 and on.
58. Harrison, "The Ancient Atomists," 4.
59. Roller, *Greek Atomic Theory*, 209.
60. See Commenys Cajori on *General Scholium*, appendix *Principia*, vol. I, 669.
61. On Newton's theological views see especially R. Westfall, "Isaac Newton: Religious Rationalist or Mystic?" *Review of Religion* 22 (1958): 155-80, and *Science and Religion in Seventeenth-century England* (New Haven: Yale University Press, 1958), chapter eight.
62. Jonathan Powers, *Philosophy and the New Physics* (London: Methuen, 1985), 32.
63. Hall, *From Galileo to Newton*, 304.

1.3

IS ARISTOTLE DEVIANT?

EMM. MIKROGIANNAKIS

PROFESSOR EMERITUS, UNIVERSITY OF ATHENS

Abstract

My study of the passage in *Pol.* V, 10, 1310b 9–10 does not open a new path. However, at a critical point, it does discover the path “εν ἡ ἰτέον”—the one to be taken. The insistence of all translators, scholiasts, and scholars since approximately the thirteenth century to translate “from the demos” as “against” has had the tendency to bring the people and the “worthy” into conflict, eventually leading to an even greater blunder (precisely so that the text and translation could agree). They have led to the correction of the text. The preposition “from” (ἀπό) became “against” (ἐπί), and “from the demos” (ἀπό του δήμου) became “against the demos” (ἐπί τον δήμον) (as in *Seven Against Thebes* [Ἐπτά ἐπί Θήβας]). And this despite the unanimous, without exception, manuscript tradition.

I believe that with the change that was proposed and accepted, Aristotle has been completely overlooked or overturned. The monarchy ceases to be a “correct” constitution and becomes a “deviation.” Marx, of course, would have approved of such an antithesis. And Aristotle? It would certainly have been a good transhistorical background for Marx, but is, I believe, the complete opposite of the ancient philosopher’s position. Aristotle supports and shows ways in which to bridge, not intensify, the antithesis between the “few” and the “many.” Between the usual opposites, it is better to have the copulative conjunction “and,” which coordinates, rather than the disjunctive “or,” which divides. For the preferred pairing, an able intermediary is required. Aristotle is precisely the thinker who is “midway” [μεσεύει], the one who believes that the interests of the opposite parties are not different but “identical.” Aristotle is perhaps the most prolific and fruitful teacher in the history of

humankind. He fertilizes his students even when he is misinterpreted. One of the darkest passages in his *Politics*, which touches upon the huge issue of the differentiation of monarchy (into kingship and tyranny), comprises the following ten words (from Book V 10, 1310b, 9–10):

Βασιλεία πρὸς βοήθειαν τὴν ΑΠΟ ΤΟΥ ΔΗΜΟΥ τοῖς ἐπιεικέσι γέγονεν.

Over a centuries-long tradition, all translators and scholars of the *Politics* have, without exception, on the basis of this passage, seen the king as turning against the demos. They have translated it thus: kingship was created so that the “worthy” would have a leader against the demos. They forced the text, offering another meaning. In order to remedy this arbitrary interpretation, they even consented to the correction of the text, so as to favor the meaning, as they saw it. On Rasso’s proposal, “from the demos” [ἀπό του δήμου] became “against the demos” [ἐπί τον δήμον]. One mistake led to another.

The crucial and definitive “correction of the correction” was offered in 1990 in my study *Παθολογία πολιτευμάτων στην αρχαιότητα* [*Pathology of Constitutions in the Antiquity*] (145 ff.). In this work, I translated and noted, among many other things, the following: “ἡ βασιλεία γεννᾶται γὰρ βοήθειᾳ τοῦ δήμου πρὸς τοὺς ἐπιεικέις (τοὺς ὀλίγους εὐγενεῖς). Βοήθειᾳ ἡ ἀπὸ τοῦ δήμου εἶναι ἡ δημοτικὴ, ἡ λαϊκὴ” [“Kingship arises for the help of the demos towards the worthy. Help from the demos is of the people, popular”].

Despite my insistence in 1990, the issue was not taken up by scholars. The Greek language is also to blame (*Graeca non leguntur*). Thus, Eckart Schuette and Jo. Gehrke, in *Aristoteles Politik* (Berlin 1996, ad 1.), translate it as “das Koenigtum wurde zum Schutz der Guten gegen den Demos eingerichtet.” David Keyt, in *Aristotle, Politics*, Books V and VI (Oxford, 1999, ad 1.), insists on the traditional translation: “kingship has arisen to provide aid to the worthy against the (depredations) by the people.” P. L. Simpson, in *Translation of the Politics* (1997, ad 1.) and *A Philosophical Commentary on the Politics of Aristotle* (1998, ad 1.), with whom I discussed the issue in Greece, after having made and published my correction, somehow adopted my line of thinking but did not acknowledge this, as he was obliged to. I noted this in a re-examination of the subject (*Relations Between King and the People: Volume in honour of I. Triantaphilopoulos* [Athens-Komotini, 2000], 139–44).

Today’s re-examination of the subject focuses on scholar Hermann Rasso, or Rassoivius, who proposed the correction of the passage, which

was accepted despite the unanimous version in all the codices. Who was this Rassow? In which publication or journal did he write? How did he justify his proposal? The great W. L. Newman gives a partial explanation of the thinking behind this change from his own perspective, with a vague reference to Rassow. He states simply: “All the MSS, including Γ, have *από του δήμου*, but I have not found any parallel to the use of *από* in the sense of ‘against’ with *βοήθεια* ... It seems, therefore, best to read *επί τον δήμον* with Rassow Sus. [emihl] and Welldon.” Newman does not give a reference and neither does Sus., and nor do any of those I was able to find. Welldon, beneath his translation, for example, simply notes: “Reading *επί τον δήμον*.”

After persistent efforts on my part in the National Library of Greece, the Gennadius Library, and the British School at Athens, with the help of their willing and experienced staff, I eventually found, to my great relief, the source. It is a small study in the yearbook of a Gymnasium: “Bemerkungen über einige Stellen der Politik des Aristoteles” (Weimar, 1864), 3–17. It is included in a bound volume (in BSA) along with other studies. Hermann Rassow, who published it, was the school’s headmaster.

In this work, Rassow makes various observations of a primarily philological nature on Aristotle’s *Politics*. We come to the crucial passage in the article that concerns us (p. 16). The discussion concerns the origins of the constitution of kingship, which is being examined in juxtaposition with that of tyranny. The author, quite reasonably, considers it essential and most important that a distinction is made between these two types of constitution and the particularities of kingship and tyranny. Rassow proceeds to the line of thought that led him to defy the whole manuscript and print tradition, saying:

βοήθεια η από του δήμου τοις επιεικέσι kann schlechterdings nicht Anderes heissen, als eine Huelfe, die vom Folke ausgeht und den Fornemen gebracht wird. Wie sich daher die Herausgeber bei dem ueberlieferten Texte haben beruhigen koennen, ist mir nicht erklarlich; denn Aristoteles will offenbar sagen, dass die Koenigsherrschaft entstanden sei, um den Fornemen gegen das Volk Huelfe zu bringen, waehrend umgekehrt die Tyrannis sich urspruenglich gegen die Fornemen richtet im Interesse des Demos. Mir scheint daher nichts uebrig zu bleiben, als *βοήθειαν την επί τον δήμον* zu schreiben, obwohl die codices ausnahmslos *από* bieten.

What is Rassow telling us here? It is clear that “*βοήθεια η από του δήμου τοις επιεικέσι*” can mean only one thing—that the help derives from the demos and goes to the “worthy” [επιεικέτις]. This help he believes to be

impossible and incomprehensible. Since, however, this is the only meaning of the Aristotelian passage with the preposition *από* followed by the two words *του δήμου*, and since he considers precisely this meaning to be unacceptable, Rasso wonders, turning to the publishers, how they can remain satisfied with the transmitted text. It is inexplicable to him. It is as though he is telling them that they must do something. In his mind, there is no doubt that Aristotle wanted to say that kingship was made in order to give help to the notables against the crowd. With this logic, Rasso sees no other way out than to propose *την επί τον δήμον*. This help “*η από του δήμου*” became “*επί τον δήμον*.” Not only has the preposition changed but also the case of the word *δήμος*. The demos, instead of helping, is now under attack from the “worthy” who have the king as their leader. Every faction has its leader. Qualitatively and ethically, however, with the “correction” that was proposed, there is no difference between a tyrant and a king. And this is the great mistake made by Rasso and all those who adopted his proposal. King and tyrant are two extreme poles of political life. One makes war and the other is a peacemaker. Greek political thought embellishes the king with all the positive characteristics and blackens the tyrant with all the negative.

According to Rasso, the text had to conform to the translation and not the translation to the text.

And how peremptory and commanding is his plea to the editors. It is as though he is saying to them: “how can you sleep at night when you let Aristotle not talk of the clash between the people and the ‘*επεικεῖς*’.” In order to overcome this error, as he sees it, he introduces an aggressive preposition, *επί* (as in “Seven against Thebes” [*Ἐπτὰ ἐπὶ Ἡΐβος*]), quite different from the preposition of the manuscript tradition, the *από* [“from”].

Did Rasso’s appeal persuade the editors? The response was most impressive, as his correction was universally accepted. From Fr. Susemihl in the nineteenth century (1872) until today, all have adopted it, and the *Oxonienensis* under W. D. Ross. We thus have the striking situation that, on the one hand, the entire manuscript tradition (the *ausnahmslos*) comprised codices from the medieval period until our times, and even all the publications until the nineteenth century (up to Susemihl) contain “*από του δήμου*.” Yet, on the other hand, the editors of the past 150 or so years, from Susemihl (1872) until today, follow the inexplicable Rasso (“*επί τον δήμον*”). The former have “*από του δήμου*,” the latter “*επί τον δήμον*.” What is so paradoxical and unacceptable about this? It is that,

despite the different versions, the interpretation of both sides is the same—both insist on enmity and conflict between the demos and the “worthy” (notables, the good, generally those capable and suitable for ἀρχεῖν).

Susemihl had in front of him a long, centuries-old tradition that insisted on the element of conflict. It would have annoyed him, I believe, along with Newman and others, that the narrow grammatical interpretation did not help. He would not have felt comfortable with the difference between the text and the translation. The “ἐπὶ τοῦ δήμου” cannot mean, as all the translators wanted it to, “*adversus*,” “*contra*,” “*gegen*,” “*against*.” This is the reason, I presume, why Susemihl, Newman, and their successors felt a sense of relief with Rassow’s suggestion. This suggestion would have resulted in an agreement between text and translation. The desired translation imposed the solution that was proposed.

Susemihl, the formidable Aristotelian scholar of the nineteenth century, had, among many others, William of Moerbeke in front of him, the thirteenth-century scholar and Catholic bishop of Corinth in the Latin-held Peloponnese, who, at the request of Thomas Aquinas, translated works of Aristotle from Greek into Latin. Moerbeke’s translations are word-for-word [*verbum pro verbo*]. Whenever a difficulty arose, Moerbeke left the Greek word untranslated. In his monumental edition of 1872, Susemihl cites Moerbeke’s translation, which, it should be noted, was done around 1260 (756 years ago) from the subsequently lost Greek MS (Γ). This translation would also have been read by Dante, who refers to Aristotle and considers him the “teacher of teachers.”

Let’s see how Moerbeke translated the passage that concerns us: “*regnum quidem enim ad auxilium quod a populo epieikeis factum est.*” In this translation, as we can see, the king did indeed come for help. It is even stated where this help came from—from the people. What does it not tell us? Will the demos turn to the worthy to help them or attack them? This is difficult to answer given that the *epieikeis* (with an unclear case and no preposition, a simple transliteration of ἐπιεικίς) does not allow us to understand the syntactic function of the word. Moerbeke, I would say, simply sidestepped it without insisting on clarifying the most important point.

It seems that, when reading Aristotle, we expect to find in him Manichean notions of a clash between good and evil or the influence of revolutionary proclamations, which Aristotle and other thinkers would have seen as unfounded. We thus rage at and sometimes flay Aristotle when he does not

agree with us. The case in point is typical. Scholars believe that Aristotle cannot have anything other in mind than a conflict between fundamental political actors, the few and the many. Conflict, according to Aristotle, is produced mainly by “deviations” and not by “correct” constitutions, namely those that save. Kingship is a correct constitution, even if it is difficult for there to be a king who “matches the magnitude and dignity of the office” (*Politics* 1313b7). For the kingship, a suitable person with “superior virtue” (1310b11) is required.

In the passage under analysis, the king undertakes the difficult task of bringing help, and not any usual help, but the great power of the demos to the “worthy.” How difficult a task it is to bring the demos “to the help of the worthy” is confirmed by the fact that even scholarly research has for centuries considered it inconceivable.

The case that we are examining acquires even greater dimensions and touches on the number one problem of historical life, that of the fundamental relationship between the “few” and the “many,” the haves and the have nots of all social conflicts, the subject of many scholarly disciplines. Within this social conflict between the main actors of social life, two possibilities can be seen in their relations: war or peaceful cohabitation. To this huge problem, Marx, for example, gives a most clear answer: The chasm must be magnified and intensified so that we are driven to confrontation, with the expected for him (but not, however, everyone else) positive results.

How is this eternal problem presented in Aristotle? Did he see it? Did he face up to it? My opinion is that this problem concerned him throughout the *Politics*. The great philosopher and thinker offered the advice that it is in the interests of the few to satisfy the many and of the many to satisfy the few. Marx would contrast the ancient “and I will be hostile to the people” [“καὶ τῷ δήμῳ κακόνους ἔσομαι”] with “I will be hostile to the worthy” [“τοῖς ἐπικέσι κακόνους ἔσομαι”]. The more conciliatory Aristotle would, by contrast, in the place of the “κακόνους,” use the “favored” [“εὐνοῦς”]. Three constitutional forms (kingdom, aristocracy, polity) can be found in Aristotle’s advice, and three (tyranny, oligarchy, democracy) diverge from it.

The chapter of the *Politics* on, for example, “the safety ... of each political system” [“περὶ σωτηρίας ... ἐκαστῆς πολιτείας”] (V, 8, 1308a26–1309b32), which extends over five pages of the Oxford edition, can be summarized by two “essentials”: “in democracies it is necessary to be sparing of the

wealthy ... while in an oligarchy there is much necessity to take care of the poor” [“δει εν μεν τοις δημοκρατίαις των ευπόρων φείδεσθαι ... εν δ’ ολιγαρχία των απόρων επιμέλειαν ποιείσθαι πολλήν”]. “Similar” things are said and to a much greater degree (over fifteen pages) in chapters ten and eleven (1310a39–1315b10) “on monarchy” [“περί μοναρχίας”]. It is enough, I think, to consider the importance that Aristotle attributes to the pairing of the constitutions: oligarchy and democracy, kingship and tyranny. Here, Aristotle analyses, using many examples, the whole pathology of the constitutions, how they decline and how they survive, to how necessary and beneficial is “το αεί τοις αντικειμένοις μορίοις εγχειρίζειν τας πράξεις και τας αρχάς (λέγω δ’ αντικείσθαι τους επεικειείς τω πλήθει ...” (1308b 26 ff.). It is beneficial to give the management of affairs and offices of the state to opposite factors. And the tyrant, even, pretending to be the king, i.e. his polar opposite, improves and comes to be “half virtuous and half wicked only” (1315b, 9–10), one, I would say, *τυραννοβασιλεύς*.

In the passage studied, if we accept Rassow’s correction then we are rejecting Aristotle because we are accepting the kingship as a “deviation” and Aristotle, in this case, as a deviator.

Aristotle does not agree with the opinion of his scholars, in this instance. Aristotle, throughout the whole of the *Politics*, from the beginning to the end, emphasizes in many and various ways that “correct” are those constitutions that have a concern and care for all the citizens. The “deviations,” the wrong political systems, care for the faction. Kingship is a correct constitution. If a king becomes the leader of a faction, then he is no longer king. He becomes a tyrant.

After all this, there is no other way out than to insist on the “help from the demos” [“από του δήμου”], in other words to return to this very familiar text from the entire manuscript tradition, in the hope that it will be accepted by editors and researchers.

In the passage that concerns us, the monarchy “becomes” an institution and the king is (through “superior virtue”) able (“πειθοῦς δημιουργός”) to convince the people to offer their help and consent for the actions of the “επεικειείς.”¹

In conclusion, I note that the interpretation that is still insistently given today in one form or another of the text (“από του δήμου, επί τον δήμον”) is peculiar to Marxist thought, as it has been expressed diachronically, and that all those who accept it, consciously or otherwise, are also pushing

Aristotle, the philosopher of “μεσεύειν,” to appear as “deviant” and a stepping stone to Marx. The complete opposite is true. Aristotle sees “few” and “many” as different sizes and powers, but he believes, as did Heraclitus, that, with a good constitution, the differences can be harmonized:

ἐκ τῶν διαφερόντων καλλίστη ἁρμονία. (Aristotle *NE*, VIII 1, 1155b, 5)

Note

- ¹ This role could also be played by some other “first man”. Pericles, in his Thucydidean Funeral Oration, aims, as I argue (Emm. Mikrogiannakis, *Olympic Democracy, Pericles’ Funeral Oration Revisited*, Nikephoros 21, 2008, 133-157), at an “Olympian” competitive-style democracy in which the “*aristoi* active in the service of the polis” are based upon the many and the demos tends competitively towards exceeding itself. In such an orderly political system, where all “εὖ ἀγωνίζονται” and for all of whom “ἅθλα ἀρετῆς κείτα”, Pericles plays an important role. What? “Κατέχε το πλήθος ἐλευθέρως» (Thuc. 2, 65, 8) and guided it. The adverb “ἐλευθέρως” moderates the meaning of «κατέχειν». Pericles, we would say, acted royally and convinced the demos. He manipulated it like a king.

1.4

EQUALITY: MAGIC AND TRAGIC

EMM. MIKROGIANNAKIS

PROFESSOR EMERITUS, UNIVERSITY OF ATHENS

Abstract

Aristotle highlights the meaning of the participation of the demos in power, and clarifies in his *Politics* its extent in a εὖ κεκρομένην polity. For the demos it is sufficient, according to Solon, to have two things: ἀρεῖσθαι καὶ εὐθύνειν τὰς ἀρχάς, to elect the rulers and monitor them (bring charges against, punish, and reimburse them). Where the demos seeks continuous equality and levelling, where it hates the rise of the aristoi and fights every ἀριστίνδην [according to merit or to birth], there political life proceeds at a snail's pace or is in turmoil. Disharmony in political life also occurs when the aristoi, those who would rise on the basis of their abilities, constitute a closed circle, when they entrench themselves and do not care for the whole.

On Equality

What happened in Olympia? All citizens of the Greek states were κλητοί [invited]. The invitation was even made officially. It was a punishable offence to impede anyone who wished to go to Olympia to compete or be a member of a θεωρία, the official representation of the polis. If, for example, an Eretrian was impeded in any way by a Chalkidian, the games would be adulterated. Victory had to be clear and indisputable. Wars indeed took place during the Olympic Games, not only abroad but between Greeks (despite the ἐκεχειρία [truce]). During the seventy-fifth Olympiad (480 BC), Xerxes was at Thermopylae during the preparations for the games. He fired at Athens during the five days of their duration, and was

defeated at Salamis during the post-celebration events. The condition of full participation, fundamental for democracy, was sought with the ἐκχειρίσθαι, which means “hands off” those making their way to Olympia (or to other games or a panhellenic sanctuary). Asylum was thus not limited to places but extended to people. The athlete or delegate was a sacred and inviolable person, with an institutional character and divine protection.

The next stage completed the democratic aspect wherein all athletes competed under the same conditions, which were indisputable.

The athletes were invited to ἄμιλλαι [competition], and they accepted. The first part of the word hamilla is hama. ἄμοι (and ὁμοῶς, ὁμοῦ) indicates not only “similarly,” together, but “under the same conditions.” This ensures equality and “straightforwardness.” The second part of the word hamilla is the root of ἄλλομαι, σάλα-, αλα-, ἰλ. Ἄμιλλαι means ἄλλεσθαι (jump) together and under the same conditions. The athletes (stadium runners, double-course runners, long-distance runners, and of the other competitions) start under the same conditions. Hamilla is both a condition and an action. It is momentary, and indicates motionlessness and movement together, something like the Discobolus of Myron, which is motionless energy or active motionlessness. This condition has a past and a future.

And all this is in the present (νῦν, nunc), which is momentary, but which contains the before and after of the duration of time. It was prepared in the past and speeds towards the future. Here, at the starting point, at this moment of ἄμιλλαι (release, more specifically) is the high point of democracy. Here, all are equal. For how long? Immediately after the start, in a fraction of a second, the competitors are differentiated. Equality takes a walk. Democracy is lifted. Judgement is clear at the finishing line.

The first, the second, and the last are separated. Importance is attached mainly to the victor. Here, at the finishing line, aristocracy triumphs. This hamilla, this starting (this ἀπιέναι, to start the race, departure), discerns democracy and aristocracy. They are two distinct fields that should not be merged. Democracy triumphs in the first and aristocracy in the second. Competition is the tip, the edge, the watershed.

Imagine what would have happened if an attempt was made, with some kind of equalizer (accelerator or decelerator), to maintain the stand of equality.

The athletes would all reach the finishing line together. In that case, what is the contest for? It would have no meaning. Some would say that *Égalité* is a very good thing and we should maintain it. In athletics, however, such an action is a disaster, and would even require a tiresome effort. To sum up, Equality and Liberty are inconsistent.

Transferring this sporting image to the political sphere, we can see that wherever, after some equalizing revolution and as a characteristic of it, an attempt is made to maintain equality in a violent fashion and with the rallying cry of permanent revolution, we have constant turmoil.

Equality is a wonderful concept as a starting point, a springboard (*ἐφολτήριον*). The problem is how will the shift to equality come about: in a violent, revolutionary way, or institutionally, with *καίμενο*, along established principles?

The democratic element comes under the general political one, and it must be aware of its limits and leave room for the other, the aristocratic element.

There is only one political system (the polity—the constitution, strictly speaking) as the *ψυχή* [soul] of the polis. When certain elements of it were emphasized, it became autonomous and numerous forms resulted. According to Aristotle, there are six main forms: three correct political systems (kingship, aristocracy, and polity) and three incorrect ones—*παρακβάσεις* [deviations], as he calls them (tyranny, oligarchy and democracy). Of note in this classification is the fact that the polity is the term and the name not only for each political system (*πολιτεία* και *πολίτευμα* τοῦτον), but also for one of the six. As such, the same name is used for the general and the specific. Is this classification defective? It seems that Aristotle accepts the polity as the political system par excellence, which as a *μίξις ὀλιγαρχίας καὶ δημοκρατίας* [mixture of oligarchy and democracy] is the political starting point suggested. From this starting point, it is possible for us, with an upward trend (and intensification of positive elements), to pass to an aristocracy or kingship, or, with a downward trend (and intensification of negative elements), to pass to tyranny, oligarchy, or a democracy of mob rule. Aristotle classifies this last type under *παρακβάσεις*, and does not leave room for misinterpretation. For tyranny and democracy, his statement is categorical. According to him, even if we conceded and accepted them as political systems, they are the “worst” available. A necessary observation. If Aristotle were today to survey the two hundred or so political systems of

the world's states (which all, as a rule, bear the title of democracy), he would not find a single one that would accord with this title. The majority are mixed, but are called democracies because the people are, according to Aristophanes, εὐγοήτευτοι [easily charmed], and each likes to be presented as ἄρχων and κροτῶν, even when they have no power. Aristotle highlights the meaning of the participation of the demos in power, and clarifies in his *Politics* its extent in a εὖ κεκρομένην polity. For the demos it is sufficient, according to Solon, to have two things: αἰρεῖσθαι καὶ εὐθύνειν τοὺς ἄρχάς [to elect the rulers and monitor them] (bring charges against, punish and reimburse them). Where the demos seeks continuous equality and levelling, where it hates the rise of the aristoi and fights every ἀριστινὴν [according to merit or to birth], there political life proceeds at a snail's pace or is in turmoil. Disharmony in political life occurs also when the aristoi, those who would rise on the basis of their abilities, constitute a closed circle, when they entrench themselves and do not care for the whole, but only for their group interest, and do not renew themselves.

In an εὖ κεκρομένην πολιτεῖαν [well-mixed constitution], channels are open. Rulers and the ruled proceed hand-in-hand. Each one succeeds in relation to their proven qualification (see my article, **O**lympic Democracy, *Nikephoros* 21 [2008]: 133–57). Long wars lasting for years (such as the Peloponnesian and the Roman Civil wars) would have been avoided or curbed if the warring parties had not become stuck in the dilemma of democracy or oligarchy (a form of which is aristocracy). This dilemma is disastrous, while the wedding of democracy and aristocracy is beneficial.

Aristocracies of all types constitute a closed circle and do not accept new elements, and certainly not those that come about through competitions and decline, and are destroyed first from within and secondly from outside by those who want to enter but are excluded.

The functionality and viability of a polity depends on the extent to which it distinguishes between the two stages of “democraticity” and “aristocraticity.” And both are taught to us by athletics in the classical (ideal) way they were expressed at **O**lympia.

Equality (and equalization) is considered by many as a magic word. There can be no revolution without the slogan of equality. This ἐξισοῦν (so dominant in mathematics with systems of equations) is put forward in every example of social life.

From all that we have noted so far in reference to **●**lympia, it emerges that the **●**lympic ideal moves towards equality. How? In the procedure of inviting all athletes, the concern is that no one should be impeded and there is a provision of identical preconditions for all. Is absolute equality a goal? It is fully believed that the **ἄγώνιοι** gods of the contest supervise. They want equality, so as to award inequality. At the end of each competition, Nike will not crown all the athletes, but only one. Was the competition for equality or inequality? The athletes who went to **●**lympia wanted to be distinguished, to take first place. Their value, virtue, shone, for example with the boxing contest (**πύξ**), just as with football (**λάξ**) today.

In all types of competition, equality is not a goal but a means for its accomplishment. It is something intermediary, one “between.” Yet, while it is something intermediary, and indeed very small, it is absolutely necessary and a sine qua non for every success and progress.

For every great aspiration, it is necessary for us to get over this springboard, this **ἄλλεσθαι**. **Ἄλλομαι**, **ἐφαλτήριον**, and **ἄμιλλαι** are words with the same root.

There can be no **ἄμιλλαι** without equality. This is declared in the first part of the word **ἄμει**. The **ἄμει**, **ὁμοῦ ἄλλεσθαι** [jump], to start a contest under the same conditions and with the same aspiration, presumes and similarly declares equality. But it needs equality only at a specific moment, and to not become stuck on it. It wants to abandon it. It is an intermediary station. All **ἄμιλλαι** revolves around the point of equality. **Ἀμιλλαι** is stopping and starting. It is not a zero point, but the arrival at and departure from it. It is, one might say, a **μηδενόσε** and a **μηδενόθεν**.

●f all that has been put forward, there is no doubt that the difficulty in each competition (the **●**lympics or the football World Cup) is to secure the equality of the participants in a way that is indisputable, and so the proper conduct of the competition, so as to produce the victor and hierarchize the participants. The problem, then, is condensed into how we secure equality and how we remove ourselves from it.

It is truly admirable that the Greek language offers us a word which means in itself both the process of securing equality and overcoming it. It is an ambiguous word, bearing the two meanings of a contradiction. It means the position and the removal, i.e. two diametrically opposed things.

The word I have hinted at is **ἀνισῶ** (and correlates). The usual and commonly known meaning of **ἀνισῶ** is “I make something unequal,” i.e.

different (superior or inferior). In Xenophon, however (Cyropaedia 7.5.65), we read ὁ σίδηρος ἄνισοῖ τοὺς ἄσθενεῖς τοῖς ἰσχυροῖς, where ἄνισοῖ means that iron weapons make equally strong (i.e. they level) the weak and the strong (iron negates the difference in physical strength).

In ἄνισω, the first part is (a) the preposition ἀνά or (b) the negative prefix α-. As such, ἄνισω in the first case means I restore equality (which has been disturbed), and in the second I disrupt the equality (which had been achieved). Thus, the same word expresses the whole process of the two stages we mentioned, the first in terms of levelling as ἀνισάζω [equalize], ἀνισοσμός [equalization], and the second in terms of hierarchizing as ἀνισάκις; ἄνισοῦν gives birth to tragedy. And tragedy is ἡ εἰς τὸ ἐναντίον τῶν προπτομένων μεταβολή. It is to arrive at the opposite of that which we seek; for one to find themselves 180° somewhere else, to go north and end up south. Thus, ἐπανισοῦν, for example, can be disastrous in its application if it is imposed from outside and without accepted leadership from above. When Alcibiades approached the Persians, he advised them that the only effortless way to destroy (annihilate) the Greeks was ἐπανισοῦν (to neutralize them systematically). In this case, ἐπανισοῦν took the form of reinforcing the Spartans if the Athenians were ahead, and reinforcing the Athenians if the Spartans were ahead. The equalizing of the two leading belligerents in the Greek camp (equalizing by reinforcing the one in the inferior position) allows the third party (the Persians) to intervene as referee and with the equalizing, i.e. destructive role of extending the contest, to have the upper hand. The contest, as is well known, finishes earlier if one of the warring parties comes out on top, whereas it is continued if the belligerents are equally strong (for their own bad luck). This is the surest way of neutralizing the belligerents, and the brilliant diplomacy of the Romans (divide et impera), which they applied to a great extent.

What happens in this situation? The ἄνισοῦν, the making equal, is wonderful as a slogan (here with the ἀνά -). With the search for the superior, we are constantly with weapon in hand to decapitate the most eminent (following the advice τοὺς ὑπερέχοντες στάχους κολοῦειν or ἀναίρειν).

The ἄνισοῦν (with ἀνά-, or α-) acts as a savior in the political sphere if institutionalized, if political mechanisms are established so that things lead to ἕμλλη. It is to this ἕμλλη that our effort must be aimed—the restitution to equality and its exceeding itself in time (regaining, retrieving).

1.5

THE ILLIBERAL DEMOCRACY OF ANCIENT ATHENS

ARISTIDES N. HATZIS

PROFESSOR OF PHILOSOPHY OF LAW & THEORY
OF INSTITUTIONS, DEPARTMENT OF HISTORY & PHILOSOPHY
OF SCIENCE, UNIVERSITY OF ATHENS

Abstract

The Ancient Athenians introduced democracy, majoritarianism, and popular sovereignty. They also introduced populism and rent seeking. Moreover, Athenians did not invent the rule of law. The power of demos was almost unlimited, and there were no constitutional guarantees or checks and balances. The laws were subject to the whims of the majority of citizens or judges. Most important, individual rights were not recognized in Athens. The concept of liberty in Ancient Athens was very different from the concept of liberty that prevailed after the great revolutions of the late eighteenth and the early nineteenth centuries, which led to the contemporary liberal democracies. We will discuss these issues with reference to famous historical episodes and trials.

1. Ancient and Modern Liberty

On February 13, 1819, thirty years after the end of the French Revolution and four years after the Bourbon Restoration, Benjamin Constant, a leading liberal intellectual of the era, delivered one of the most important lectures in the history of political theory.

Constant was fifty-two years old at the time, a veteran liberal activist and a very much respected figure in French politics and letters. He delivered a speech at the Athénée Royal entitled: “The Liberty of Ancients Compared

with that of Moderns” [“De la liberté des Anciens comparée à celle des Modernes”]. This speech remained rather obscure for almost 150 years before it was rediscovered by contemporary scholars.

In this lecture, the most important argument of Constant is very simple—Athens was a democracy but not a liberal democracy. Even though it was the best democracy of antiquity, it was not equal to the advanced democracies of the nineteenth century, the reason being that Athenians were quite free but not as free as an individual in a modern liberal constitutional democracy.

Let me first explain what a liberal democracy is.

Democracy is essentially a way of reaching collective decisions. The democratic way to decide collectively is the majority rule. When there is a disagreement—and in a genuine democracy there is always disagreement—the decision by a majority ensures political legitimatization because it sounds (and is) fair. At the same time, majority rule is the decision-making process most compatible with freedom. The principle of popular sovereignty based on majority rule is called the democratic principle, and this was literally invented in Ancient Athens.

However, one might ask—is it politically desirable for the majority to decide on everything? The answer is no. There is an area where individuals should be free to decide for themselves even when their decisions have an impact on society at large. This area is protected by individual rights. Individual rights define the area of personal freedom, where the society, the majority, the government, cannot intervene. What is the extent of this area? It depends on the amount of freedom society has conceded to individuals. Let’s call this the liberal principle. The liberal principle was introduced by James Madison in the US Constitution of 1787 and the US Bill of Rights of 1789.

Consequently, in a liberal democracy, there is a personal domain protected by negative rights. This domain should be shielded against not only an authoritarian government but also a democratic majority. This domain should be under the protection of the rule of law and its most powerful institutional weapon—the constitution. A society where people are regularly called upon to express their values, preferences, and choices by voting, and where an extended area of personal liberty is safeguarded by the rule of law, is a liberal society. Individuals in this society are in charge of their lives, and are personally autonomous. In such a society, wellbeing is

linked to individual preferences. It is not determined by society, by a majority, or by a committee of experts. Wellbeing is achieved by the satisfaction of preferences through choices and contracts.

To understand the antithesis between the democratic and the liberal principles, let's see how John Stuart Mill defends this *par excellence* individual right: "If all mankind minus one, were of one opinion, and only one person were of the contrary opinion, mankind would be no more justified in silencing that one person, than he, if he had the power, would be justified in silencing mankind" (*On Liberty* 1859, II.1).

Athens was a democracy, but not a liberal democracy. Athenians discovered the majority rule but not individual rights. Furthermore, one can hardly characterize the Athenian government as a rule of law because, in a rule of law, as Aristotle later defined it, law is above people, even majorities: "And the rule of the law, it is argued, is preferable to that of any individual. On the same principle, even if it be better for certain individuals to govern, they should be made only guardians and ministers of the law" (Aristotle, *Pol.* 3.1287a). In Ancient Athens, the people, the Demos, the *hoi polloi*, were politically dominant and nothing was there to restrain them. There was no constitution, laws could be annulled or nullified by a temporary majority, and no checks and balances existed. Athens was an illiberal democracy.

Let us see what Constant's exact argument is. According to him, liberty, for Ancient Greeks:

consisted in exercising collectively, but directly, several parts of the complete sovereignty; in deliberating, in the public square, over war and peace; in forming alliances with foreign governments; in voting laws, in pronouncing judgments; in examining the accounts, the acts, the stewardship of the magistrates; in calling them to appear in front of the assembled people, in accusing, condemning or absolving them. But if this was what the ancients called liberty, they admitted as compatible with this collective freedom the complete subjection of the individual to the authority of the community. You find among them almost none of the enjoyments which we have just seen form part of the liberty of the moderns. All private actions were submitted to a severe surveillance. No importance was given to individual independence, neither in relation to opinions, nor to labor, nor, above all, to religion. The right to choose one's own religious affiliation, a right which we regard as one of the most precious, would have seemed to the ancients a crime and a sacrilege. In the domains which seem to us the most useful, the authority of the social body interposed itself and obstructed the will of individuals ... Thus among the ancients, the individual, almost always sovereign in public affairs, was a slave in all of his private relations.

As a citizen, he decided on peace and war; as a private individual, he was constrained, watched and repressed in all his movements; as a member of the collective body, he interrogated, dismissed, condemned, beggared, exiled, or sentenced to death his magistrates and superiors; as a subject of the collective body he could himself be deprived of his status, stripped of his privileges, banished, put to death, by the discretionary will of the whole to which he belonged.

At this point, Constant makes a distinction. Ancient Athens did not have the same kind of democracy as the rest of them. Athens was a special case. Athenians lived freer lives than most Greeks and their democracy had some similarities with modern liberal democracy:

There was in antiquity a republic where the enslavement of individual existence to the collective body was not as complete as I have described it. This republic was the most famous of all: you will guess that I am speaking of Athens ... [●]f all the ancient states, Athens was the one which most resembles the modern ones ... [Athens'] example might be opposed to some of my assertions, but which will in fact confirm all of them. Athens, as I have already pointed out, was of all the Greek republics the most closely engaged in trade, thus it allowed to its citizens an infinitely greater individual liberty than Sparta or Rome. If I could enter into historical details, I would show you that, among the Athenians, commerce had removed several of the differences which distinguished the ancient from the modern peoples. The spirit of the Athenian merchants was similar to that of the merchants of our days ... ●bserve how their customs resemble our own ... In their relations with strangers, we shall see them extending the rights of citizenship to whoever would, by moving among them with his family, establish some trade or industry. Finally, we shall be struck by their excessive love of individual independence.

Nevertheless, even though Athens had the most liberal regime in Ancient Greece, it could hardly be characterized as a liberal democracy. The “complete subjection of the individual to the authority of the community” was there too:

However, as several of the other circumstances which determined the character of ancient nations existed in Athens as well; as there was a slave population and the territory was very restricted; we find there too the traces of the liberty proper to the ancients. The people made the laws, examined the behavior of the magistrates, called Pericles to account for his conduct, sentenced to death the generals who had commanded the battle of the Arginusae. Similarly, ostracism, that legal arbitrariness, extolled by all the legislators of the age; ostracism, which appears to us, and rightly so, a revolting iniquity, proves that the individual was much more subservient to the supremacy of the social body in Athens, than he is in any of the free

states of Europe today ... Ostracism in Athens rested upon the assumption that society had complete authority over its members. On this assumption it could be justified.

Apparently, Constant overemphasized the importance of the institution of ostracism—and he is right: ostracism is incompatible with a liberal democracy. Did he pick ostracism because it was the most illustrative example for his case or because he lived in political exile himself for so many years, ostracized by almost every authoritarian French government, the revolutionaries included? Are there any other examples of the illiberal nature of the Athenian democracy and the absence of the rule of law? More than enough, and we are going to present some of them in the third section. But before that, we have to briefly discuss the nature and the guiding principle of the Athenian democracy.

2. Athenian Democracy and Popular Sovereignty

I am not going to recount the history of the development of the democratic institutions in Athens and nor am I going to describe them. The literature (older and recent) on Athenian democracy is rich and of a very high quality, given our constraints on documenting a kind of political organization so different in many respects from ours. Still, I have to clarify some issues and emphasize some characteristics of the Athenian system of government.

I will start with something that is rarely stressed when Athenian democracy is described—the concept of democracy was not developed theoretically in parallel with the institutional development of Athenian democracy. Democratic theory was embryonic in the fifth century BC. Of course, we can find some ideas developed by philosophers (like Plato) and playwrights (like Aeschylus), and we should not underestimate the importance of Pericles's Funeral Oration, one of the most important political texts in human history. However, we do not have rigorous (democratic) political theory before Aristotle.

On the other hand, the institutional development over at least 250 years (from Solon's reforms to the end of Athenian independence when Alexander the Great consolidated his power in southern Greece) was more than impressive—it was radical, innovative, and complex. At the same time, it was not always consistent and based on principles. Even a century after Cleisthenes's reforms, the average Athenian had a rather ambiguous idea of what democracy meant. The laypeople in Athens, as well as the intellectuals, identified democracy with a set of institutions which safeguarded popular

sovereignty. But, for a lot of them, democracy was the equivalent of mob rule, since the uneducated farmers, laborers, small-size merchants, and sailors were always the majority—a majority which fell prey, very often, to demagogues, opportunists, and chauvinists. Despite its lack of definition, democracy was very popular in Athens. Even its enemies disguised themselves as democrats. The Thirty Tyrants' reforms were called "democratic," while the brutal authoritarian regime executed 1,500 prominent democrats.

That is why one additional institutional development was necessary—a legal clarification of what democracy really means. This development came rather late. In 337 BC, at the eleventh hour of Athenian democracy, the Law of Eukrates identified democracy with popular sovereignty for the first time in legal history: "If anyone should rise up against the Demos for tyranny or join in establishing the tyranny or overthrow the Demos of the Athenians or the democracy in Athens, whoever kills him who does any of these things shall be blameless."

The original idea in this decree was the fact that the good under legal protection was (as in previous legislation against subversive activities) no longer the vague concept of democracy, but the more politically tangible concept of popular sovereignty. Demos was the only source of political power and political legitimization. The decree was written up on a marble stele capped with a relief depicting democracy crowning the seated demos. The political symbolism was more than clear.

At the end of its life, the ancient Athenian democracy was a genuine democracy, a political system which literally gave absolute power to the people. But it also gave to the people the right to abuse this power absolutely.

3. Democracy without Individual Rights

Athenian citizens had rights, but these rights were political rights, not individual rights. This means that Athenian citizens had a right to participate in politics, to vote and be elected. One could say that they had a share in the Athenian political community—of course, not all the inhabitants of Attica but only 10–12% of its total population (the free adult men of Athenian birth with a full citizen status numbered thirty thousand in the fifth-century Athens, from more than 250,000 residents).

But these rights were not owned by the citizens in the way individual rights are attached to persons today. Athenian citizens were not “individuals” (individualism had not yet been invented), but parts of an organic whole. The “individualistic” behavior was identified with selfishness and was not tolerated by the political system—ostracism was the safeguard. It was also frowned upon by philosophy and poetry. Heroes of Greek mythology with alarming individualistic tendencies were accused of hubris and their end was predestined.

Individual rights could not be invented in such an environment. Aristotle has described the limits of the individual in his early social contract theory, which sounds a lot like the one advocated by Thomas Hobbes two millennia later. A person cannot survive as an isolated individual because they are by nature a social animal. They cannot be conceived otherwise but as a part of society. The polis is naturally prior to the individual, because an individual cannot exist apart from society. Not only because they are not self-sufficient, but also because they cannot be conceived as something separate from society. And since they cannot be a god, they are clearly a beast.

To use Constant’s terminology, the individual is not only subservient to the supremacy of the social body, but it is unnatural for them to be conceived as something separate from the social body. This was the conventional wisdom in Ancient Greece, even in the democratic Athens. Individual rights, i.e. negative rights against the political community, were thus unthinkable.

4. Democracy without the Rule of Law

The Athenian democracy was not a constitutional democracy. Athens did not have a constitution, so the power exercised could not be restrained. Yes, there were laws prescribing procedures. However, these procedures could have been changed rather easily if a temporary majority wished so. Retroactivity was not common but was also not alien to the Athenian legal system. The jury system was dominant. Actually, the trials in Athens were less trials by jury and more trials by a political body with 501 members. It would be difficult for any lawyer to present evidence and use rational argument for such a formidable body. The fact that there were no lawyers, and the accused had to defend themselves with some help from a speech prepared by a professional speechwriter, was illustrative. Athens was a clear case of a political system ruled by men, not laws.

We do not wish to belittle the (for its era) progressive nature of this political system. Athenians had more safeguards to protect them against arbitrary power than any other nation on earth. In addition, they felt free and independent. But this was, to a certain degree, a mirage. A number of trials can testify to this.

One of the most famous examples is the trial of the generals after the (victorious for Athens) naval battle of Arginusae. Six of the eight generals were prosecuted (the other two chose self-exile) because they failed to rescue the survivors of sunken triremes due to a wild storm in the area. The six generals were sentenced to death after a messy trial, a mix of political maneuvers, and emotional outbursts, despite the attempts of several officers to enforce the law and ensure a fair trial. They failed miserably. One of the law-abiding officers was Socrates, who was an “epistates” (president of the court), the only public office he had in his life.

The failure of protecting the “rights” of the defendants in the Arginusae trial and the dodging of the law to achieve political ends led to the prosecution of Socrates himself. The real prosecutor was not Anytus but the Democratic Party. Anytus was a rather ill-reputed *nouveau riche* politician who became popular (despite his doubtful past) when he actively participated in the overthrow of the Thirty Tyrants. He epitomized a widespread resentment of the members of the Democratic Party against the criticism of Socrates to the idea of majority rule, popular sovereignty, and democratic governance. Socrates’s critique was not necessarily dismissive of democracy, but it was clearly critical in one aspect—Socrates was an adherent of the idea of a rule of law.

For Socrates, laws were not just “Covenants, without the Sword, [but only with] Words.” Socrates attested to his conviction with his teaching and choices. In probably the most famous passage in political philosophy, he explains why (Plato, *Crito* 50a–b):

Consider this: What if the laws and the government come and interrogate me: “Tell us, Socrates,” they say; “what are you about? Are you going by an act of yours to overturn us—the laws and the whole State, as far as in you lies? Do you imagine that a State can subsist and not be overturned, in which the decisions of law have no power, but are set aside and overturned by individuals?”

Socrates’s persecution and punishment were such a shock to his followers that they led, essentially, to the birth of political philosophy. The impact of

this shock is evident in Aristotle but also as far as the official proceedings of the Constitutional Convention of the US Constitution of 1787.

Despite the infamous legacy of the Socrates trial, there is another trial, a political trial, which is the best example for our purposes. It is the case of the unlawful award of a golden crown to Demosthenes after a proposal of his political ally, Ctesiphon, in 330 BC. Aeschines, who was then a political opponent of Demosthenes, decided to persecute Ctesiphon (injuring Demosthenes at the same time) because the particular honor was against the law, since Demosthenes was still in office and the ceremony took place in Dionysia. It is clear that Ctesiphon violated the law with his proposal. Aeschines waited for six years until 336 BC to find the right time for the persecution of Ctesiphon. In his very well organized, structured, and reasoned speech (*Against Ctesiphon*), Aeschines demonstrated the unlawfulness of the proposal based on facts and the written law of the city. In a much-cited passage he declares that the Athenian democracy is a rule of law. He explains to the jurors why this is important (Aeschines 3.6):

There are, as you know, fellow-citizens, three forms of government in the world, tyranny, oligarchy, and democracy. Tyrannies and oligarchies are administered according to the tempers of their lords, but democratic states according to their own established laws. Let no man among you forget this, but let each bear distinctly in mind that when he enters a court-room to sit as juror in a suit against an illegal motion, on that day he is to cast his vote for or against his own freedom of speech. This is why the lawgiver placed first in the jurors' oath these words, "I will vote according to the laws." For he well knew that if the laws are faithfully upheld for the state, the democracy is also preserved.

Some scholars cite this passage as proof that the Athenian democracy was a rule of law after all. But this is not a description. This is an argument. An argument that Aeschines lost bitterly.

Despite his brilliant speech, he could not persuade more than one-fifth of the jurors. All the others were mesmerized by Demosthenes' speech. Demosthenes did not bother much with legal arguments; he did not even offer decent counter arguments to Aeschines. He just delivered one of the greatest political speeches in history. It is characteristic that he announces from the very beginning that his arguments will be purely political (Dem. 18.11):

Malicious as you are, Aeschines, you were strangely innocent when you imagined that I should turn aside from the discussion of public transactions to reply to your cabunnies. I shall do nothing of the sort: I am not so

infatuated. Your false and invidious charges against my political life I will examine; but later, if the jury wish to hear me, I will return to your outrageous ribaldry.

The devastating defeat of Aeschines was also a defeat for the idea of the rule of law.

5. An Imaginary Open Society

Athens was never a rule of law. Individual rights were not recognized. It was an illiberal democracy. Benjamin Constant was right when he stressed the differences with modern democracies. Nevertheless, Athens was not just another democracy. Athenian democratic institutions were sophisticated and the atmosphere of freedom was pervasive. We cannot but discern in political and legal texts, like that of Aeschines or Plato, that Athenian intellectuals longed for more. I am going to refer briefly to three texts—a tragedy, a comedy, and a political speech—which share the same uncanny insight for a rule of law, for individuality, and for a tolerant liberal society (respectively).

In *Eumenides*, the goddess Athena establishes Areopagus with a declaration which is impressive because she promises one of the pillars of a rule of law—an impartial judiciary, bound only by laws (470–90):

I will select judges of homicide bound by oath, and I will establish this tribunal for all time. Summon your witnesses and proofs, sworn evidence to support your case; and I will return when I have chosen the best of my citizens, for them to decide this matter truly, after they take an oath that they will pronounce no judgment contrary to justice.

Aristophanes in *The Acharnians* introduces a character who is an Athenian citizen and decides to make a private peace with Sparta. Aristophanes wrote the play during the Peloponnesian War while he was persecuted by Cleon, a warmongering demagogue. It is not a coincidence that when Dikaeopolis, the protagonist, decides to behave as an autonomous individual, disillusioned with the collective decision making (at the Ecclesia), he has to confront social stigma and contempt but also hostility from his countrymen.

Chorus

You ask that, you impudent rascal, traitor to your country; you alone amongst us all have concluded a truce, and you dare to look us in the face!

Dicaeopolis

But you do not know WHY I have treated for peace. Listen!

Chorus

Listen to you? No, no, you are about to die, we will annihilate you with our stones.

He manages to persuade them by stressing the aggressions of the Athenian democracy (496) and then, the first thing he does (after ridiculing Lamachus, a warmongering general who was considered a war hero), is to establish a private market—a market where trade is welcome even with belligerent nations!

Dicaeopolis

For my own part, I make proclamation to all Peloponnesians, Megarians and Boeotians, that to them my markets are open!

Dicaeopolis's individualistic behavior is vindicated and his fellow citizens acknowledge it using the word "Eudaimonia" (836):

Chorus

The man is truly blessed. Didn't you hear how his enterprising plan is progressing? The man will reap a bumper crop by sitting in his market.

Finally, Pericles himself, in his Funeral Oration, describes Athens as a tolerant liberal democracy in an extraordinary passage (Thucydides 2.37):

There is no exclusiveness in our public life, and in our private intercourse we are not suspicious of one another, nor angry with our neighbour if he does what he likes; we do not put on sour looks at him which, though harmless, are not pleasant.

There is no historical evidence certifying that Athens was such a society, an open society like a contemporary liberal democracy. Apparently, Pericles was exaggerating, or most probably Thucydides let his imagination run away when he described Athenian democracy. His insight, as well as the insights of the two poets, are living proof of a vibrant intellectual life which maybe had not been reflected in institutions and everyday life, but inspired and still inspires ideas of freedom.

Acknowledgement

The author is thankful to Yulie Foka-Kavalieraki and Nicholas Hatzis for useful comments.

Texts Cited

- Aeschines. *Against Ctesipho*, translated by Charles Darwin Adams. Cambridge, MA: Harvard University Press, 1919.
- Aeschylus. *Eumenides*, translated by Herbert Weir Smyth. Cambridge, MA: Harvard University Press, 1926.
- Aristophanes. *Acharnians*, translated by Jeffrey Henderson. Cambridge, MA: Harvard University Press, 1992.
- Aristotle. *Politics*, translated by Benjamin Jowett. New York: Colonial Press, 1899.
- Demosthenes. *On the Crown*, translated by C. A. Vince and J. H. Vince. Cambridge, MA: Harvard University Press, 1926.
- Eukrates. *Decree Against Tyranny*, translated by Benjamin Meritt. *Esperia* 21 (1952): 355–9.
- Plato. *Crito*, translated by Benjamin Jowett. New York: Century, 1903.
- Thucydides. *History of the Peloponnesian War*, translated by Benjamin Jowett. Oxford: Clarendon Press, 1881.

1.6

THE ANCIENT ATHENIAN ECONOMY: A REVIEW

NICHOLAS C. KYRIAZIS

PROFESSOR, UNIVERSITY OF THESSALY, VOLOS, GREECE

AND EMMANOUIL M. L. ECONOMOU

RESEARCH FELLOW, UNIVERSITY OF THESSALY,

VOLOS, GREECE

Abstract

This article describes the way by which a radical change in the socioeconomic basis of Athenian society took place during the Classical period (508–322 BC). It is argued that the need to repel the imminent second invasion of the Persians in Greece, which eventually took place in 480 BC, led the Athenians to adopt the “turn to the sea” strategy and implement a colossal construction program of two hundred trireme warships that saved Athens and Ancient Greece in general. It is argued that the shipbuilding program combined with the rapid development of both the “secondary sector of production” (shipyards, iron, etc.) and the “tertiary” production (a reliable monetary system, banking and insurance services, the protection of private property and commercial contracts, setting up joint companies for profit), accompanied the high-level protection of citizens and economic agents through the law. This article concludes that the Ancient Greek economy exercised in practice many modern methodological institutional tools that are related to the operation of a free-market economy, as perceived in modern terms, and therefore the earlier view of its “primitivism” must be rejected.

1. Introduction

The ancient Athenian democracy, being the “prototype” of a democratic state and society, has raised a lot of attention during the last three centuries. Thousands of books and articles have been written over that period covering the historical, political, and social aspects of ancient Athens, and this interest is very much alive today.

However, much less attention has been paid to the economic aspects, perhaps because most authors believed that we lack sufficient information on this issue. Another reason has to do with the influential work of Moses Finley (1954; 1973; 1983), who argued that the Ancient Greek economy was characterized by primitive structures and organization, and was “embedded” in social, political, and religious aspects, and thus was not a market economy as we understand the term today.

However, Finley’s work has been revisited by many modern authors, such as Cohen (1997), Shipton (1997), Amemiya, (2007), Bitros and Karayannis (2008), Halkos and Kyriazis (2010), Lyttkens (2013), Bergh and Lyttkens (2014), Economou, Kyriazis, and Metaxas (2015), Kyriazis and Economou (2015), and Ober (2015), who argue that many elements of the Ancient Greek economy can be interpreted with modern economic theory. This mostly applies to the New Institutional Economic School of thought and Behavioural Economics.¹

Our hypothesis is that the extant fourth century sources contain sufficient information on the Ancient Greek economy to enable us to reconstruct its major aspects and even proceed to some first quantification of basic data. For this purpose, we use both ancient and modern authors. This paper mainly focuses on the Athenian case, since our historical data are quite enough to offer safe conclusions. It argues that the external threat that the Athenians faced twice in 490 BC in Marathon and during 480–479 BC made them reconsider many aspects concerning their socioeconomic organization, so as to effectively repel the imminent threat of the second Persian invasion. It is then argued that Athens transformed from a mainly land power into a sea power, which leads to a break of path dependence and into a new regime.

Within this regime, new, more efficient institutions, both political and economic, emerged. Thus, the “turn to the sea” strategy led to a major transformation of the economy, with the gradual abandonment of the feudal organization which was mainly based on land and agriculture, and the establishment of a “secondary” and “tertiary” type of economy, which was

based on sea power, commerce (both naval and land), and a variety of very advanced economic institutions for the era. All these innovations were mutually reinforced by the establishment and evolution of democracy already being introduced in Athens through Cleisthenes's reforms from 508 BC onwards.

2. The Persian invasion and the “successful response of the Athenians” through the “turn to the sea” strategy

At the beginning of the fifth century BC, Athens was still mainly an inward looking city-state, the great majority of whose inhabitants lived off agriculture. It had some trade, some commercial ships, and presumably some warships, but it certainly was not a major trading or naval power, as archaeological findings of the sixth century BC outside of Attica revealed.

During the 480s, the Athenians and the rest of the Greeks were receiving more and more info concerning the Persians' intentions to launch a second invasion to Greece. Athenian politics was strongly influenced by a visionary politician, Themistocles, who had no doubts concerning the true Persian intentions. Themistocles foresaw that the decisive encounter of the forthcoming war would take place at sea. Thus, Athens needed a strong fleet. The problem was how to finance such a fleet, of about two hundred triremes. The city's revenues, consisting of public land revenues, custom duties, fines, and war booty, were insufficient for this major naval program.

Suddenly, as a *deus ex machina*, in 483–482 BC the Athenians found in Maroneia, the silver-mining district of Lavrion near Cape Sounion, an unprecedentedly rich vein of silver. The royalties from this reached the unheard of figure of one hundred talents per year (or six hundred thousand ancient drachmae) at a time when one drachma was a middle-class day's income. This amount was enough to pay for all regular state expenditures, with a large surplus to be distributed at a flat rate of ten drachmas to every citizen.

Themistocles intended to use this amount of money to finance a fleet of two hundred new trireme warships (one hundred each year) sufficient to repel the Phoenician-Persian fleet. However, he first had to convince the Athenian people in the arena of politics. His main political opponent was Aristides, who was the leader of the conservative aristocratic party which was mainly supported by the wealthier landowners and possibly also medium smallholders whose revenues came from agriculture. The aristocratic party was also supported by the richest classes, the *pentakosiomedimnoi* (those who

had an income of as high as five hundred bushels), the horsemen (Greek: *hippeis*, or *triakosiomedimnoi*, those rich enough to have a horse) and the *zeugitai* or *diakosiomedimnoi* (those possessing a pair of plough oxen).

● On the other hand, Themistocles was supported by the low-income *thetes*, who until that time had limited political rights—they could vote in the Assembly, but were excluded from public office. Themistocles understood that he could convince the poorer *thetes* to vote in favor of his shipbuilding program if he could promise full political rights to them. But, practically, he actually promised to find jobs for the poorer citizens.

Building two hundred ships in two years was a task requiring the harnessing of a substantial labor force. Since, at the time, the slave population was relatively small, a major source of employment came from the citizens. It is logical to believe that the better-off citizens, such as farmers and city workers, would have weaker incentives to abandon their work in order to be employed in the construction of the fleet. Thus, the people employed in the shipbuilding project came from the poorer class, the *thetes* (Kyriazis and Zouboulakis 2004; Tridimas 2013).

Themistocles also promised that, since triremes needed to be equipped by men, *thetes* were the most appropriate source of manning them. Triremes comprised a crew of two hundred men: seven officers from the upper income class, including the captain (*trierarchos*), ten marines (*penonautai*) possibly coming from the medium-income hoplite class, ten sailors, four archers, and 170 rowers (Morrison, Coates, and Rankov 2000). Rowers came from the low-income class—the *thetes*.

The Athenians finally decided to approve the proposal of Themistocles to build the fleet. This decision can be seen as an issue of “public choice,” if we use a modern economic term: sacrifice more consumption (ten drachmas to each Athenian) in favor of the public good (defense). This is the so-called “butter for guns” choice. In retrospect, it can be argued that the Athenians chose wisely, since this fleet, which comprised two-thirds of the entire Greek fleet, saved Greece, Europe, and the Western world by defeating the mighty Phoenician-Persian fleet in the Salamis naval battle (490 BC).

In order to construct the fleet, the Athenians introduced the *trierarchy*, according to which a wealthy Athenian was charged with the running expenses of a trireme warship for one year, at the same time acting as its captain. In the beginning, the *trierarchy* fell on individual wealthy Athenians, who realized, during the course of the fourth century BC, the

limitations of this system, both from a “justice” and a practical point of view. So, on the basis of a proposal by Demosthenes, they introduced the *symmoraiæ* system, under which a group of wealthy Athenians was collectively responsible for each trierarchy (Kyriazis 2009). Trierarchy proved a successful Public Private Partnership (PPP) program in the area of national defense, if we interpret it in modern economic terms.

Kyriazis and Economou (2015) characterize triremes as a “school of democracy”—people from different social groups and with different life experiences had to cooperate so as to achieve the common goal of defending their motherland, and even die fighting in favor of their “altars and hearths” [*yper vomon kai estion*].² Making a trireme warship to coordinate with the other ships of the fleet and performing difficult and venturesome maneuvers during the battle required exceptional seamanship, courage, and determination. But, most importantly, it needed trust and cooperation [*ἀμύλλα*] among the crew. All members, from the wealthy captain to the poorer rower, depended on each other. Thus, a well-run trireme worked like a well-tuned orchestra, in which different musical instruments playing sometimes different tunes produce one melody.

Thus, seeing the Persian invasion repelled through A. Toynbee’s (1966) spectacles proves not only the ability of the Athenian sociopolitical system to “survive” and respond effectively to the external threat, but also that the repelling led to a major socioeconomic change—it transformed the economic base of the Athenian economy. In the next section, the financial and economic institutions and mechanisms that the Athenian economy introduced after the “turn to the sea” are analyzed.

3. The rise of commerce and the gradual transformation of the economy through the creation of secondary and tertiary sectors of production

The necessity to repel the Persian fleet led not only to the construction of trireme warships, but also the creation of the proper infrastructure so as to make the construction program feasible. New production sectors arose such as: timber (for the construction of ships, oars, etc.), forges, steelwork stores (for the rams of warships and special nails in order to connect the different parts of the ships, etc.), paint shops, shops for ropes, and a variety of products related with shipping, such as pitch, hemp, flax, and iron, as well as a major upgrade of the existing infrastructure for dockyards (*ναύσταθμοί*), anchorages, and marine installations, etc.

Then, the next step followed—once the threat faded away, all this newly-made infrastructure did not become useless. The democratic spirit of innovation led the Athenians to exploit it so as to make their city wealthier and stronger. One has to bear in mind that, after repelling the Persians, the Athenians were the leaders the Greek world, together with the Spartans. The Athenians played a major role in the establishment of the so-called First Athenian Alliance (Delian League) during 478–404 BC. Thus, Athens had actually managed to integrate a large part of the East Mediterranean region into an integrated status of economic cooperation and security through its mighty fleet. Commerce in this unified area of economic cooperation rapidly flourished.

Athenian exports comprised olive oil, Hymetus honey, and wine from the agricultural sector, but also, more significantly, handicraft and “industrial” products like pottery, furniture, silver plates, art products like marble and bronze statues, iron and bronze domestic utensils, arms, and jewelry (Kyriazis and Zouboulakis 2004). According to some estimates (Cohen 1997), the import of grain required six hundred shiploads at three thousand medimni (120 tons) per shipload. Total trade value has been estimated to at least 13.8 million drachmae, or 2,300 talents, per year (Isager and Hansen 1975)—a colossal sum created through economic transaction. Luxury items like ivory were also imported, as well as slaves.

Once the secondary sector of the economy was shaped and the volume of commerce started to increase, the Athenians were flexible enough to understand that they had to develop new institutional mechanisms in favor of commerce. Thus, they took a series of steps. At first, property rights and their protection were further refined during the period of democracy in Classical Athens (510–322 BC). Kyriazis and Economou (2015) argue that a regime of property-rights protection was gradually in development from the Homeric era onwards.

Property-rights protection is one of the most important prerequisites and axioms that safeguards the prosperity of a modern state (Hodgson 2015a). During the Classical era, property rights were further secured. In the case of a violation of their property, a citizen had the right to sue the one who was responsible for the violation. The system of property rights was so advanced that citizens had the right to even sue the state itself when they faced a state violation (Karayannis 2007). As Cohen (1997) has persuasively shown, free Athenian women could also own property, and even function as entrepreneurs and bankers.

Another major issue has to do with the introduction of a reliable coin as a means of performing efficient economic transactions. Camp and Kroll (2001), Kroll (2011), and van Alfen (2011) have thoroughly studied the Athenian coinage system and strongly support this argumentation. The Athenian owls were introduced in about 650 BC and during the sixth and fifth centuries BC the Athenian state, through state mints, introduced thousands of very reliable coins, including their subdivisions so as to make feasible every kind of transaction (of a higher or a lower value). The Athenian coins, such as the famous *tetradrachm*, had an intrinsic value (like all coins in antiquity), and were very reliable and pure concerning their silver content, rapidly becoming the universal coin of the era.³

The fact that Athens and many other Greek city-states utilized reliable coins led to what it is known in modern economics as transactional cost reduction. During 375–4 BC, Nicophon introduced his Monetary Law, which was accepted by the Assembly. Under its provisions, all “good” foreign coins (meaning of correct silver content) could circulate in the Athenian economy along with Athenian drachmas, and traders etc. could use foreign coins for their transactions without having to change them into Athenian money. This reduced transaction costs and facilitated trade and exchange. In cases of doubt about the “purity” of the contents of the foreign coins (and as a state guarantee against fraud), the office of the “tester” (*δοκιμαστής*) was introduced.

The “tester” was a state official with an office—a bench in the market places in Athens and the harbor of Piraeus. If one of the private contracting parties had doubts about the purity of the foreign coins, they could bring them to the “tester,” who examined their purity. If found to be authentic, the transaction could proceed with a state guarantee. If found impure (e.g. in the case of fraud), the coins were confiscated. The law of Nicophon again reduced transaction costs and generated, through its existence and provisions, trust (Ober 2008, chapter 6).

In addition, according to modern economic literature, the protection of commercial agreements and contracts is pivotal for commercial transactions to become credible (Hodgson 2015b). This is strongly related to the existence (or not) of a regime that protects property by law and under legitimate procedures backed by the state, which is the legal institutional mechanism that safeguards property rights that are related to commercial action. Edward Cohen (1973, 158–98) mentions a variety of cases of property rights that have to do with maritime law. He argues that, at some point during the fourth century BC, special maritime courts were set up in

Athens to deal with commercial cases (*δίκαι ἐμπορικαί*), apparently replacing an earlier system of such cases (*ναυτοδίκαι*). There is no doubt that the use of written contracts was a standard commercial practice. Cohen (1973, 93) also argues that, in cases where trials concerning *δίκαι ἐμπορικαί* took place, jurors (*δικασταί*) were specially chosen from those with experience in handling such kinds of cases. Such cases were judged within a month, so that justice was provided rapidly among litigants.

A comment must be offered as far as banking is concerned, since banking activities are strongly related with the enforcement of contracts and the protection of property. In Athens, a series of wealthy men could offer various banking services to Athenian and foreign citizens. Banking services covered a wide range of economic activities, such as offering loans and safekeeping of valuables (possibly acquired as security for loans), while their merchant owners traded elsewhere, arranged the payment of merchants' creditors in their absence to their associates, and acted as guarantors in favor of an economic agent.

They could also provide witnesses for business deals, keep contracts of arrangements, and offer currency exchange, etc. Cohen (1997) and Shipton (1997) offer various passages (Dem. Phor. 36; Dem. Ag. Tim. 49 etc.) and epigraphical evidence (IG 11² 2741, 11. 5–6) to support this thesis. During the fourth century BC, the wealthiest Athenians were no longer landowners but “entrepreneurs” (Kyriazis 2009). Thirty bankers are known to us by name, such as Passion and Phormion (Cohen 1997). Finally, related to banking and commercial activity, there are also attested insurance and joint stock companies, the later established for profit reasons. These institutions made trade activity easier and safer (Plut. Solon, 31, Dem. Against Zinothemis; Cohen 1997; Reed 2003).

A general comment must also be made concerning the procedures of attributing justice in public courts, because they are obviously related to the enforcement of the law and property rights.⁴ It is known that litigants were required to provide all the documentary evidence, such as contracts and bills, to the judges. The Athenian state had laws which were inscribed on large stone blocks erected in various public areas of Athens, as in the Areopagos court and in the Acropolis.

From the end of the fifth century BC, copies were kept in public buildings. Many would have been located at the office of the magistrate, whose duties were related to a certain type of case. In the fourth century BC, a large collection of official documents including laws were located in the *metron*

(*μητρόων*), an Ancient Greek temple dedicated to a mother goddess. A special institutional body called *νομοφύλακες* (meaning “guardians of the laws”) was responsible for the safety and protection of those written laws from forgery, loss, or damage of the inscribed passages written on them, etc., and for this purpose they had full access to the *μητρόων*, also known as *νομοφυλάκιον* (Sickinger 2004, 95–86, 102–4; Lanni 2006). This means that there was an officially established system of laws (being previously decided by the Athenian Assembly), according to which the jurors offered their verdict.

4. Conclusions

In 483–2 BC, the Athenians found a large vein of silver in Maroneia at the Lavrion mints. Themistocles, the leader of the democratic party, convinced the Athenian citizens in the Assembly to “invest” their money in favor of the public good defense against more personal private consumption. In order to repel the Persians, the Greeks, and more specifically the Athenians, chose the “turn to the sea” strategy, and performed a colossal shipbuilding program (which may be seen as of Keynesian inspiration in today’s interpretation), finally managing to repel the threat.

But the “turn to the sea” strategy was transformed into a process of reshaping the Athenian economy toward a well-functioned monetized market economy with flourishing institutions and highly developed secondary and tertiary sectors. The Athenian economy utilized a series of institutions such as property rights protection, reliable coinage, the enforcement of contracts, an effective banking sector, insurance and prototype joint stock companies, and an effective judicial system that protected all the commercial transactions.

This paper sheds light on the current academic trend that favors a major revision concerning the “backwardness” of the Ancient Greek economy, which had many modern characteristics and can be interpreted by making use of many modern methodological tools that are related to economic theory.

Bibliography

Ancient Authors

- Demosthenes, “Against Timotheus” (Dem. Ag. Tim.).
 Demosthenes, “For Phormion” (Dem. Phorm.).
 Demosthenes, “Against Zinothermis” (Dem. Ag. Zin).
 Plutarch, “Solon” (Plut. Solon).

Modern authors

- Amemiya, T. *Economy and Economics in Ancient Greece*. London: Routledge, 2007.
- Bergh, A. and C. H. Lyttkens. “Measuring Institutional Quality in Ancient Athens.” *Journal of Institutional Economics* 10 (2) (2014): 279–310.
- Bitros, G. C. and A. D. Karayannis. “Values and Institutions as Determinants of Entrepreneurship in Ancient Athens.” *Journal of Institutional Economics* 4 (2) (2008): 205–30.
- Bresson, A. *L' économie de la Grèce des cités, les espaces de l' échange*, Vol. 2. Paris: Armand Colin, 2007.
- Cohen, E. E. *Ancient Athenian Maritime Courts*. Princeton, NJ: Princeton University Press, 1973.
- . *Athenian Economy and Society: a Banking Perspective*. Princeton, NJ: Princeton University Press, 1997.
- Camp, J. and J. H. Kroll. “The Agora Mint and Athenian Bronze Coinage.” *Hesperia* 70 (2) (2001): 127–62.
- Economou E. M. L., N. Kyriazis, and T. Metaxas. “The Institutional and Economic Foundations of Regional Proto-federations.” *Economics of Governance* 16 (3) (2005): 251–71.
- . *The Ancient Economy*. Berkeley: University of California Press, 1973.
- . *Economy and Society in Ancient Greece*. New York: Penguin Non Classics, 1983.
- Halkos, G., and N. Kyriazis. “The Athenian Economy in the Age of Demosthenes.” *European Journal of Law and Economics* 29 (2010): 255–77.
- Hodgson, G. M. *Conceptualizing Capitalism: Institutions, Evolution, Future*. Chicago: University of Chicago Press, 2015a.
- Hodgson, G. M. “Much of the ‘Economics of Property Rights’ Devalues Property and Legal Rights.” *Journal of Institutional Economics* 11 (4) (2015b): 683–709.

- Isager, S. and M. H. Hansen. *Aspects of Athenian Society in the Fourth Century BC*. Odense, 1975.
- Karayamias, A. *Ancient Greek Leadership on Economics*. Athens: Papazisis, 2007.
- Kroll, J. H. "The Reminting of Athenian Silver Coinage 353 BC." *Hesperia* 80 (2011): 229–59.
- Kyriazis, N. and M. Zouboulakis. "Democracy, Sea Power and Institutional Change: An Economic Analysis of the Athenian Naval Law." *European Journal of Law and Economics* 17 (2004): 117–32.
- Kyriazis, N. "Financing the Athenian State: Public Choice in the Age of Demosthenes." *European Journal of Law and Economics* 27 (2) (2009): 109–27.
- . *Democracy and War. Histories from Ancient Greece*. Athens: Eurasia Publications, 2014.
- Kyriazis, N. and E. M. L. Economou. *Democracy and Economy. An Analytical History of Democracy From Its Birth to Today*. Athens: Enalios, 2015.
- Lanni, A. M. *Law and Justice in the Courts of Classical Athens*. Cambridge: Cambridge University Press, 2006.
- Lyttkens, C. H. *Economic Analysis of Institutional Change in Ancient Greece: Politics, Taxation and Rational Behaviour*. Abingdon: Routledge, 2013.
- Morrison, J. S., J. F Coates, and N. B. Rankov. *The Athenian Trireme*. Cambridge: Cambridge University Press, 2000.
- Obber, J. *Democracy and Knowledge: Innovation and Learning in Classical Athens*. Princeton NJ: Princeton University Press, 2008.
- . *The Rise and the Fall of Classical Greece*. Princeton, NJ: Princeton University Press, 2015.
- Reed, C. M. *Maritime Traders in the Ancient Greek World*. Cambridge: Cambridge University Press, 2003.
- Shipton, K. M. W. "The Private Banks in Fourth-century B.C. Athens: a Reappraisal." *The Classical Quarterly* 47 (2) (1997): 396–422.
- Sickingler, J. P. "The Laws of Athens: Publication, Presentation, Consultation." In *The Law and the Courts in Ancient Greece*, edited by E. M. Harris and L. Rubinstein, 93–109. London: Duckworth, 2004.
- Toynbee, J. A. *A Study of History*. Oxford: Oxford University Press and Dell Publishing Co, [1946] 1966.
- Tridimas, G. "Homo Oeconomicus in Ancient Athens: Silver Bonanza and the Choice to Build a Navy." *Homo Oeconomicus* 30 (4) (2013): 435–58.

van Alfen, P. G. “Hatching Owls: Athenian Public Finance and the Regulation of Coin Production.” In *Quantifying Monetary Supplies in Greco-Roman Times*, edited by F. de Callatay, 127–49. Bari: Edipuglia, 2011.

Notes

- 1 This discussion concerning the “primitivism” or “modernism” of the Ancient Greek economy goes back to the late nineteenth century, with the so-called Bücher-Meyer controversy. Bresson (2007, 16–52) offers a detailed analysis concerning the different methodological approaches of this controversy. He also offers arguments as to why modern economic theory can offer explanatory power concerning the description of the Ancient Greek economy.
- 2 Kyriazis (2014) and Kyriazis and Economou (2015) analyze how the organization of the *hoplite* (phalanx) formations and the trireme warfare forged bonds of trust, emulation, and bravery between the *hoplites* and the sailors, and promoted the democratic ideals.
- 3 As also happened later, with the Greco-Macedonian *tetradrachm* after the conquests of Alexander the Great, the Roman *denarius*, the Byzantine *solidus*, the Venetian *grossi*, Great Britain’s *pound sterling*, and, currently, the US *dollar*.
- 4 Lanni (2006) provides an extensive analysis concerning the Athenian judicial system.

1.7

THE CONTRIBUTION OF ANCIENT GREECE TO NEUROSCIENCE

GEORGE PAXINOS

NHMRC SENIOR PRINCIPAL RESEARCH FELLOW
AND SCIENTIA PROFESSOR OF MEDICAL SCIENCES,
NEUROSCIENCE, RESEARCH AUSTRALIA
AND THE UNIVERSITY OF NEW SOUTH WALES,
SYDNEY, AUSTRALIA

Abstract

The present work initially refers to historic clues relating the contribution of Greeks to neuroscience and subsequently to the big questions: (a) what the mind is, if it is needed to invoke the term “soul” in order to study human behavior, and if there is free will; and (b) if the brain is able to solve the problem of the environment that it created on its own. Some of the points mentioned have already been presented in the introductory speech of the author at the Academy of Athens.

1. Introduction

According to an Aesop’s fable, a fox enters an actor’s house and, looking at various things, it drags up a mask, a marvelous imitation of a human head. It puts its leg on it and says: “What a wonderful head! Nevertheless, it has no value because it has no brain at all.”

We cannot infer without a particular study that the brain creates the mind and is the center of intellect, motion, senses and feelings. Egyptians mindlessly threw away the brain, despite the care they showed for life after death, creating in this way brainless generations of Pharaohs.

Some pre-Socratic philosophers rejected the supernatural causes and mythical interpretations of the natural world and the nature of the soul. These philosophers replaced myth with reality and exiled gods and magic.

Some writers consider Alkmaeon (Pythagoras's student, about 500 BC) of Croton (today's Crotona, south Italy) as the first to associate the brain with intellect.

This thought was possibly transferred to Kos, where Hippocrates was working. Hippocrates (460–377 BC) expressed a tremendously modern approach which could be taught today in any university—people should know that pleasure, delight, sadness, pain, and tears come from the brain.

Plato also supported the prevalence of the brain. In the tripartite division of psyche, the “Logical,” the immortal soul, inhabits the brain; the “Spirited” soul inhabits the heart; and the part of the soul that deals with hunger, “Appetitive,” inhabits the area under the diaphragm. That is, Plato considered the most important of these souls as living in the brain.

Aristotle (384–22 BC), possibly the greatest scientist of all Antiquity, missed the target by saying: “All souls inhabit the heart. Brain just reduces the blood temperature.”

Herophilus of Chalcedon studied medicine in the island of Kos sixty-five years after Hippocrates's death, and is deemed to be the first anatomist. There are no written records of his texts but there are references to him in others' works, such as those of Galenus. Herophilus attributed the strongest part of the soul to the ventricles of the brain (Dobson, 1925; Acar et al. 2005).

Galenus (AD 130–200), an admirer of Hippocrates and Herophilus and doctor of Marcus Aurelius, brought the intellect or the soul back to the brain and rejected as unreasonable Aristotle's view that the function of the brain is to cool the blood.

Galenus also said that the folds of the brain have nothing to do with intellect, since “the donkey's brain has a lot of folds.”

The heart-centered view of Aristotle and the brain-centered one of Galenus competed with each other until Shakespeare's era. In *The Merchant of Venice*, Portia asks: “Tell me where is fancy bred, ●r in the heart or in the head?”

2. Brain, Mind, Soul and Free Will

Today, there is no doubt where love is located. When one receives a heart transplant, one does not fall in love with the wife of the late donor.

The brain is the location of love and more. And, today, from this place, where some of these ideas originated 2,500 years ago, I would recommend a news bulletin urging people not to exchange cards with hearts on St. Valentine's day but with something much more correct.

The greatest cartographer of the cortex of the human brain was von Economo (1876–1931), born in Romania of Greek parents and who flourished in Austria. He described cerebral stupor and post-cerebral Parkinsonism, and was given the Award of Positive Studies of the Academy of Athens, and offered the Chair of Neurology and Psychiatry, but he never wanted to return to Greece (personal communication with L. Triarhou, 2012).

Von Economo and Koskinas described 107 areas of the cortex of the human brain (Economo and Koskinas, in Triarhou, 2007). Brodmann (1909), whose map is still used, describes only fifty. Unfortunately, the much better map of Economo and Koskinas is not used.

After such a struggle to find the location of the psyche, psychology lost its soul in 1930. According to Hebb (Harris 1958), the mind is the composition of the energy of brain neurons. That is, there is no phantom in the machine (human organism).

If the relationship between brain and behavior is one to one (that is, totally corresponding), we do not need to invoke the soul in order to study the behavior.

According to Paul Broca (as von Bonim [1950] mentions), there is a group of functions in the human mind and a group of folds in the brain, and the data that science has collected so far allows us to say that the big areas of the mind correspond to the big areas of the brain.

What does science know about the relation between the mind and brain? When there is damage in one lobe of the brain, there is equivalent damage in human behavior. In Alzheimer's disease, the degeneration of the brain brings about catastrophic behavior changes. The mind is the energy of the brain, and bears the same damage as the brain.

The above thoughts are congruent with Hippocrates's thoughts.

According to many neuroscientists, there is no need to invoke the existence of the soul so as to study behavior. The question is whether there is any free will.

Many neuroscientists (e.g. Skinner) believe that behavior is the result of only two factors, over which we have no choice:

- (a) ● Our genetic disposition (we do not choose our parents)
- (b) ● Our environment (we do not choose the society we are born in, as well as a mother smoking during pregnancy)

Since we can choose neither of these two factors, many neuroscientists and neurophilosophers have come to the conclusion that no free will exists. It is somewhat easier to show that there is no free will in the emotional part.

I will conjure up Michalis Kakoyannis, who shows us with his lyrics that it is impossible for a man to get a certain love out of his head. "Love that you became a double-edged knife. ●nce you gave me joy only ... But now you drown the joy in tears ..."

Are we then slaves of the past? Behavior changes with the influence of the environment and the psychologists have exactly this goal: to change the behavior of e.g. smokers and drug addicts, and free them from addiction. It is not the person who decides to change their behavior because of their free will. It is the environment which conveys this change.

What do we win by believing that there is no free will? We lose the feeling of hatred. You can neither hate a crocodile for eating your hand nor wish to take revenge on it. No one is responsible for the evil they have committed, and with this we come to Jesus's words "Love your enemies, or at least do not hate them." Jesus's teaching opposes the Christian thought about revenge, punishment, tyranny and hell following death (Harris 2012).

In case you have not been convinced that the brain is an important organ, just look at what an artist, George Bernard Shaw, wrote (*Human and Superhuman Act III*):

●ON JUAN: I did so purely for the sake of alliteration, Ana; and I shall make no further allusion to them. And now, since we are, with the exception, agreed so far, will you not agree with me further that Life has not measured the success of its attempts at godhead by the beauty or bodily

perfection of the result, since in both these respects the birds, as our friend Aristophanes long ago pointed out, are so extraordinarily superior, with their power of flight and their lovely plumage, and, may I add, the touching poetry of their loves and nestings, that it is inconceivable that Life, having once produced them, should, if love and beauty were her object, start off on another line and labor at the clumsy elephant and the hideous ape, whose grandchildren we are?

THE DEVIL: You conclude, then, that Life was driving at clumsiness and ugliness?

DON JUAN: No, perverse devil that you are, a thousand times no. Life was driving at brains at its darling object: an organ by which it can attain not only self-consciousness but self-understanding.

I have many concerns about the brain capacities that I will mention later.

Susan Blakemore (1999) says: “our brain is three times bigger than that of our closer species in comparison with the size of our bodies. This huge organ is dangerous and painful to give birth to about 20% of the energy of the body when it is calm, although it only has 2% of the total body weight. There must be a reason for all this evolutionary expenditure.”

What distinguishes the brain from other organs? It has a body map. It has a map of the outside world. It has a map of our experiences. It is the only organ which has all these three qualities (Rakic 1999).

Some statistics about the brain: the brain has 1,000 nuclei, 2,000 major interconnections, 200 important enzymes, and expresses 20,000 genes. The brain of all mammals as well as all birds is like this.

The difference in the human brain is that it has eighty-seven billion neurons, much more than one could expect of the size of the mammal we are. In a similar way that the giraffe has a tall neck, we have a big brain. We do not have the biggest brain, as whales have a brain ten times bigger than ours, but also have a much bigger body. Besides, we have as many cells as primates, small and many, which are probably very efficient. Whales are not primates and do not have such neurons.

3. The Brain and Environmental Crisis

Today, we face an imminent environmental crisis and the question is whether we will act like the Athenians and Spartans toward the forthcoming war.

The fuel industry places a sarcophagus of carbon dioxide (CO₂) above us. The companies have a lot of money to persuade many people that there are doubts among scientists over whether the overheating of the planet is humanmade. As Naomi Oreskes and Eric Conway mention in their book *Merchants of Doubt* (2011), the companies are these merchants of doubt.

The fuel-mining companies will be destroyed if they are not allowed to make use of their stock, whereas if they are they will destroy the atmosphere. They have much more money than they need to organize attacks against the scientists and misinform people, so as not to block their business model which will induce the 3–6°C rise in temperature before the end of the century.

I think one of our biggest problems is lack of self-awareness.

Who are we?

We are at a loss concerning nature. We do not know why we are here, without free will, having Paleolithic feelings with remnants of the brain of serpents and dreadful technology putting ourselves and all other life forms at risk.

It has been said that we use only 10% of our brain. This is a sophism and is possibly conducive to the arrogant assumption that we possess immense spiritual reserve. We lack self-awareness and think that, if need be, we will manage to cool our overheated planet with geo-mechanical methods.

Since the time that Narcissus saw his reflection in the river and fell for it, there has not been a human organ that is the object of such admiration, and surely with such insufficient reason.

In fact, our brain is a limited organ which sets boundaries in our intellect, emotions, and motives.

4. General Conclusion: Is Our Brain the Right Size?

If our brain was “smaller” than it is (less smart and less capable of speech), it could not have invented the science and technology which today threaten our lives. For example, the other primates do not threaten either themselves or us. If our brain were “bigger” than it is, we could possibly understand the problem and perhaps solve it.

Thus, I come to the conclusion that the human brain is not the right size.

Bibliography

- Acar, F. N. Sait, M. Guvencer, U. Ture, and M. N. Arda, "Herophilus of Chalcedon: a Pioneer in Neuroscience," *Neurosurgery* 56 (2005): 861–7.
- Blakemore, S. "Meme, Myself, I," *New Scientist* (March 13, 1999).
- Brodmann, K. *Vergleichende Lokalisationslehre der Grosshirnde* (Leipzig: Barth, 1909).
- Dobson, J.F. "Herophilus of Alexandria," *Proceedings of the Royal Society of Medicine* 18 (1925): 19–32.
- Dobson, R. "Alkmain's Discovery that Brain Creates Mind: a Revolution in Human Knowledge Comparable to that of Copernicus and of Darwin," *Neuroscience* 147 (2007): 561–8.
- Harris, S. "The Delusion of Free Will," Festival of Dangerous Ideas 2012, Sydney Opera House.
- Harris, D.●. *A Textbook of Psychology* (Philadelphia: Saunders, 1958).
- Rakic, P.T. "Great Issues for Medicine in the Twenty-First Century," *Annals of the New York Academy of Sciences* 882 (1999): 66.
- Von Bonin, G. *Essay on the Cerebral Cortex* (Springfield, IL: Thomas, 1950).
- Von Economo, C. and G. N. Koskinas, *Atlas of Cytoarchitectonics of the Adult Human Cerebral Cortex*, translated, revised, and edited with an introduction and additional appendix material by L. C. Triarhou (Basel: Karger, 2007).

1.8

THE GENETIC ORIGIN OF THE GREEKS

CONSTANTINOS TRIANTAPHYLLIDIS

PROFESSOR EMERITUS, ARISTOTLE UNIVERSITY

OF THESSALONIKI, GREECE

Abstract

The recent fascinating developments in DNA analysis have allowed genetics to assist history, archaeology, linguistics and other sciences in answering the question of the origin of the Greeks, both ancient and modern.

Population genetics data support the model of the first appearance of the anatomically modern human (*Homo sapiens*) in Africa about two hundred thousand years ago. From Africa, humans moved to the Middle East, and from there arrived in the area of Modern Greece fifty-three thousand years ago. The oldest evidence of humans in Europe was discovered in Kleisoura and Franchthi caves in Argolis. From Greece, hunter-gatherers spread throughout Europe. During the last Ice Age, the human presence was limited to four refugia in Southern Europe. One of these was the Balkan refugium, out of which, after the ice melted, humans with a distinct genetic makeup re-expanded into Central Europe. Approximately 12,500 years ago, inhabitants of the Fertile Crescent in the Middle East developed agriculture and animal husbandry. The dissemination of the innovative agricultural technology by settlers in Greece then followed. The main starting point of Neolithic agricultural populations groups arriving in Greece/Europe is believed to be Western Anatolia, mainly by a maritime route, and to a lesser extent a terrestrial route through the Bosphorus strait. Archaeogenetic studies indicate that the Aegean Neolithic population can

be considered the biological root for all early European farmers and their colonization routes, and furthermore help trace their expansion routes.

The genetic data indicate that the genetic heritage of Greeks was created by four main independent migratory population waves corresponding to: (a) the early colonization of Greece by pioneer hunter-gatherer *Homo sapiens* from Africa through the Middle East during the Middle Paleolithic era; (b) the population movements from Northern/Central Europe to the warm Balkan glacial refuge of Southern Europe during the last glacial and subsequent postglacial re-population of deserted areas of Central and Northern Europe from the Balkan glacier refuge; (c) The Neolithic demographic diffusion of farmers from the Near East and their arrival into Greece approximately ten thousand years ago; and (d) the migrations mainly from Greece to the rest of Europe, and vice versa, since the Bronze Age. So, it seems that, to a great extent, the genetic heritage of the present inhabitants of Greece had already been formed in that distant prehistoric Bronze Age period, and it is therefore the descendants of these people who inhabited the area of Greece as early as 2000 BC who are characterized as Greeks.

Genetic results prove the existence of the genetic signature of the Ancient Greeks in all their colonies, the close relationship with the inhabitants of southern Italy, and finally the genetic continuity of the population living in the geographical area of Greece. On the other hand, it refutes theories such as the Indo-European incursion from the North/Caspian area that “Hellenized” Greece or the descent of Cretans from Egypt.

Ultimately, the genetic evidence supports the view that was expressed by the prominent archaeologist Sir Colin Renfrew: “The Greek culture, Greek beliefs and probably the Greek language developed here, within the land which we know as Greece today that in that sense the Greeks were autochthonous and were ever in the process of becoming.”

1. Introduction

The DNA molecule contains the genetic information that determines our biological development. Thus, the components of a human being (individual) are “constructed” according to the plan that is stored in DNA. Therefore, similarities between organisms are due to the similarities in their genetic (DNA) material.

DNA replication has excellent fidelity. Therefore, DNA is passed unchanged from generation to generation, unless a biological error occurs during duplication, e.g. a mutation, which under certain conditions can be inherited (passed) to offspring. Thus, each of us carries DNA in our cells which was inherited from our parents. By the same mechanism, our parents inherited their own DNA from their own parents, and so on until we arrive at our ancestors. For this simple reason, the DNA of modern humans can be a credible witness to events in the human history that happened dozens, even hundreds or thousands, of years ago.

2. The Colonization of Greece and Europe by Anatomically Modern Humans

Anatomically modern humans (*Homo sapiens*) originated in Africa at least two hundred thousand years ago. Hunter-gatherer population groups left Africa from today's Ethiopia by crossing the Red Sea at the Bab-el-Mandeb Strait and spread into the Arabian Peninsula (modern Yemen) during a mild and wet climate interval at least one hundred thousand years ago. From the Arabian Peninsula, anatomically modern humans moved to the Near East, where there were already populations of the *Homo neanderthalensis* species. Individuals of both species lived, met, and interbred in the Near East, albeit rarely, during the Paleolithic era. The two species also probably interbred in Europe. However, the majority (>97%) of the genetic heritage of anatomically modern humans living outside Africa, and therefore of Greeks and the other Europeans, originated in Africa.

Anatomically modern humans arrived in Greece at least fifty-three thousand years ago (see Fig. 1 below). These human population groups developed the Uluzzian culture in the Ermionida province (Kleisoura and Franchthi caves) in the eastern part of the Argolida prefecture (southern Greece), as well as in the region of Puglia in southeast Italy.

During the Middle Paleolithic era, the first hunter-gatherer population groups that arrived in Greece from the Near East were carriers of the matrilineal clade of mitochondrial haplogroup R, and mainly the genealogical clades of the mitochondrial haplogroup U, as well as, in the patrilineal clade, carriers of the Y chromosome haplogroups R and IJ. These population groups of hunter-gatherers spread the Aurignacian culture.

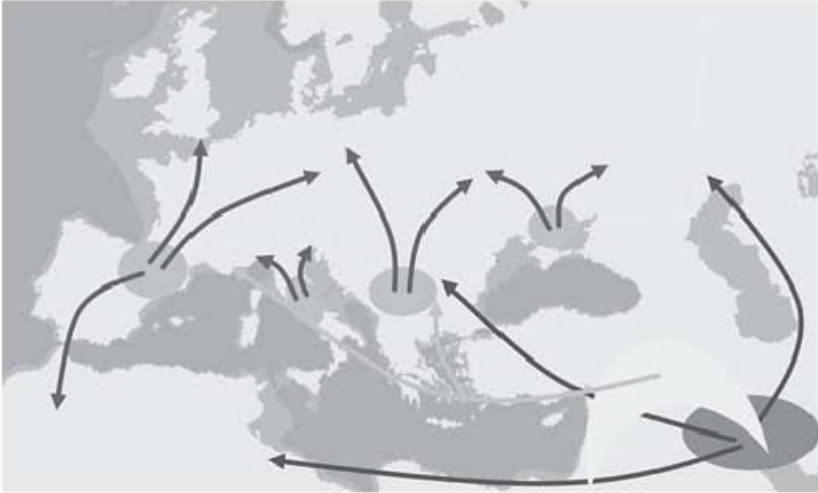


Fig. 1. Map of Eurasia showing the major migration events that may have influenced the gene pool and genetic diversity of modern-day Europeans. The Eurasian ancestral population originated from an African population from at least one hundred thousand years ago. Black arrows: symbolize the initial expansion of hunter-gatherers from the Middle East and their settlement in Europe during the Middle Paleolithic era around fifty-three thousand years ago. Red arrows: during the last glaciation period (nineteen to twenty-five thousand years ago), the populations of Northern and Central Europe retreated into four glacial refugia (the Franco-Cantabrian, Italian, and Balkan peninsulas, as well as the northern coast of the Caspian Sea). After the end of the last Ice Age, these refugia were the starting points for the subsequent recolonization of Europe. Green arrows: the movement of Neolithic farmers approximately 12,500 years ago from the Fertile Crescent of the Near East west over Cyprus and the Aegean Islands and into Southeastern Europe (mainly Greece and Bulgaria), and their expansion into the rest of Europe following different paths.⁸

The first expansion wave of hunter-gatherers from the Near East into Europe was followed by a second expansion wave (twenty-two to thirty-two thousand years ago) during the Late Paleolithic era. They were carriers of the matrilineal haplogroup H and developed the Gravettian culture, which was established throughout Europe. At almost the same period, the Y chromosome haplogroup IJ-429 evolved into haplogroup J in the Near East, and approximately thirty thousand years ago haplogroup I was created in the Balkan Peninsula. Carriers of this Y-haplogroup spread from the Balkans to the whole of Europe, carrying the Gravettian culture.

3. Population Movements from 23000 BC to the Mesolithic Era

During the peak of the last glacial period (nineteen to twenty-three thousand years ago), the Paleolithic hunter-gatherers with Aurignacian or Gravettian culture could not withstand the Northern European cold weather and retreated to the south until they arrived and settled in four warm shelters—those of the Franco-Cantabrian, Italian, and Balkan peninsulas, and the northern coast of the Caspian Sea (see Fig. 1 above).

After the gradual global climate re-warming (13,500 to 19,000 years ago), the second stage of recolonization of Central and Northern Europe with hunter-gatherers from all the glacier shelters followed (see Fig. 1 above). From the Balkan shelter, populations who were carriers of mitochondrial haplogroups I, U5b1, U4, H1, H3, and V spread into Central and Northern Europe. Similarly, men from the Balkan shelter, with the genetic makeup of the Y chromosome haplogroup I, repopulated Central and Northern Europe as far as the Scandinavian Peninsula, as well as part of Eastern Europe.

4. Population Movements during the Neolithic Era

Approximately 12,500 years ago, the hunter-gatherers of the Fertile Crescent developed the cultivation of cereals, the domestication of wild animals, and animal husbandry. The transition from the hunter-gatherer way of life to the agricultural way of life at the beginning of the Neolithic era is considered the most important cultural and technological innovation in the history of anatomically modern humans. Generally speaking, there are two possible migratory routes (see Figs. 1 above and 2 below) that the pioneer Neolithic population groups could have followed into Greece and Europe: (a) over land through the Dardanelles, and (b) across the sea over the Aegean islands. The main starting point of the Neolithic settlers arriving in Greece/Europe is believed to be the Western Anatolia coast, although to a lesser extent Neolithic people may have also used the maritime route starting at the Levantine coast, as well as the terrestrial route to Thrace. Next, the expansion of the Neolithic population groups, with agricultural technology and ceramic artifacts from Greece to the rest of Europe, followed two major routes: the Mediterranean route toward Italy, and the Continental route through the Balkans (Axios and Danube valleys) toward Central Europe.

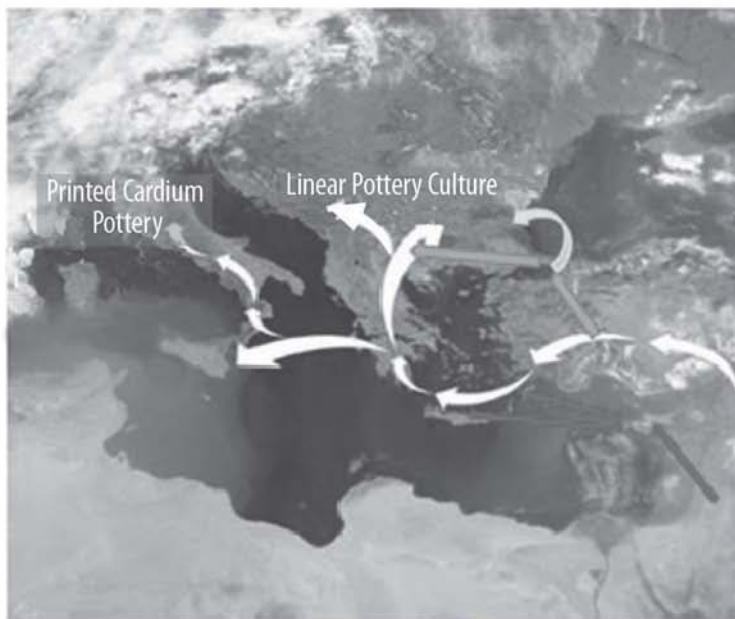
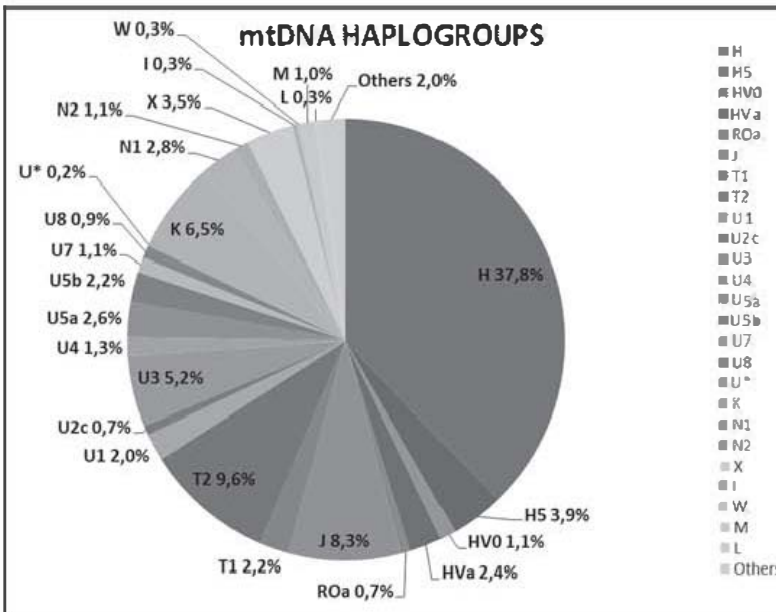
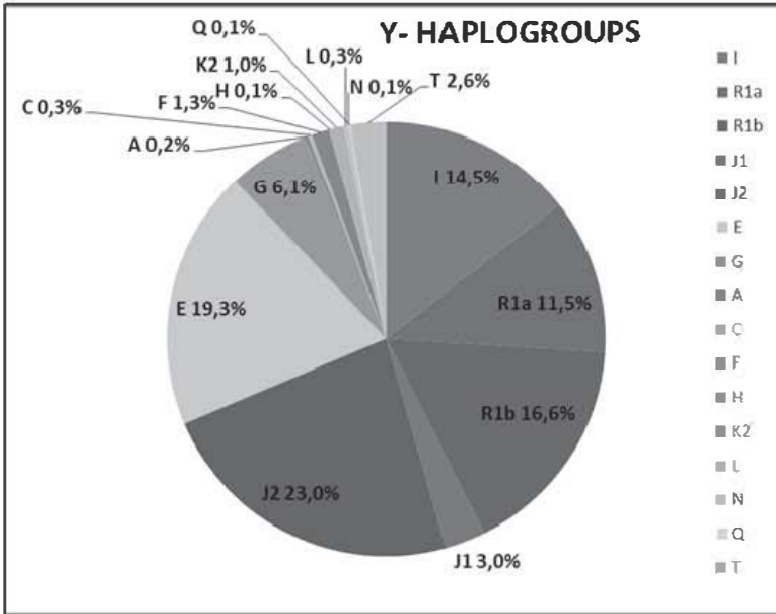


Fig. 2. Possible routes of expansion of Neolithic farmers from the Near East into Greece and Europe. The Neolithic farmers from the Near East traveled mostly by sea to reach Greece/Europe. (a) The main maritime route connecting Western Anatolia via the Aegean islands (Dodecanese/Lesvos/Chios)–Cyclades Islands–to the Peloponnese, mainland Greece and to the rest of Europe is symbolized by white arrows. Two further alternative maritime routes have been also suggested: (b) Levantine–Cyprus–Aegean islands–mainland Greece and the rest of Europe (red arrows); (c) Northern Anatolia–Danube River and rest of Central Europe (yellow arrows). A possible land route (green arrows) is also indicated on the map: Northwestern Anatolia–Dardanelles and Bosphorus strait–Thrace–Macedonia–Southern Balkans and on to the rest of Europe.¹⁵

Based on the genetic data available, it is concluded that, during the Neolithic era, population groups of farmers arrived in the Greek geographical territory carrying characteristic patrilineal and matrilineal haplogroups. Individuals/carriers of, for example, the patrilineal lineage G2 and the E-V13 lived on the Aegean islands seven thousand years ago. The existence of these sub-haplogroups in the inhabitants of Southern Italy and the French Provence probably reflects the maritime colonization of these areas by the Ancient Greeks during the Neolithic era, but mainly during the Iron Age.



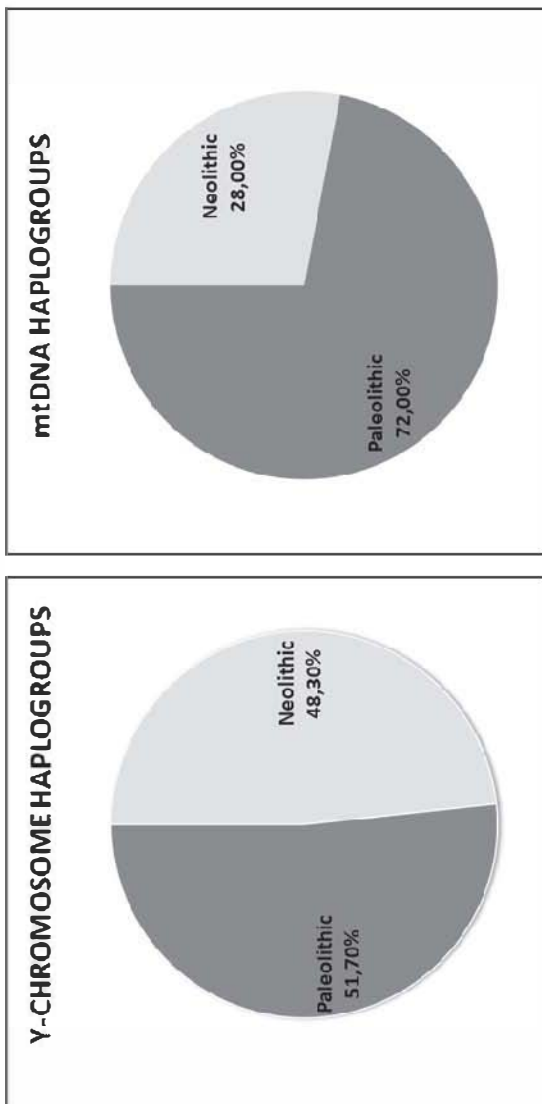


Fig. 3. Top: Y-chromosome (left) and mitochondrial haplogroups (right) of Greek people. Bottom: The percentage of Y chromosome haplogroups (left) and mitochondrial haplogroups (right) representing the Paleolithic and Neolithic origins of present-day Greeks.¹¹

The spread of carriers of haplogroup G from Thessaly into Sicily, southwest France, and the Iberian Peninsula has been associated with the printed-cadmium pottery culture from 5000 to 1500 BC (see Fig. 2 above). Additionally, this haplogroup has been found in archaic human remains from Central Europe with linear pottery culture (LBK). Consequently, the archaeogenetic studies support the view that Neolithic populations carrying this lineage played an important role in the expansion of agriculture from Greece into Central Europe.

Percentages of haplogroups in Greeks. The major paternal lineages, i.e. Y chromosome, and maternal, i.e. mitochondrial, haplogroups, found in the Greek population are presented in Fig. 3 above. The DNA studies revealed that the majority (> 95%) of the Greeks are descendants of people who were carriers of 8-10 matrilineal and patrilineal haplogroups.

The inhabitants of Greece are characterized by a high prevalence of mitochondrial (matherlinear) H-haplogroup, which is the predominant haplogroup in the Europeans. Haplogroup L, which is characteristic of the African population, is very rare among Greeks. In the patrilineal makeup of Greeks, the highest frequencies were observed for the R and the J2 and E haplogroups that denote Paleolithic and Neolithic descent, respectively.

5. The Position of the Greeks on the Mediterranean Genetic Map

The geostrategic position of Greece at a crossroads between three continents has provoked huge interest in anthropological and genetic studies. In addition, the populations of the Mediterranean countries are quite diverse, consisting of people of different nationalities, languages, and religions. Hence, it was worthwhile to explore the genetic relationships between Greeks and other Mediterranean people, as well as the genetic relationship among the inhabitants of the Mediterranean countries. For that purpose, data were collected for the genetic heritage of the inhabitants of nine Mediterranean countries (see Fig. 4 below) for genetic variants (alleles) associated with classical genetic markers.¹⁰

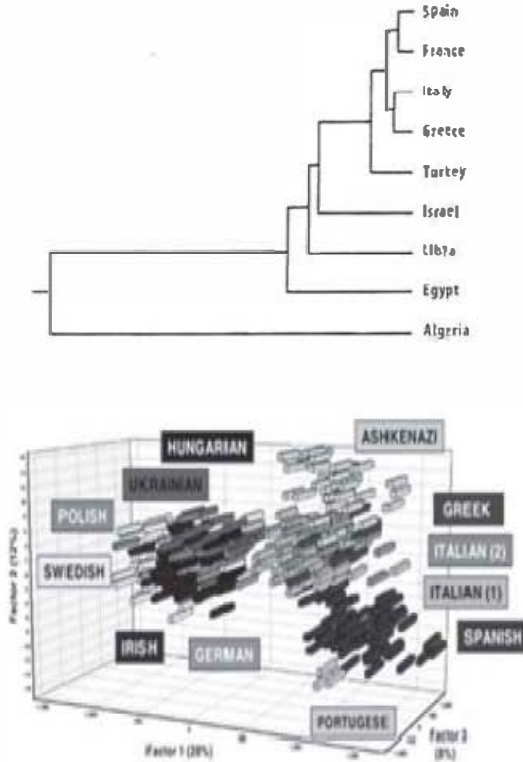


Fig. 4. Left: Phylogenetic tree showing the genetic relationships among the inhabitants of nine Mediterranean countries.¹⁰ Right: Using thousands of single nucleotide polymorphisms in Americans hailing from eleven different European countries allowed for grouping them into two main population groups, representing European ancestry from northern and southern parts of the continent. The sample population marked Italy 2 are Americans of Italian origin, while the sample labeled Italy 1 are native Italians.⁹

From Fig. 4 (Left), which represents the genetic relationship among nine Mediterranean populations, it is concluded that: (a) The smallest genetic distances (or the greatest genetic affinity) occur between French-Spaniards and Greeks-Italians; (b) the greatest genetic distances were determined between the Algerians and the inhabitants of the other eight Mediterranean countries. Moreover, the populations of the northern Mediterranean countries were clustered together in one genetic group, while this was not the case for the inhabitants of North Africa. Thus, one could argue that the

Greeks seem to be genetically closer, first with the Italians, next with the French and Spaniards, and last with the Turks. Similarly, based on thousands of single nucleotide polymorphism markers (SNPs), it has been documented (see Fig. 4 [right] above) that the Greeks exhibit the highest genetic affinity, first with the Italians, and then with the Spaniards.⁹

6. Genetic and archaeological evidence concerning the Minoan civilization

At the beginning of the twentieth century, the British archaeologist Sir Arthur John Evans discovered relics of a Bronze Age culture on Crete, which he named the Minoan civilization.⁹ Evans attempted to provide a plausible explanation for the origin of the people who developed such an advanced civilization. Based on the apparent similarities between the archaeological findings of the Minoan period and those of Egypt and Libya, he suggested as founders of the Minoan civilization descendants of refugees derived from the culturally advanced Delta region of Egypt. Evans's hypothesis is still in force today. Of course, both Evans himself³ and modern archaeologists later questioned this version of events. It has been suggested that the Minoans were descended from Bronze Age settlers coming to Crete from neighboring regions, either from the Middle East, Anatolia, or the Cyclades Island, or that the development of the Minoan civilization was indigenous, created from descendants of the original Paleolithic or Neolithic settlers of Crete. The final answer to this archaeological issue was given by molecular genetic analysis of ancient DNA in Minoan remains.⁴

None of the archaic Minoan samples from Crete carried mtDNA sequences of the L haplogroup that characterize African populations. Furthermore, the statistical comparisons of the mtDNA variants illustrated the great genetic distance (i.e. the absence of genetic similarities) between the Minoans and the Egyptian, Libyan, and other African populations. This interesting study instead demonstrates that the Minoan gene pool's strongest genetic relationships are with modern and ancient (Neolithic and Bronze Age) southeastern European populations. In fact, the highest genetic similarity of the Minoans' DNA is observed with Modern Greeks, and especially with the current inhabitants of the Lassithi prefecture, as well as those of the Chios, Euboea, Argolida, and Laconia regions. These results, according to the authors, refute or at least raise convincing doubts about the correctness of Evans's initial theory^{2 3} that the founders of the Minoan civilization were of North African (Egyptian or Libyan) origin. Based on the archaeological

and genetic evidence, it was suggested that the Minoan civilization was native, i.e. created by the Cretans, and therefore European.

7. Conclusions Regarding the Study of the Genetic Heritage of the Greeks

The genetic studies on the structure of the present inhabitants of Greece with various genetic markers have revealed that the Greek population is *panmictic*, which means that marriages were made randomly and there is no substantial stratification into subpopulations. In addition, the inhabitants have higher rates of genetic variation than the people of Central, Northern, and Western Europe. This indicates that various population groups—from the Middle Paleolithic era until relatively recently—moved from the Greek geographical area to Western and Central Europe, and that the area of Greece is at the core of the biological history of Europe's populations.

Interestingly, despite the proximity or even cohabitation of the Greeks with different people, the Greek population does not exhibit a significant recent admixture with other neighboring populations. Thus, although the island of Crete is close enough to accept African genetic penetration, the genetic heritage of the Minoans had a higher rate of affinity with Neolithic, ancient, and current European populations. This result indicates that the Minoan civilization has a European and not an Egyptian origin. Similarly, the Greek refugee population that originated from Asia Minor, and now resides in Greece, shows greater genetic similarity to the population of mainland Greece than the Turkish population. In a broader context, despite four centuries of Ottoman rule, Greeks and Turks have different genetic heritages, since apparently there has been no significant admixture between Greeks and people of Mongolian origin.

All the previous genetic data¹¹ suggests that the genetic heritage of Greeks was created by four main independent migratory population waves corresponding to: (a) the early colonization of Greece by pioneer hunter-gatherer *Homo sapiens* from Africa through the Near East during the Middle Paleolithic era at least fifty-thousand years ago; (b) the population movements from Northern and Central Europe to the warm Balkan glacial refuge of Southern Europe during the last glacial period (nineteen to twenty-five thousand years ago) and the subsequent postglacial repopulation of deserted areas of Central and Northern Europe from the Balkan glacier refuge between 13,500 and 19,000 years ago; (c) the Neolithic demographic diffusion of farmers from the Near East and their

arrival into Greece approximately ten thousand years ago; and (d) the migrations mainly from Greece to the rest of Europe, and vice versa, since the Bronze Age (approximately 3,500 years ago).

Hence, to a great extent, the genetic heritage of the present inhabitants of Greece had already been formed in that distant prehistoric Bronze Age period. It is therefore the descendants of the people who inhabited the area of Greece certainly as early as the third millennium BC and perhaps even earlier who have been expressing themselves in Greek since at least the Mycenaean Era and characterized themselves as Hellenes/Greeks at the end of the Bronze Age.

The genetic data show that the distribution of the genetic markers coincides perfectly with the geographical distribution of the Ancient Greeks in the Eurasian region at the first half of the first millennium BC. This includes southern mainland Italy and Sicily, areas situated to the north of the present Greek borders, covering the southern part of Albania, FYROM, and Bulgaria, and a part of Asia Minor at latitudes projecting up to the city of Trabzon on the Black Sea. Similarly, research projects on the genetic structure of the Italians show a template that it faithfully reproduces the Greek colonization in antiquity. The perseverance of a close genetic affinity between Modern Greeks and the current inhabitants of various areas of Italy that had been colonized by the Ancient Greeks is convincing evidence for their common ancestry.

These patterns of affinity that reflect the dispersion of the Ancient Greeks are repeated in the results of the investigation of the genetic heritage of Eurasian peoples, and demonstrate the durability of the DNA signature of the Greeks. Thus, one could plausibly argue that the genetic investigations document, albeit indirectly, the genetic continuity of the Greeks in space and time.

Roughly three-quarters of the genetic background of Modern Greek DNA sequences signal the genetic fingerprint of human hunter-gatherers who lived in the Greek geographical area as early as the Middle Paleolithic and Mesolithic periods, and about one-quarter of DNA sequences represent farmers who entered what is today Greece during the Neolithic era. The admixture of these population groups basically constitutes the genetic background of Modern Greeks.

The relatively low level of admixture with other human population groups that has been detected in the DNA of the Modern Greeks may be

indicative of genetic isolation due to natural barriers or the cultural, religious, and linguistic characteristics of the Greeks. Of course, the genetic data should in no way be interpreted as reflecting any form of “purity” of the genetic heritage of the Greeks. Additionally, whether a person is Greek cannot be determined using genetic analysis.

Ultimately, the genetic evidence supports the reports of ancient writers about the indigenous origin of the Greeks. The Athenian Orator Isocrates (436–338 BC) said in his Fourth Panegyricus (verses 23 to 24, 380 BC) that he said to the Athenians:

Our city is recognized as the oldest, the largest and most famous in the world. Therefore, being so glorious since the beginning of history, it should be further honored for continuity. Because we who dwell in this city, have not driven others hence, neither have we found it deserted, nor have we gathered here scattered by different peoples. Our origin is so good and genuine, so that in the very land on which we were born, in this we have lived without interruption (forever), because we are indigenous in this place. So we can call the city with the same name one gives to their closest relatives.

The same view was expressed recently by the prominent archaeologist Sir Colin Renfrew^{6 7}: “The Greek culture, Greek beliefs and probably the Greek language developed here, within the land which we know as Greece today, that in that sense the Greeks were autochthonous and were ever in the process of becoming.”

References

1. D. Boric and T. D. Price, “Strontium isotopes document greater human mobility at the start of the Balkan Neolithic.” *Proceedings of the National Academy of Sciences of the United States of America* 110 (2013): 3298–303.
2. A. J. Evans, *The Palace of Minos at Knossos*, Vol. I (London: MacMillan and Co, 1921).
3. A. J. Evans, “The Early Nilotic, Libyan and Egyptian Relations with Minoan Crete.” The Huxley Memorial Lecture for 1925. *Journal of the Royal Anthropological Institute* 55 (1925): 199–228.
4. J. Hughey, et al., “A European Population in Minoan Bronze Age Crete.” *Nature Communications* 4 (2013): 1861.

5. P. Paschou, et al., “Maritime Route of Colonization of Europe.” *Proceedings of the National Academy of Sciences of the United States of America* 111 (2014): 9211–16.
6. C. Renfrew, “II. Who Were the Greeks? A Problem of Ethnicity.” Stanford University, April 31, The Towner Lectures on Human Values, 1993.
7. C. Renfrew, “‘Ever in Process of Becoming’: the Autochthony of the Greeks.” In *The Good Idea: Democracy in Ancient Greece*, edited by J. A. Koumoulides. New Rochelle, NY: A. D. Caratzas, 1996.
8. C. Renfrew, “Archaeogenetics: Towards a ‘New Synthesis’?” *Current Biology* 20 (2010): R162–R165.
9. M. F. Seldin, et al., “European Population Substructure: Clustering of Northern and Southern Populations.” *PLoS Genetics* 2 (2006): e143.
10. C. Triantaphyllidis, et al., “Genetic Relationships Among the Inhabitants of Nine Mediterranean Countries.” *Human Heredity* 36 (1986): 218–21.
11. C. Triantaphyllidis, *The Genetic Origins of the Greeks*. Thessaloniki: Kyriakidis Editions, 2016, 248.

2.

ART AND ARCHITECTURE

2.1

FROM ANCIENT GREEK ARCHITECTURE TO NEOCLASSICAL FACADES: TYPES AND EXAMPLES OF CARYATIDS IN ATHENIAN BUILDINGS

MARIA LENI

HELLENIC MINISTRY OF CULTURE AND SPORTS, ATHENS

Abstract

Ancient architecture, particularly the principles of symmetry and harmony, strongly influenced the buildings of the Modern Greek state, since new public and private buildings were inspired by classical models.

The facades of Athenian neoclassical buildings often have sculpted or plastic decoration; in particular, they are frequently decorated with caryatids. Although, during the classical period, caryatids supported, as an Ionic column, the weight of entablature, the neoclassical caryatids have a more decorative use and usually do not carry heavy weight. Their size and material depend on their functionality, regarding the support they provide to different parts of the building.

Using the development of their bodies as a distinguishing criterion, the neoclassical caryatids can be classified into different types: (a) Full-body caryatids used as pilasters to receive heavy weights; (b) Caryatids placed, from waist down, on a broad-top base; (c) Caryatid busts without arms on a schematic female breast base.

The different types of caryatid form are presented in a series of examples of Athenian architecture, created by well-known or anonymous architects. The increased preference for this exterior decoration form is due to the influence of the caryatids that adorn important monuments, such as

Zappeion, Hotels Bagheion and Megas Alexandros, the Benaki Museum, and the Ziller-Loverdos residence.

1. Introduction

The revival of Greek antiquity values during the Enlightenment period in Western Europe was evident in art and literature. The influence of classical aesthetics was crucial in all aspects of art; it was particularly evident in architecture, which was inspired by the detailed drawings of the eighteenth and early nineteenth-century travelers in Greece and Asia Minor, depicting the architectural remains of antiquity and thus spreading the value of classical civilization.

Neoclassicism was born in Western European urban centers, as Ancient Greek thought and philosophy, logic, and rationalism, the meanings brought by classical education, expressed the values that represented the rising bourgeoisie. The Western European cities were built with neoclassical public buildings, which referred to the principles of justice, and respect for freedom and democracy. Similarly, private neoclassical buildings revealed the economic prosperity, culture, education, and bourgeois origin of the owner.

Neoclassicism in Greece was received uniquely, as it followed the stylistic preferences of Central Europe at first, but afterwards was inspired directly by the existing classical buildings. Therefore, although neoclassicism was a rhythm introduced by the Bavarian rulers and architects, in Greece it gained an additional symbolic value [1]. The new state did not simply follow the Western European artistic trends, but was also the guardian of classical civilization, which was the role model for Western Europe. The new capital, Athens, was decorated with buildings inspired by the classical edifices that stood in the historic center of the city.

For the Greeks, neoclassical architecture was therefore the “natural” continuation of classical art, showing the Western world that they were the heirs of ancient art, the descendants of the original creators. Consequently, for Greece, neoclassical architecture was simultaneously an international and a national style. The neoclassical style acquired a particular symbolism in Greece, so the international neoclassical architecture was perceived as a unique Greek style [2].

Architectural design in the developing urban centers of the new state had found its models both from Western cities and standing classical

antiquities. Athens in particular, after its proclamation as the new capital, was built with public and private structures referring to classical antiquity, indicating the particular ideological orientation and giving a distinctive cultural identity.

The monuments of antiquity were powerful models, since they seem to have inspired the architects who attempted to repeat their style [3]. Doric columns appear on many facades and also in the interiors of Athenian residences and commercial buildings. Often deprived of their initial function of holding the weight of the entablature, Doric columns or half columns stand as pilasters, usually with a more decorative than functional role. In the same way, Ionic columns play a similar part, decorating the facades and offering them a monumental character.

The imitation of classical creativity appears particularly in repeating certain monuments of classic architecture, which seem to have had a profound effect on the nineteenth-century architectural inspiration. Two characteristic monuments of classical Athens—the choragic monument of Lysicrates (335–334 BC) and the clock tower of Kyrristos (first century BC)—show that, probably due to their particular shape, they inspired architectural design [4]. The cylindrical body with Corinthian columns of the choragic monument and the octagonal shape of the hydraulic clock tower were repeated in several buildings, many of which were demolished during the 1960s and 1970s.¹ It is worth mentioning that both monuments inspired architects in Western Europe and the United States since the eighteenth century, as they had become well known through travelers' designs [5].

Female sculpted figures are quite common on the facades of public and private buildings in the Athenian center, dating from the second half of the nineteenth century. The caryatid forms that enhance the monumentality of buildings had already appeared in Western European capitals, mainly in public architecture. The caryatids of the Erechtheion have become the main source of inspiration, both at the interiors, as sculptor Jean Goujon's "room of the caryatids" in Louvre proves, forming a Renaissance imitation (1550) of the model, and on the facades and entrances, as shown by the caryatids of the new church of St Pancras in London, built in 1819–22 by architects William and Henry William Inwood.

In modern Athenian architecture, female sculpted figures seem to have appeared repeatedly in different types during the second half of the nineteenth century. Although they do not have a single form, they appear

to be constantly selected by particular architects inspired by both the authentic ancient models and their Western versions. This paper will attempt to examine these female decorative forms, classify them, and identify their models.

2. Purpose and Research Methodology

2.1. The purpose of research: questions

The decoration of the facades of neoclassical or eclectic buildings has been studied by researchers. Focusing on a special feature of the facades, for example the different types of caryatids, facilitates their classification and the research of their models. This paper will attempt to separate the different types of sculpted or plastic female figures of neoclassical facades and categorize them. The goal is to examine the models effectively and search for a possible association with a specific period. It is also worth examining whether the selection of each type relates to the construction cost of the building they are decorating. Finally, the identity of the architects who frequently use types of caryatids at the facades will also be studied.

Therefore, the research questions could be summarized as follows:

- What are the different types of caryatids and during which period were they popular?
- Which edifices were the models of this architectural decoration?
- Is there a correlation between the types of caryatids and the building construction cost?
- Which architects prefer to decorate their buildings with these forms?

2.2. Research methodology: case study

Examining the different types of caryatids on neoclassical building facades in Athens, as well as the categorization of their architectural model, requires a sufficient study of the city's neoclassical monuments. The information used has been collected from fieldwork and bibliographical research. The buildings examined were the important ones for the purposes of this research. The method used is empirical, based on observation.

Although caryatids are common in the architecture of almost all the cities of the Modern Greek state, this study will focus on the neoclassical buildings of Athens. The geographical restriction aims at a more effective management of the sample; moreover, the research will not be affected negatively since in Athenian architecture all types are represented.

2.3. Research problems: terminology issues

Usually, references to sculpted or plastic female forms on the facades of neoclassical buildings use the terms “caryatids” when they appear in a full-body or nearly full-body representation. The terms “Hermai—Caryatids” [6], “Hermai,” or “Hermai with bases” are used when they consist of a column with a female head [7]. However, even if they do not hold the weight of the entablature, as with the caryatids of the Erechtheion or of the Treasure of Sifnos, these sculptures are different from Korai or Hermai that do not carry any weight. Even if their role is decorative and they do not support the entablature and other architectural parts, their characteristic is that they seem to carry the weight of the upper part of the building on their heads. They have the same structural role as a column. Therefore, we use the term “caryatid” for all types of female forms that appear to hold the entablature, regardless of the development of their body. The decisive factor is whether they appear to support, as a column, the weight of an architrave or a pediment.

3. Types of Caryatids in Modern Athenian Buildings

The caryatids on the facades of Athenian buildings differ from each other in material and form. The marble caryatids decorate the large-scale public buildings, such as the circular atrium in Zappeion Megaron, while the smaller private buildings prefer the ceramic versions. The ceramic materials have low costs, while achieving the architect’s objective, namely the presence of sculptural decoration on the facades or in the interior of a building [6]. Ernst Ziller himself noted that the ceramic used in modern buildings was just as solid as the marble sculptures, and he used them in a series of monumental architectural structures such as the Psycha, Vouros, and Mela residences, and other important buildings [7].

●rganizing the typology of caryatids in modern buildings is based on the size of their torso. Using as a distinguishing criterion the development of their bodies, the neoclassical caryatids can be classified into different types. Full-body caryatids used as pilasters and giving a monumental

character to the building are rather rare. Typical examples are the caryatids at the entrance of the National Theatre on Koumoundourou str., built by E. Ziller during the period 1891–1901. The perfectly frontal posture, without any movement of the feet, and their arms crossed under the breasts refer to building decorations in Central Europe.

Caryatids supported from the waist down on a base or a “case” that broadens towards the top are more common. These female sculptures have Western European models, their breasts are naked and their arms are crossed beneath them, while their garment is loosely tied at the hips. Instead of legs, there caryatids have a column with a narrower base that broadens up towards the hips.² Well-known examples are the decorations of Hotels Bagheion and Megas Alexandros in Omonia sq., designed by E. Ziller during the period 1889–94. The caryatids of the vernacular house on 45 Ag. Asomaton str., created by sculptor John Karakatsanis in the early twentieth century, were inspired by the same models.

Most sculptures belong to the third type—the caryatid’s head is placed on a base that widens towards the top, having a schematic torso without arms. Actually, they are female busts supporting an architrave or other architectural parts. The base is usually a column with a reversed pyramid shape, often decorated with garlands and other floral ornaments. This type is common enough and adorns both private and public buildings. Characteristic are the facades of the Melas residence, the Ziller-Loverdos residence, and the former Hotel Excelsior, all designed by E. Ziller and constructed during the period 1874–1910. The same type inspired architect Anastasios Metaxas in the facades of the Orphanides residence at 56 Amalias Av. and the Benaki Museum during the decade 1900–10. The type is repeated in other Athenian edifices, such as the building on Satovriandou and 3rd September str., and the house on 10 Pindarou str.

The chronological examination shows that the earliest examples seem to be the heads of the caryatids at the Zappeion atrium, as well as the ones at the Mela residence. The architectural plans of Zappeion were originally drawn by François Boulanger, but did not materialize due to delays. The construction began in 1874 according to Theophil Hansen’s modified designs, under the supervision of E. Ziller. The circular atrium is surrounded by thirty-two Ionic columns, while on the second floor the columns have been replaced with caryatid heads on a base, supporting the circular architrave. The Mela residence on Aeolou, Kratinou, Straight and Sophocles str., designed by E. Ziller, dates from the same period. The

caryatid heads on the buildings seem to have affected the architectural creation.

4. Conclusions





The correlation of the caryatid types with the construction date of the building they decorate, as well as the architect who designed it, is going to help answer the research questions. This research of Athenian buildings is not exhaustive, but indicative of architectural trends and options of the late nineteenth and early twentieth centuries. Table 1 below therefore shows these relations schematically and helps to come to some conclusions.






The decoration of facades with sculpted or plastic female figures that support the weight of the architrave seems to have appeared in the last quarter of the nineteenth century and lasted until the early twentieth century and the gradual predominance of the modern movement. Since there are no samples of caryatids during King Otto's period, it seems that their use in Athenian architecture did not interest the first Bavarian and Greek architects, who used in their compositions the ancient symmetry, balanced structure, and strict morphology, highlighting elements of the Doric and Ionic style. The caryatids of the modern period give the facades a monumental character, referring to the characteristics of classical temples.




Selecting the third type, the caryatid heads, that have a smaller size compared to the other two types, does not correlate with the building's construction costs since this type, besides the smaller constructions, often decorates large buildings with marble components and costly construction.

The introduction of caryatids in modern Athenian architecture can be attributed to the architects of Central Europe. The firsts to use these types of decorative caryatids on Athenian buildings seem to be Th. Hansen and E. Ziller. The former had already used some in Vienna. Moreover, contemporary with the Zappeion Megaron and having many similarities was the building of the Austrian Parliament with a series of full-body caryatids designed by the same architect. E. Ziller continued using these female figures and included them in many of his architectural creations. In addition, he collaborated with Dimitrios Sarris's ceramic workshop, which he supplied with caryatid drawings and other architectural decorations. Architect An. Metaxas, who had worked with E. Ziller, continued using decorative caryatids in his large-scale projects.

Table 1. Types of Caryatids in Modern Athenian Buildings

Name of the building / Address	Image	Type of caryatid	Construction Date	Architect
Zappeion Megaron		caryatid bust on a column/ case	1874–88	F. Boulanger Th. Hansen E. Ziller
Mela Residence, 93 Aeolou and Kratinou str.		caryatid bust on a column/ case	1874	E. Ziller
Ziller-Loverdos Residence, 6 Mavromihali str.		caryatids' bust on a column/ case	about 1882	E. Ziller
Megas Alexandros Hotel, Omonia sq.		caryatids up to the waistline	1889	E. Ziller

Bagheion Hotel ●monia sq.		caryatids up to the waistline	1890–1994	E. Ziller
National Theatre, 22 Ag. Konstantinou str.		full-body caryatids	1895–1901	E. Ziller
45 Ag. Asomaton str.		caryatids up to the waistline	about 1900	(sculptor I. Karakatsanis)
●rphanides Residence, 56 Amalias Ave.		caryatid bust on a column/case	1900	An. Metaxas
10 Pindarou		caryatid busts on columns/cases	end of nineteenth to beginning of twentieth centuries	

12 Satovriandou and 3rd September str.		caryatid busts on columns/cases	end of nineteenth to beginning of twentieth centuries	
Benaki Museum, Vas. Sophias and 1 Koumbari str.		caryatid busts on columns/ cases	1910	An. Metaxas
Former Hotel Excelsior, 68 Panepistimiou str., ●monia sq.		caryatid busts on columns/ cases	1910–14	E. Ziller

Referring to the *korai* of the Erechtheion, as well as to the perception of the classic past through Western Europe, neoclassical caryatids are harmonized with the archaeological sites of Attica and bridge over twenty centuries of Athenian architecture.

References

- [1] P. Mylonas, “Architectural Classicism in Modern Greece: The Historic and Aesthetic Significance.” In *The Neoclassical Athens of Pavlos Mylonas: Drawings 1941–1955*. Athens: Benaki Museum, 2000.
- [2] E. Bastea. *Athens 1834-1890: Neoclassical urban planning and Greek national consciousness*. Athens: Libro, 2008.
- [3] M. Biris and M. Kardamitsi-Adami, *Neoclassical Architecture in Greece*. Athens: Melissa, 2001.
- [4] M. Biris, *Half a Century of Athenian Architecture 1875–1925*. Athens, 1987.
- [5] J. Stuart and N. Revett, *The Antiquities of Athens: Measured and Delineated*. London: Priestly and Weale, 1825–30.
- [6] D. Orphanoudakis, *Caryatids of the 19th Century in Greece*. Athens: Tsipopoulou, 1983.
- [7] E. Ziller, *Pottery Samples for Architectural Decoration and Other Useful Projects from Dimitrios Sarris’ Laboratory in Athens*. Athens: Culture, 1977.

Notes

- ¹ Typical examples were the buildings on 25–27 Filellinon and Simonides St., Evangelides’s residence in Exarchia, Stoumari Mansion on Vas. Sofias Avenue, etc. The hotel “Prince George” on Aeolou and Stadiou St. is still standing, having a modern usage.
- ² Caryatids of this type decorate the Muzikverein concert hall in Vienna (1867–9), according to Th. Hansen’s architectural designs. The room is adorned with golden caryatids in a “case” from the line of the hips, with arms crossed under their naked chests.

2.2

OLYMPIAN BODIES IN LENI RIEFENSTAHL'S *OLYMPIA: A STUDY ON MEMORY AND IDENTITY*

KATERINA ZISIMOPOULOU

DOCTORATE CANDIDATE NTUA,
ARCHITECT MARCH. MSc DIPL. ENG. RIBA ARB TCG

As the museum closed late at night
Deidamia descended from the pediment
Tired of the tourists
she took her hot bath
and spent a long time in front of the mirror
combing her golden hair.
Her beauty was
forever halted in time ...

“The Statue and the Craftsman” by the Elian poet Giorgis Pavlopoulos
Collection *Master Keys* (1988), translated by the author

Abstract

Leni Riefenstahl's *Olympia* film is analyzed as a case study, commencing with the artist and her personality, the influences that inspired her, and the film itself. The research has focused on the personality and work of the German director Leni Riefenstahl, as she was inspired by Ancient Greek myths and archetypes of beauty and virility. The influence of Ancient Greek artistic thought and athletic ideals determined the identity of the artist and consequently the work of art produced. The impact of Ancient Greek concepts, myths, and art on *Olympia* film is particularly evident during the film's prologue. Filmmaker Leni Riefenstahl manipulated her own persona during the interwar period as the unconventional heroine of the film industry, a merged synthesis of Diotima's adaptation, depicted as a mysterious priestess dancer, (He) Leni beautiful, a woman of National

Socialist Germany, and Amazon Queen Penthesilea, the perfect German woman, an exceptional female athlete who competed with men as their equal. Respectively, the narrative of *Olympia* was manipulated by the National Socialist regime to derange the scope of the 1936 Olympic Games in Berlin and exploit the Ancient Greek athletic ideal to spread its interwar propaganda.

Riefenstahl managed to take full artistic credit for the success of the film, and the main responsibility for its outcome as well. Nevertheless, the artwork is not merely analyzed as the creation of the artist, but also as an object that expresses its epoch and subsequently embodies its time's predominant ideals. The film represents these ideals in a space that expresses them. As a work of art, *Olympia* uses Ancient Greek myths that embody both the artist's personality and the collective identity of its time. The prologue is composed of carefully directed fragments of representations of Ancient Greek architecture and art icons. The film presents them to the modern world as a new narrative representation of mythical ancient male and female gods, heroes and athletes, and carefully selected masterpieces of Greek, Hellenistic, and Roman art. The story of an imaginary *Olympia* is registered in the viewer's collective memory through modern cinema. The film intends to use this registry in order to link the modern and contemporary world to the ancient world, its concepts and ideals.

Parts of the prologue of *Olympia* were filmed on June and July 1936 in Greece, while preparation ceremonies for the Olympic Games were taking place. Is this true action or staged action? Is it a documentary film or fiction? We shall investigate these questions looking into the scenes of the prologue that precede and follow the Olympic torch relay from *Olympia* to Berlin; these scenes constitute a politically structured imaginary, ceremonially directed place for the history of art and cinema. Where were these scenes actually filmed? Why did Riefenstahl choose to shoot parts of the film in Delphi? Did she come to that decision under the influence of the Greek photographer Elli Sougioultzoglou-Seraidari (also known as Nelly's)? The Ancient Greek ideals of female body beautiful and male body virility are represented in the film in consecutive fractal extracts. Where did Riefenstahl and her crew search for the representatives of these ideals while they were in Greece?

The questions that emerge when analyzing *Olympia* remain as timely as they ever were. The journey towards the valid answers forces us to explore aspects of modern self and identity, travelling through time back to ancient Greece.

1 Introduction

As a young child in the early 1980s I used to visit the archaeological site of Olympia every once in a while, along with my family, friends and their children. Usually, there were Germans or Austrians visiting the Peloponnesian land and the famous place of the Olympic Games, and we all took an imaginary road trip following our motorized interpretation of Pausanias's footsteps in Helia.¹ Us children could not really talk to each other, as we did not speak each other's native language, but no one could stop us from playing "catch me if you can" or "hide and seek" in the open grounds of Olympia. Our games never lasted long enough because parents and guards cannot always appreciate sports even at the birthplace of athletics; they like to keep it quiet and under control. I think I will never forget the awkward feeling of dirt and pine needles mixed with the sand and salt of the nearby beaches in my shoes and a sense of shame for not paying full respect to a sanctuary. Nevertheless, Olympia has always been to me a place near home, a favorite land at close distance, reachable, accessible, and memorable.

1.1 Leni Riefenstahl as Diotima, Heleni, Penthesilea

Since I watched the film *Olympia*, directed by Leni Riefenstahl in 1936, my own experienced land of Olympia, the actual landscape of the archeological site approached from an architectural perspective during the years of my study as an architect and the imaginary space sequences of Olympia represented in *Olympia*'s prologue, all three spaces have been negotiating in my mind ever since. My personal research interests have specifically focused on this particular modern film of the interwar era, directed by a woman, the ambiguous Leni Riefenstahl. The German film director's whole career was inspired by Ancient Greek mythical heroes and timeless athletic ideals. The classical allusion projected on Riefenstahl's extravagant persona perceives the director as a woman building her identity and professional life through the Ancient Greek beauty ideal, bodily culture, and athletics. In her memoirs, she evolves from an unknown actress playing "Diotima," the mysterious dancer,² to the director "(He) Leni beautiful" of interwar Nazi Germany, or actor and director "Penthesilea," a female idol of aggressive perfection [1]. Director Arnold Fanck's Diotima, in Brigitte Peucker's words, "conjures up the Diotima of Hölderlin's Hyperion (1777–9) as well as her model, the priestess in Plato's Symposium whose role is to explain both the nature of

love as well as the connection between the beautiful body and the ideal” [2].

Riefenstahl’s attraction to beauty and harmony translates the Platonic ideal of the beautiful and erotic into modernity and the modern art of photography and film. National Socialist Germany’s political objective manipulated the narrative of the 1936 Olympic Games in order to spread the prewar National Socialist propaganda, which identified with Riefenstahl’s ambitious personality perfectly. The perception of politics as art, the “aestheticization of politics” [3], is presented in Riefenstahl’s *Olympia* through male virility and female beauty as timeless ideal representations. These are analyzed herewith in order to study the image of Ancient Greece and *Olympia* projecting on an artwork in the context of the cultural production of the interwar period.

2 Interwar Germany and the Greek Temple

Many years after the 1936 Olympic Games, Riefenstahl, when interviewed for *Spiegel* by journalists Schreiber and Weingarten in 1997, expressed her aversion towards reality.³ When the journalists asked her, “If you photograph a Greek temple and a rubbish heap is next to it, would you leave out the rubbish?” Riefenstahl replies, “Absolutely. Reality does not interest me” [4]. If we consider the most influential films she has ever directed, which are of the Nazi party rally and the Olympic Games [5], this is quite an astonishing assertion, coming from a director of mainly documentaries about real events considered to have been filmed “live,” while real-time action was actually taking place.

Why did the journalists who interviewed Riefenstahl in 1997 ask her about an Ancient Greek architectural monument and the annoying rubbish heap that ruins the perfect frame? Why was that example chosen out of many? How is it possible for one of the best directors of documentary film in the world to admit to being completely uninterested in reality? Is it acceptable for film to create art at any cost, even at the cost of truth?

2.1 *Olympia*’s Prologue, Ancient Art in Motion

The only film Riefenstahl directed that includes Greek temple scenes is *Olympia*, in the prologue of part 1, “Celebration of the People.” The only time Riefenstahl ever visited Greece for filming, according to her biographies and memoirs, was on July 1936 for less than a week.⁴ *Olympia*’s prologue represents the birth of humankind, the myth of

genesis. According to Dr. Stephanie Grote: “The Fest der Völker begins with shots of the peoples of ancient Greece, the ‘birthplace’ of the ●lympic Games. Classical ruins, Doric columns, ancient temple sites, and images of the statues of Greek deities as silent witnesses of past times” [6].

The analysis of the film’s prologue in scenes shows a sequence of Greek temple images for approximately 194 seconds from 1’06’’ to 4’20’’, which diagrammatically could be described as an imaginary tour through ●lympia for a few seconds, the Erechtheion (supposedly filmed at dawn, camera facing east, but most probably a sunset in reverse), ●lympia again, and Delphi, the Parthenon, Propylaia, the Erechtheion again from a different angle to include the Caryatide porch, the Doric colonnade of the Parthenon, and an end to the scene with the exquisite Pendelikon marble portrait of Alexander the Great from the Acropolis Museum under the Dorian columns of the Parthenon. Three minutes and fourteen seconds are enough to connect Riefenstahl to the Greek temple in the collective memory for ever.

The narrative of the ●lympic Games is connected to the Greek land of ●lympia; the film could be characterized as a modern epic documentary linking Germany to Ancient Greece with the ●lympic torch relay and ceremonies.

Seeking answers in the film sequence and background story itself, letting the artwork speak for itself and the creator, I believe that it is worth the effort to analyze Riefenstahl’s and the era’s relationship with the timeless Ancient Greek archetypes, the mythical heroes and heroines, and the classical body ideal cultural heritage, no matter how appalling the National Socialist political ideas interwoven into the film may rightfully be to our contemporary culture. Robert Taylor, in *The Word in Stone*, cites Hitler in order to describe the regime’s rules of stylistic imitation for art and architecture: “it is better to imitate something good, than to produce something new but bad” [7]. This takes us back to Winkelmann’s famous argument: “The only way for us to become great or, if this be possible, inimitable, is to imitate the ancients. What someone once said of Homer—that to understand him well means to admire him—is also true for the art works of the ancients, especially the Greeks” [8].

For the purposes of this analysis and through the lens of the formalist approach of an aesthetic distance, ●lympia and especially the film’s prologue reverts Winkelmann’s hermeneutic “Kunstmythologie” method, i.e. “his method of interpreting ancient mythological imagery, which in the

nineteenth century was referred to as Kunstmythologie” [9]. Nikolaus Himmelmann in his book *Reading Greek Art*, describes the Winkelmann method of interpreting ancient art imagery through myths. In *Olympia*, we will analyze how Riefenstahl creates ravishing moving images as modern art through timeless myths.

3 The Male Sculptured Body: Herculean Power

The transition from the myth of birth to the superhuman athletes of humankind in *Olympia*'s prologue is achieved through the resurrection of the famous statue of the Discobolus (a discus thrower) created by the ancient sculptor Myron of Eleutherae. The statue filmed for *Olympia* is a Roman marble copy of the original bronze, known as the *Lancelotti Discobolus*, and is represented from a fixed viewpoint for approximately four seconds before it moves to a real athlete, German decathlete Erwin Huber. The athlete comes to life; marble becomes flesh, and he gradually begins to move and eventually throws the disc. The scene was shot most probably in September 1936 in Curonian Spit, the land that separates the Curonian Lagoon from the Baltic Sea coast, near the Latvian border, as Getty Images and the Hulton Archive attest. The mise-en-scène included a glass-glazed wooden frame where the outline of the statue's selected viewpoint was literally drawn in full size in order to ensure that the human body of the athlete would assume the exact same position, within the border of the camera's frame. The co-director of the film's prologues, cinematographer Willy Zielke, must have used great quantities of smoke powder and plenty of Vaseline for the statue and the athletes to create the mystic atmosphere [10].

Riefenstahl's Discobolus was not the first attempt to regenerate modern art on ancient artwork paragons. Greek photographer Nelly's, or Elli Souyioultzoglou-Seraidari, had photographed her Discobolus in Delphi in the late 1920s,⁵ most probably during the Delphic Festival revival organized by Eva Palmer-Sikelianos and Angelos Sikelianos. Archeologist Dimitris Damaskos, in his paper *The Uses of Antiquity in Photographs by Nelly: Imported Modernism and Home-grown Ancestor Worship in Inter-war Greece*, discusses the influence that Riefenstahl took from Nelly's in *Olympia*, and Irene Boudouri implies that the two of them might have met in Greece during the shooting [11], though this has been not been confirmed.

Andrew Stewart, in *Art, Desire and the Body in Ancient Greece*, remarks clearly that “the Greek male body was of course the rule” [12]. The social

gender structure in Ancient Greece consists of a hill to climb, a goal to achieve, a trophy to win. Stewart quotes Simonides of Ceos (verses also mentioned in Plato's dialogue Protagoras): "it is difficult to become (a) truly excellent (man), four-squared in hand and foot and mind, formed without blemish." Riefenstahl in *●lympia* promotes this perfect image as the immaculate objective, and sanctifies the constant struggle to reach the goal of personal perfection in body and mind. In Susan Bordo's words: "even the most shallow representations ... discloses a moral ideology one, in fact, seemingly close to the aristocratic Greek ideal described by Foucault in *The Use of Pleasure*. The central element of that ideal ... is 'an agonistic relation with the self' aimed ... at a 'virile' mastery of desire through constant 'spiritual combat'" [13].

Athletics in *●lympia* map the way for the spirit of all to fight for excellence. However, the female mythical iconic idols exemplified in the film to glorify beauty differ significantly from the male ones, though they are complimentary in order to successfully produce their effect for the desire to reach perfection under a leading guidance.

4 The Female Body Beautiful Dance: Erotic Grace

Stewart quotes Roland Barthes: "the signs that try to pass as 'natural' ... in reality have the most intense ideological burden, because they attempt to foist culture as nature" [14], in order to describe the processes through which the Greeks and we ourselves look at artwork. In *●lympia's* prologue, the female bodies take their lead from the male ones in a ceremonial choreography that represents the lighting of the ●lympic torch. Following the discus, spear, and sphere-thrower athletes, nude female dancers perform ball, rope, ribbon, and hoop gymnastics exercises in a natural landscape under the windy, cloudy sky, in front of trees and reflecting waters. Then they form a group of three and perform expressive dance choreography under a foggy sky that debilitates a central light, maybe the sun, before they are covered with flames of fire.⁶ Wind, flora, water, light, sun, and fire—nature integrates with the female naked bodies only to verify the relegation of the latter as part of the domain of nature.

The female bodies of *●lympia's* prologue are filmed differently than the male bodies. Stephanie Grote vividly draws the lines of the comparison:

The transition to the naked female bodies in the following scene is accompanied and highlighted by the change of rhythm in the music. Resembling pagan incantation rituals, the movements of the dancers are

harmonious, graceful, shallow and localised; they are in harmony with nature, along with images of swaying grasses on the beach. L. Riefenstahl reinforced the gender issue using perspective. While the camera captures the gymnastic exercises of the filmed women (...) in horizontal plan view, L. Riefenstahl contrasts this impression with the consistently low vertical view of the male athletes ... This representation suggests strength, fighting spirit, space conquest and force of nature almost divine attributes. [15]

The female bodies that represent female erotic grace in *Olympia's* prologue are moving under the forces of nature. Moreover, the faces of the female temple dancers are hardly recognizable. They remain obscure under the chosen light, wind, and smoke conditions, filmed from an angle that hinders definite identification. The objective of the director in this choice is to transmit a sense of passive docility to the female body, which is rendered submissive—the female dancers willingly surrender their personal identity to the harmonious geometry of the exercise and the totality of nature. The resemblances of the images of the nude female temple dancers in *Olympia's* prologue to photographs by Nelly's of Mary Wigman's expressive dancers are striking. The natural landscape backdrop, the female bodies captured in graceful dancing motion, and the tripartite complex of Riefenstahl's temple dancers performing geometric repetitive gestures refer to the Delphic Festival's chorus lines as represented in the photographs of Nelly's, imitating Ancient Greek pottery images and terracotta dancing figurines⁷ that influenced both Wigman's and Palmer's choreographies.

This ceremony in the view of Stewart's argument takes us to Laura Mulvey and *Visual Pleasure and Narrative Cinema*. Mulvey argues that "pleasure in looking has been split between active/male and passive/female" [16]. In the line of Mulvey's scopophilic argument, the *Olympia* prologue's nude women dancers "are simultaneously looked at and displayed, with their appearance coded for strong visual and erotic impact." They somehow interrupt the diegetic process of the prologue to symbolize nature in the story; they intervene between the first male athletes' active competing and the torch relay, and "freeze the flow of action in moments of erotic contemplation." Hence, women viewers of the female beautiful figures in *Olympia's* prologue are exposed to the passive docility of the women performing fragmental rhythmic gymnastic exercises as symbolic dancers to be watched performing out of context.

5 Conclusion: Olympian Bodies and the Collective Memory

Leni Riefenstahl was a creator of beauty in art and also a modern emancipated woman. She directed *●lympia*, manipulating beauty in a way that transcends binaries and dilemmas. Her directing speaks of a female consciousness and identity which are not to be unambiguously defined by such dualist axes as subject/object and spectacle/spectator. It is not so easy with Riefenstahl's work to separate action and spectacle using Mulvey's active/male and passive/female split. Riefenstahl has placed her definite personal erotic gaze on the male athletes she films. Male bodies are indeed treated as spectacle in *●lympia*, as well as the paragons for men to imitate. However, modern women, like ancient Kallipateira [17], can put their gaze on the male protagonist, since they are not banned from the modern ●lympics or their film, but preferably do not get emancipated in the process—they would much rather identify with the women dancers “as (passive) raw material for the (active) gaze of man ... [as] demanded by the ideology of the patriarchal order” [18]. There is a profound distinction between male athletes and female dancers in *●lympia*'s prologue, a distinction not to be discharged without circumspection: athletes aim to win, while dancers aim to entertain. So the split between active/male and passive/female representation in *●lympia* remains valid in content, even if the scopophilic gaze is playfully interchangeable between male and female viewers.

Riefenstahl in *●lympia* treats male and female bodies differently, but still spectacularly, in accordance to what Brigitte Peucker, in her book *The Material Image: Art and the Real in Film*, characterizes as the “anti-Eisensteinian principle of accretion.” Riefenstahl's editing style is, according to Peucker, based on an organic theory of art whose governing structure is wholeness: “As in a kaleidoscope, patterns ... change but yet in some sense remain constant: in substituting for narrative, movement and editing merely replace one form of spectacle with another” [19].

●lympia, edited as spectacle after spectacle in a kaleidoscopic manner, produces a modern artwork based on timeless Ancient Greek models of male and female archetype bodies. The structure of the prologue reveals the impact of classical antiquity on modern narratives in art and culture. Nudity, in the case of Riefenstahl's athletes and dancers, vividly exposes the plasticity of the body in controlled stylized serial motion, aiming to emulate the aesthetic effect created by Ancient Greek sculpture and the material texture smoothness of marble. Stewart turns to John Berger's

remark that “nudity is a form of dress” [20] to discuss the naked body in Ancient Greek art. In *Olympia*'s prologue the naked body becomes an object of gaze in order to transform to a nude representation and a dress of marbled plasticity in stylized motion.

The will in the film to intentionally transform and shape the collective memory tends to use bodily movements as structured narratives and architectural monuments as landmark settings. Moving bodies and monumental architecture, as represented in the film, form a narration that negotiates issues of memory in time and space. This cinematic mechanism that generates collective memory reconstructs the past, taking a given present time primarily into account. Ancient *Olympia* in the film generates, stimulates, and attributes meaning to the collective memory of the viewers as well as their modern ideology and conscience. *Olympia* emerges after the prologue as an archeological landscape landmark, but also an imaginary place where political athletic and architectonic ideas meet. When we discuss the film and the prologue now, we analyze the historical past of the time the film was made, and reveal the social and political necessities that generated the film, but we also discuss the social and political needs of the present time that make the specific film pertinent. While discussing the interwar period we cannot help discussing the similarities and disparities to the present social and political situations. Exactly as the past is shaped—when history is written and a story narrated—with the present political needs in mind, or in Pantelis Lekkas words “all that happens in the name of the past, changes it as well, since they totally reshape its perception in retrospective” [21], the future could be prescribed as the continuous creative line of the dominant political narration. The questions that emerge when analyzing *Olympia* are still as timely as they ever have been. The journey towards the valid answers forces us to explore aspects of modern self and identity, travelling once again through time back to ancient Greece.

References

- [1] About Leni Riefenstahl (Heleni and Penthesilea) and an analysis of the classical allusion projected in her persona see “*Olympia* Film: the *Olympic* Narrative, (He)Leni's Myth and the Ancient Greek Beauty Ideal” pages 3-6 in the following conference proceedings link <https://lekythos.library.ucy.ac.cy/bitstream/handle/10797/6210/ISSEIproceedings-Katerina%20Zisimopoulou.pdf?sequence=1>.

- [2] Brigitte Peucker, *The Material Image: Art and the Real in Film* (Stanford, CA: Stanford University Press, 2007), 57.
- [3] About the aestheticizing of political life see Walter Benjamin, "The Work of Art in the Age of Its Technological Reproducibility," in *The Work of Art in the Age of Its Technological Reproducibility and Other Writings on Media*, edited by Michael W. Jennings, Brigid Doherty, and Thomas Y. Levin, translated by Edmund Jephcott, Rodney Livingstone, Howard Eiland, et al. (Cambridge, MA, London: The Belknap Press of Harvard University Press, 2008), chapter XIX, 41–2; "More than any other art, the art of politics is far removed from the dry theories of the desktop," writes Joseph Goebbels in his article "Will and Way" ["Wille und Weg"—later, the title became "Unser Wille und Weg"], 1 (1931), 2–5, <http://research.calvin.edu/german-propaganda-archive/wille.htm>.
- [4] Mathias Schreiber and Susanne Weingarten, "Realität interessiert mich nicht," *Der Spiegel* 34 (1997), <http://www.spiegel.de/spiegel/print/d-8761533.html>. Translation of the interview extract by Narraway Guinevere, "Control and Consumption: Photographs of Leni Riefenstahl," in *Riefenstahl Screened: an Anthology of New Criticism*, edited by Neil Christian Pages, Mary Rhiel, and Ingeborg Majer-●Sickey (New York, London: Continuum, 2008), 228, note 73.
- [5] *Triumph of Will* (1935) is the best of the three Nazi party rally films; the other two are *Sieg des Glaubens* [*Victory of Faith*] (1933) and *Tag der Freiheit—Unsere Wehrmacht* [*Freedom Day—Our Armed Forces*] (1935). The exact titles of the XI ●lympiad two-part film are ●lympia (Part 1) *Fest der Völker* [*Celebration of the People*], and (Part 2) *Fest der Schönheit* [*Celebration of Beauty*] (1938). "Triumph of the Will and ●lympiad are undoubtedly superb films (they may be the two greatest documentaries ever made) ..." Susan Sontag, "Fascinating Fascism," in *Movies and Methods: an Anthology*, edited by Bill Nichols (Berkeley & Los Angeles, CA, London: University of California Press, 1985), 42. See also "Riefenstahl's position in film history's pantheon has been secured by her two masterpieces, Triumph of Will and ●lympia." Ruby Rich, *Chick Flicks: Theories and Memories of the Feminist Film Movement* (Durham, NC: Duke University Press, 2004), 41.
- [6] Stefanie Grote, "●bjekt" Mensch. Körper als Ikon und Ideologem in den cineastischen Werken Leni Riefenstahls. Ästhetisierter Despotismus oder die Reziprozität von Auftragskunst und Politik im Dritten Reich (Eingereicht von Stefanie Grote an der Kulturwissenschaftlichen)

- (Fakultät der Europa-Universität Viadrina Frankfurt (Oder), 2004), 194, <https://opus4.kobv.de/opus4-euv/files/4/grote.stefanie.pdf> (translated from German by the author).
- [7] Robert R. Taylor, *The Word in Stone: the Role of Architecture in the National Socialist Ideology* (Berkeley, Los Angeles, CA, London: University of California Press, 1974), 39, note 106, quoting Adolf Hitler, Hier Spricht Das Neue Deutschland, Heft 7, Adolf Hitler, Die Deutsche Kunst (1934, 19, S., Scan, Fraktur), 11, <https://archive.org/details/Hier-spricht-das-neue-Deutschland-Heft-7>.
- [8] Johann Winckelmann, “Reflections on the Imitation of Greek Works in Painting and Sculpture,” in *The Art of Art History: a Critical Anthology*, edited by Donald Preziosi (Oxford: Oxford University Press, 1998), 31.
- [9] Nikolaus Himmelmann, “Reading Greek Art: Essays by Nikolaus Himmelmann” (Princeton, NJ: Princeton University Press, 1998), 217, 233, note 6.
- [10] See for instance Peucker, *The Material Image*, 60.
- [11] Dimitris Damaskos, “The Uses of Antiquity in Photographs by Nelly,” in *A Singular Antiquity: Archaeology and Hellenic identity in Twentieth-century Greece, Mouseio Benaki, Third Supplement*, edited by Dimitris Damaskos and Dimitris Plantzos (Athens: Benaki Museum, 2008), 321–36. Damaskos discusses Riefenstahl’s relationship to Nelly’s and Nelly’s photographs of the Diskobolos (discus thrower) (332–3, 326–7). Regarding Riefenstahl’s meeting with Nelly’s, see Irene Boudouri, *Nelly’s: Photographic Approaches of Greek Art in Antiquities, Greece 1925–1939, NELLY’S* (Athens: Melissa & Benaki Museum, 2003), 27, note 95. Further research I have undertaken in the Benaki Museum Photographic Archives and Nelly’s archive has not confirmed that Riefenstahl and Nelly met in Athens in 1936.
- [12] Andrew Stewart, *Art, Desire and the Body in Ancient Greece*, translated by Anastasios Nikolopoulos, edited by Dimos Koyvidis (Athens: Alexandria, 2003), 44.
- [13] Susan Bordo, *Unbearable Weight, Feminism, Western Culture, and the Body* (Berkeley, Los Angeles, CA, London: University of California Press, 1993), 198.
- [14] Stewart, *Art, Desire and the Body in Ancient Greece*, 46.
- [15] Stefanie Grote, “Objekt” Mensch, 197.
- [16] Laura Mulvey, “Visual Pleasure and Narrative Cinema,” in *Film Theory and Criticism: Introductory Readings*, edited by Leo Braudy and Marshall Cohen (New York: Oxford University Press, 1999), 837.

- [17] Kallipateira was the woman who successfully violated the ban on women's presence at ●lympia in ancient times. See, for instance, David C. Young, *A Brief History of the ●lympic Games* (●xford, Malden, Carlton: Blackwell, 2004), 107, 120; Georgia Emm. Chatzi, *The Archaeological Museum of ●lympia* (Athens: ●ikos, 2008), <http://www.latsis-foundation.org/ell/electronic-library/the-museum-cycle/to-arxaiologiko-mouseio-olybias>: "The unknown artist uniquely depicts the mixed feelings of attraction and repulsion in the expression of the beautiful Lapith woman", 233.
- [18] Mulvey, *Visual Pleasure and Narrative Cinema*, 843.
- [19] Peucker, *The Material Image: Art and the Real in Film*, 49.
- [20] ●quote from John Berger, *Ways of Seeing* (London: British Broadcasting Corporation and Penguin Books, 1972), 54. See also Stewart, *Art, Desire and the Body in Ancient Greece*, 71.
- [21] Pantelis E. Lekkas, *Playing with Time: Nationalism and Modernity* (Athens: Hellenika Grammata, 2001), 223 (translated from Greek by the author).

Notes

¹ Referring to Pausaniou Hellenos periegesis, Heliaka, Ekdotiki Athinon in Greek and Ancient Greek. A copy of the book remained in the car all summer long and a home-recorded audio cassette tape of Helia's periegesis was frequently played on the journey to my discontent as a child.

² Leni Riefenstahl, *Memoiren 1902–1945 Zeitgeschichte* (Frankfurt M, Berlin: Ullstein, 1994), 158: Referring to her first meeting with Hitler and her dance in the role of Diotima in Fanck's film *The Holy Mountain*, she writes: "He [Hitler] enthusiastically spoke of my 'dance by the sea', and said that he had seen all the movies in which I had acted" (translated from German by the author).

³ The readers of her biographies can judge for themselves if the argument is valid for her life as well as her art. I have worked with the following: Jürgen Trimborn, *Riefenstahl: eine deutsche Karriere* (Berlin: Aufbau-Verlag, 2002); Mario Leis, *Leni Riefenstahl* (Hamburg: Reinbek, 2009) and *Leni Riefenstahl: The Power of Will*, translated by Ioanna Avramidou (Athens: Melani Publications, 2011); Steven Bach, *The Life and Work of Leni Riefenstahl* (New York: Alfred A. Knopf, 2007); Leni Riefenstahl, *Memoiren 1902–1945 Zeitgeschichte* (Frankfurt M, Berlin: Ullstein, 1994) and *Wild Century: Autobiography*, translated by Tonia Kowalenko (Athens: Terzo Books, 1996). Also consulted were: *Leni Riefenstahl, the Seduction of a Genius* by Rainer Rother, *A Portrait of Leni Riefenstahl* by Audrey Salkeld, *Leni Riefenstahl* by Renata Berg-Pan, *Leni Riefenstahl. Schauspielerin, Regisseurin und Fotografin* by Charles Ford, *The Films of Leni Riefenstahl* by David B. Hinton, and *Leni Riefenstahl and Olympia* by Cooper C. Graham.

⁴ According to my research at the open Greek Press archives in the Library of the Greek Parliament, Riefenstahl came to Greece on Saturday July 18, 1936, and

probably returned to Berlin on the 23rd. She personally supervised the shooting of the Olympic torch lighting in Olympia, which took place on Monday July 20, 1936, and part of the flame relay in Greece. The newspaper *Kathimerini*, on the issue of July 19, 1936, published a front-page interview with Leni Riefenstahl titled "Leni Riefenstahl in Athens." However, her crew arrived in Greece much earlier, most probably in June or May, in order to make the necessary preparations and begin shooting the film in various locations, including archaeological sites and museums. Finally, Riefenstahl has visited close relatives who have been living in Salonica and Chalkidiki later in her life, though this visit did not receive wide publicity.

⁵ Referring to the two photographs that the Benaki Museum Photographic Archives have catalogued with the codes N_1821 a, N_1821 b, labeled "Athlete, Delphic Festival" when published in Deny Euthymiou-Tsekoura, Klimentini Vounelaki, and Irene Boudouri's, *Nelly's: Body and Dance* (Athens, Kalamata: Atras Publications, Ammos Publications, Benaki Museum, Kalamata International Dance Centre, 1997), 102-3, not defining if the photograph was taken on the first Delphic Festival in 1927 or the second in 1929-30.

⁶ Starting from minute 8'37" and ending at 11'02".

⁷ See, for instance, the Ancient Greek terracotta dancing girl (350 BC) exhibited at the British Museum, the "Furious Maenad, carrying a thyrsus and a leopard, with a snake rolled up over her head," Ancient Greek Attic white-ground kylix (490-480 BC) from Vulci, exhibited at the Staatliche Antikensammlungen Munich, Germany, and the Ancient Greek terracotta statuette of a dancing maenad (third century BC), from Taranto, exhibited at the Metropolitan Museum of Art, New York. Nelly's also photographed an Ancient Greek sculpture of dancers for the quarterly edition *En Grece, In Greece, In Griechenland* (Ministry of Press & Tourism, 1935-6). See also Dimitris Damaskos, "The Uses of Antiquity in Photographs by Nelly," in *A Singular Antiquity: Archaeology and Hellenic identity in Twentieth-century Greece, Mouseio Benaki, 3rd Supplement*, 321-35 and especially 330, Fig. 25.

3.

MYTHOLOGY

3.1

THE MOLEIA OF NESTANI: A MOST ANCIENT CEREMONY DEDICATED TO WATER AND THE ENVIRONMENT— A GEO-MYTHOLOGICAL APPROACH

ILIAS D. MARIOLAKOS

PROFESSOR EMERITUS, UNIVERSITY OF ATHENS

Abstract

It is mentioned that in the Mantinea basin (Arcadia, Peloponnesus [1]), during the late prehistoric times, the ceremony of Moleia took place, in the greater area of Nestani village. It was a war ceremony, in memory of the murder of the Homeric hero Arethoos Korynitis by King Lykourgos of Tegea. The Moleia was celebrated throughout Arcadia. Arethoos was honored in the substance of Ippios Poseidon, god of the sea and waters and protector of the flora, and Lykourgos in the substance of Lykaios Zeus, god of the atmosphere, who destroys flora by heat.

The Arcadic plateau, while representing a hydrologically closed system, is hydro-geologically an open one. Because of the intense karstification, there are a large number of great sinkholes and caves. In almost all of the basins of the Arcadic plateau, the Minyans, an ancient Pelasgian phylum, constructed great land-reclamation works [2], some of which were drainage works and others small or large dams for collecting water in reservoirs. Land-reclamation and geo-hydraulic works were planned and constructed by the Minyans since the first half of the fourth millennium BC. They drained Kopais Lake and as a consequence most probably dominated politically, as well as economically, over the greater area of Boeotia [3].

Arethoos was a Minyan [4]. It is likely that the fury of Lykourgos against Arethoos was related to water shortage, a matter that was not settled by the Minyans, and Arethoos was held responsible.

Regardless of the above hypothetical causes, Moleia must be the most ancient ceremony for water and the environment.

1. Introduction

In Arcadia, three different physio-geographical systems can be distinguished [5]: (i) the mountainous area, comprising almost the whole of the central part of Peloponnesus, (ii) the lowland area, and (iii) the coastal area of the Argolic Gulf.

The lowland area includes the Megalopoli basin, the Arcadian plateau, and the Stymfalia and Feneos basins.

The Arcadic plateau, part of which is the Tripolis plateau (see Fig. 1 below), does not constitute a uniform lowland area, but rather a series of basins with the absence of surface runoff. Specifically, the Tripolis plateau is a closed hydrological system that has only periodically turned into a permanent lake (or lakes). The runoff water from the surrounding mountains, ending up on the plateau, usually drains through numerous sinkholes. Therefore, although the Tripolis plateau is a closed hydrological system, from a hydrogeological point of view it behaves as an open system.

The geological and tectonic structure of the Arcadic plateau is complex, with an even more complex evolution, that still goes on since it constitutes an active seismotectonic structure.

The specific physical and geological characteristics [5] of the plateau are as follows:

- (a) A great extent of carbonate rocks (limestones and dolomites) and
- (b) Extensive karstification, e.g. the intense dissolution of carbonates leading to the creation of all kinds of karstic formations, such as dolines, sinkholes, caves, etc. The great number of sinkholes and caves are located both on the margins of the carbonate rocks, as well as at the bottom of the basins, covered with clastic sediments of small thickness. The Arcadic plateau consists of a number of poljes.

●n the other hand, Arcadia is not known for its geological and tectonic structure, but its contribution to the cultural evolution of the Greeks, since the ancient prehistory of the people later known as Arcadians has been lost in the great depths of human prehistory.

Arcadia is essentially the cradle of Greek Mythology [6, 7]. Numerous ancient gods were born here, among them Poseidon on Mount Alisision, Zeus on Mount Lykaion, Pan on Mount Mainalo, Hermes in Kyllini, and possibly more [8].

There are no great gods or other deities that did not live part of their lives in this broader area of Peloponnesus, such as Rea and Cronus, along with Atlas from the Titans, giants, and the gods Artemis and Apollo, Hera and Demeter, Aphrodite and Dionysus, Asclepius, and many others.

Local heroes, descendants of Pelasgus, Lycaon, and Arcas, were the founders of different settlements, some of which evolved into important cities in the long history of the inhabitants of this area, while others did not. It is noteworthy that many names of locations, rivers, mountains, cities, and villages have remained the same, although many have also changed in the meantime, due to the historical and social circumstances of the last twelve hundred years, when Slavic, Albanian, and Western European phyla conquered the area, for different periods of time, but failed to destroy the local cultural heritage.

In view of all the above, about gods and local heroes, it is not an exaggeration to state that there may be no other area in the world in which so many gods and heroes were born or acted.

Because of this long prehistoric and historic course, many ceremonies and festivities are said to take place here. Some of these are celebrated even today, within a Christian context, after the banning of all celebrations dedicated to Ancient Greek gods. ●ne of these celebrations, now almost forgotten, is the Moleia.

2. Moleia

It is believed that the Moleia [1] was a war-related celebration in memory of the murder of the Homeric hero Arethoos (or Arethus) Korynitis by King Lykourgos of Tegea, son of Aleus.

The Moleia was celebrated all over Arcadia, and both rival heroes Arethoos and Lykourgos were honored. Arethoos was honored as Ippios Poseidon, and Lykourgos as Lykaios Zeus. The Mantineian Ippios Poseidon, being the god of water, springs, and protector of flora, argued with Lykaios Zeus, who was in charge of the atmosphere and destroyed plants with heat. It is said that the myth symbolizes the “war” between rain and drought, or between wetness and dryness, as well as the struggle of the inhabitants of the Arcadic plateau to cultivate an arid land. It is noteworthy that Arethoos Korynitis [4] originated from the city of Arni in Boeotia, the Mycenaean acropolis located near the modern village of Kastro in Kopais. At the time, all of the Kopais area was inhabited by a Pelasgian phylum, the Minyans, and the main city was Orchomenos. The Minyans, as proved by their constructions, possessed great technical-geological and hydraulic knowledge, and managed to drain Kopais Lake by means of great anti-flood and land-reclamation works [3].

As stated, Poseidon and Zeus were born in Arcadia. Zeus on the top of Mount Lykaion and Poseidon on the slopes of a hill named Mount Alision, near the plane of the contemporary village of Milia, which is part of Mantinea.

The Moleia ceremony took place at the site where Lykourgos was supposed to have killed the Minyan Arethoos Korinytis. This site was named Molychio or Phyzon [1]. Its exact location is unknown, but it lies in the broader area of Nestani village (see Fig. 2 below). Nestani is built on the western slopes of Mount Artemision at the southern hilly margins of a basin known as Argon Field, which is one of the independent basins of the Arcadic plateau.

Others believe that the Moleia was celebrated at a site of Nestani known as Panigysristra.

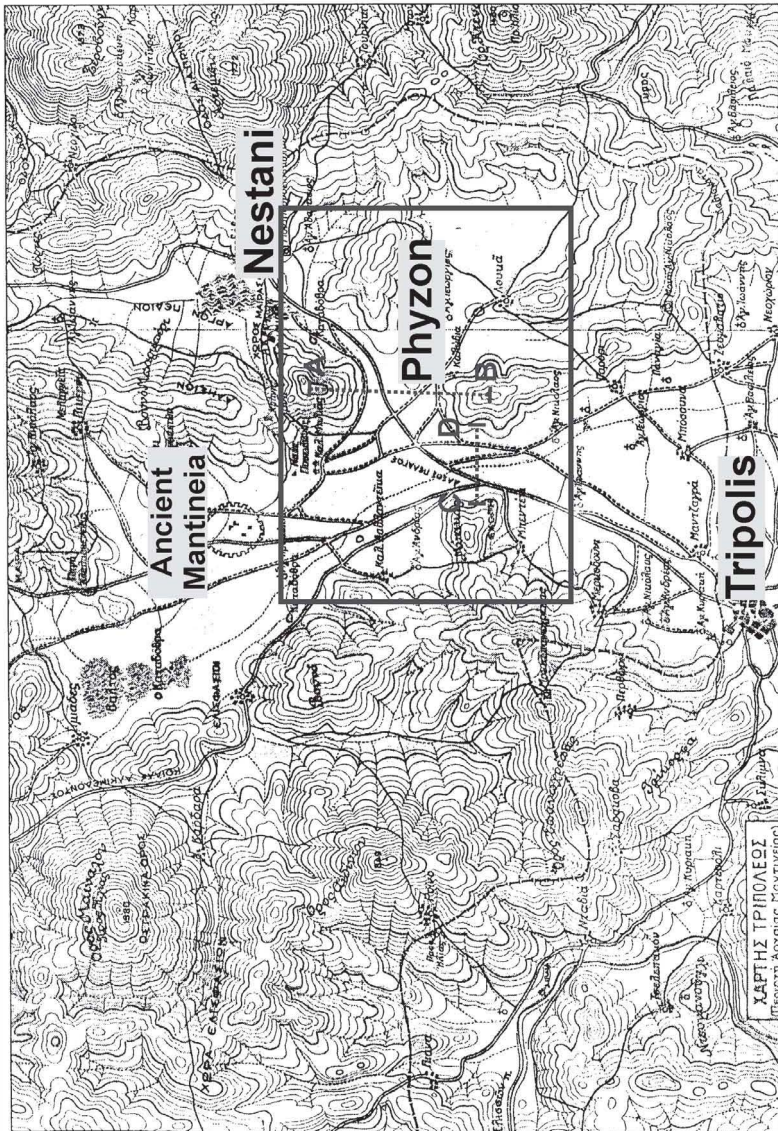


Fig. 2. Schematic map showing the possible location of Molyhio (Phyzon) (A–B). C–D: dam site [2]

3. The Moleia and Climatic Changes

What kind of celebration was the Moleia? I think that, in order to understand the symbolism of the Moleia, one should relate it to the geo-environment of the area and especially the climate of the time, and mainly the mean air temperature and precipitation, as well as the climatic changes of that prehistoric-mythological time, as these are accepted today [9].

This is very important because Mantinea and the Argon Field, as well as other planes, such as Taka, Kandyla, and Stymphalia, were often flooded at the time, as they are today. This happens because, as already stated, they are closed hydrological systems.

Consequently, flooding created problems in winter and, on the other hand, drought created problems in summer. This antithesis appears to be symbolized by the physical and geological dimension of Poseidon who, being god of the waters and of Earth's interior, regulated the drainage, and that of Zeus who dominated over the atmosphere, i.e. precipitation, sunshine, and high temperatures causing droughts. Therefore, Zeus was responsible for the dry periods. This is the reason why, in several sites of the Eastern Greece, there were sanctuaries dedicated to "Omvrios" Zeus (*omvros* = rain), as for example on the eastern slopes of Mount Hymettus (eastern Attica).

4. Possible Reasons for the Dispute

What is the reason for the fury of Lykourgos, an Arcadian, against Arethoos, a Minyan? Moreover, why was a Minyan in Mantinea, and what was the reason for the conflict occurring between Lykourgos of Tegea and Arethoos and not between Lykourgos and an inhabitant of Mantinea, especially an inhabitant of Nestani? Why (according to the myth) did the murder take place in the area of Nestani and not in Mantinea? Could it be that Arethoos was considered responsible for the drought?

These questions are obviously not answered by any ancient author. I believe that they are related to the physical and geographical conditions that prevailed in the broader Mantinea area during the Mycenaean Era and the economic and technical activities of the Minyans. The Tegean Lykourgos lived just before the Trojan War. The period of his dispute with Arethoos seems to coincide with the second Little Ice Age, the end of which dates to around 1,200 BC according to Shore [10]. This was

probably a dry period for the area, since it is known that the decrease of temperature is connected to a decrease in precipitation.

At the time, Mantinea and Tegea should have been allies. It is noteworthy that, later on, Tegea formed an alliance with the Lakedaemonians, while Mantinea allied with the Argeans and Athenians. So the murder of Arethoos should not be related to political conflict.

All this leads to the conclusion that the Moleia must have been related to the land-reclamation activities of the Minyans in Arcadia. As proved by the detailed studies of Jogst Knauss [2], the Minyans constructed low dams in the basin of Taka Lake in Mantinea and the basin of Kaphyes. These geotechnical works aimed at water collection, as well as protection against flooding. In Mantinea, the Minyans constructed a dam at a site east of Skopi village where, according to Knauss [2], in the reservoir that was formed, fifteen million cubic meters of water could be retained. This great work put an end to the flooding of the Mantinean plain and allowed for the erection of the city of Mantinea, while still securing water for summer, when temperatures are high.

It seems that, for some reason, possibly technical, the amount of water in the reservoir would not suffice during an extended drought, and Arethoos was held responsible for the technical shortcomings of the dam. So, it is possible that the reason for the dispute between Lykourgos and Arethoos, which led to the murder of the latter, was water shortage. This viewpoint seems all the more possible, since, within the inundation area, there are several sinkholes, one of which is the well-known Kanatas sinkhole located west of the small church of Saint Nikolaos.

Therefore, it seems that Arethoos was the representative of the “constructors” and was responsible for the maintenance and smooth operation of the dam.

5. Conclusions

Regardless of the causes of the dispute, the Moleia is the most ancient ceremony dedicated to water from the Mycenaean Period, although drought periods are mentioned from even earlier times.

References

- [1] G. Fougeres, *Mantineè et l' Arcadie Orientale* 44, 576 (1898): Taf. 9.
- [2] J. Knauss, "Mykenische Talsperren in Arkadien und Bötien," *Historische Talsperren* 2 (1991): 19–40.
- [3] J. Knauss, "Die Wasserbauten der Minyer in der Kopais—Die älteste Flussregulierung Europas (Kopais 1)," *Wasserbau und Wasserwirtschaft* 50 (1984).
- [4] Homer, *Iliad* (H, 137).
- [5] A. Philippson, *Der Peloponnes* (Berlin, 1892).
- [6] Hesiodm, *Theogony*.
- [7] J. Kakridis, "Greek Mythology," *Ekdotiki Athinon* 4 (1986).
- [8] Pausanias, *Ellados Periigisis—Arkadika*. Ekdotiki Athinon.
- [9] M. Milankowitch, "Kanon der Erdbestrahlung und seine Anwendung auf dem Eiszeitenproblem," *Royal Serbian Sciences* 132 (33) (1941): 633.
- [10] M. Schwarzbach, *Das Klima der Vorzeit: Eine Einführung in die Palaoklimatologie* (Stuttgart: Verlag, 1974).

3.2

THE WAY BACK OF THE ARGONAUTS ACCORDING TO *ARGONAUTICA ORPHICA*

K. KALACHANIS, P. PREKA-PAPADEMA,
I. KOSTIKAS, E. THEODOSSIOU,
V. N. MANIMANIS AND E. PANOU
UNIVERSITY OF ATHENS

Abstract

According to the unknown author of *Argonautica Orphica*, the return of the Argonauts begins with the murder of Absyrtus. The Argonauts sailed the Phasis River upstream, reaching Lake Maeotis. After ten days of wandering, the *Argo*, their boat, reached the Riphean Mountains, the source of the Danube river, and then the Argonauts, passing through a narrow chanel, made their way to the ocean called the Cronian Sea. There they met the Cimmerians and, bypassing the island of Ierne, went far from the shore in the open Atlantic Ocean, as it is explicitly called in the text. After a fifteen-day journey they reached Aeaea, the island of Circe, then Tartessus, and then they approached the Pillars of Heracles. Their subsequent course was on the Mediterranean Sea when they sailed by Sardinia, the Ausonian (Italian) islands, the shores of the Tyrrhenian Sea, and through the Lilybaeum strait to Sicily, where they met Charybdis and then the Sirens. After that, they arrived at Corcyra (Corfu), where the Phaeacians (Phaiacians) lived. Leaving Corcyra, they were carried by the winds toward Africa, reaching Crete and then Anaphe. Finally, by rowing, they passed by Cape Maleia and arrived at Iolcos.

In the present study, we examine the feasibility of such a voyage and identify certain problematic points in its description.

1. Introduction

The Greek epic poem *Argonautica*, told in the name of Orpheus, describes the expedition of the Minyans from Iolcos (at the foot of the mountain Pelion, Greece) to Colchis (on the banks of the Phasis, today the Rioni River, Georgia) in order to retrieve the Golden Fleece. The title of the text, “Argonautica,” originates from the name of their ship, the *Argo*. This was a sailing ship that could also travel by using the force of fifty rowers (v. 278–306, *πεντήκοντ’ ἐρέτησιν*). From the heroes who participated in the expedition, it appears that it took place one or two generations before the Trojan War.

The *Argonautica Orphica* were transmitted orally until the age of the Peisistratids, when they were recorded by a commission headed by Eumacritus¹ (ca. 530–480 BC), as reported by Clement (*Stromat.* I, 21, 131). Herodotus (VII 6) informs us that Eumacritus was accused of reshuffling the Orphic texts.

In the present study we follow and analyze the voyage of the *Argo*’s return using the Orphic text exclusively.

2. From Colchis to the Riphean Mountains

After taking the Golden Fleece, and after Absyrtus was murdered by Medea, the Argonauts sailed from Colchis and, because of the night and a miscalculation, they moved toward the interior of the country (the foot of the Caucasus) and not toward the estuary of the Phasis in Euxeinus (the Black Sea) (see Fig. 1 below). When the dawn came, they found themselves on an island between the rivers Phasis and Saraggis which reached the Maotis lake (the Sea of Azov). After rowing for two days, they reached the passage of Boos (the Strait of Kerch).

However, in order for the Argonauts to reach the Sea of Azov from the Rioni River, they probably followed another river that has its estuary in that sea, such as Hypanis (Kuban), which has its source near Mount Elbrus in the Caucasus (5,642 m). However, Kuban and Rioni are far from connected to each other, since they are more than 100 km apart (see Fig. 1 below). It is hard to believe that they followed a route from Rioni through the rivers Tskhenistskali, Kheledula, Kasleti, Nenskra, and Dalari to reach Kuban (see Fig. 1 below). In order to follow this demanding route, one has to climb to an altitude of about 2,000 m. Of course, the topography of the region could have changed during the intervening centuries.

After they reached Maeotis, the Argonauts sailed through the Strait of Kerch from north to south in order to reach the Black Sea. For nine days, they sailed parallel to its northwestern coastline, something attested by the description of the tribes they met. On the tenth day, they reached the Riphean Mountains and then, going through a narrow pass, found themselves in the ocean, called by the Hyperboreans the “Cronian” and the “Dead” Sea.

The Riphean Mountains have been variously identified as the Urals or the Alps in Switzerland. In *Argonautica Orphica*, it is mentioned that they are near the Alps (v. 1123–6). Since the Alps are next to the southeastern Black Forest, where the uppermost sources of the Danube are located, a river that flows into the Black Sea,^[1-2] the text supports the view that the Argonauts went up the whole Danube and then the Rhine, either directly or through tributaries, as the two rivers approach come as close as 30 km to one another (see Fig. 2 below). Thus, they reached the “Cronian Sea” near modern Rotterdam (the Netherlands), where the mouth of the Rhine used to be:

Ἐ μὲν γὰρ ὑπὸ ταῖς ἄρκτοις πᾶς μὲν ἀρκτικός καὶ βόρειος λέγεται, ἤδη δὲ αὐτοῦ τὸ μὲν ἀνοτικώτερον Σκυθικός ὠκεανός, τὸ δὲ δυτικώτερον Γερμανικός τε καὶ Βρετανικός καλεῖται· ὁ δὲ αὐτὸς οὗτος σύμπας καὶ Κρόνιον πέλαγος καὶ Πειρηγὸς καὶ Νεκρὸς ἐπὶ νομάζεται.

[This great sea that washes the whole ecumene is named with a common name: *oceanos* (ocean), but according to each place has a different name. The whole ocean that lies in the north is named north (*artikos*), the eastern part Skythian, the west Germanic and British. This whole one is named the Cronian Sea and also Frozen and Dead].^[3]

However, the following questions arise:

(1) How did they climb the steep slopes of the Caucasus? By rowing against the fast current? Even if the topography was different at the time, including more small rivers, this feat remains almost impossible.

(2) How did they achieve such a difficult journey within no more than fifty hours? What is more, the Kuban River (*Hypanis*) is not mentioned in the text. Instead, the Saraggis river is named, which other ancient sources place in *Vaktria* (Polyaenus, *Strategems*, I, 1, 3, 2) or *India* (Arrian, *Indica*, 4, 8, 2).

(3) Why, among the Black Sea tribes, are the Hyperborean mentioned, who used to reside at a place beyond the Riphean Mountains (Clement,

Stromat. I 15), the Nomads (Numidians), who lived in North Africa (Appian, *Historia Rom.*, *Preamble*, 3, 4), and the Caspians, who lived on the shores of the Caspian Sea (Stephen of Byzantium, *Ethnica*, 365, 3)?

(4) The Riphean Mountains are described as being near the Atlantic Ocean; the exact path of the Argonauts is not mentioned.



Fig. 1. Upper: The itinerary from Phasis to Maeotis through the Western Caucasus. Highlighted is the distance between the rivers Phasis and Hypanis. Lower: Detail of the distance between Phasis and Hypanis that equals 60.7 km, including flows of smaller rivers. Mount Elbrus is highlighted by the green dot.

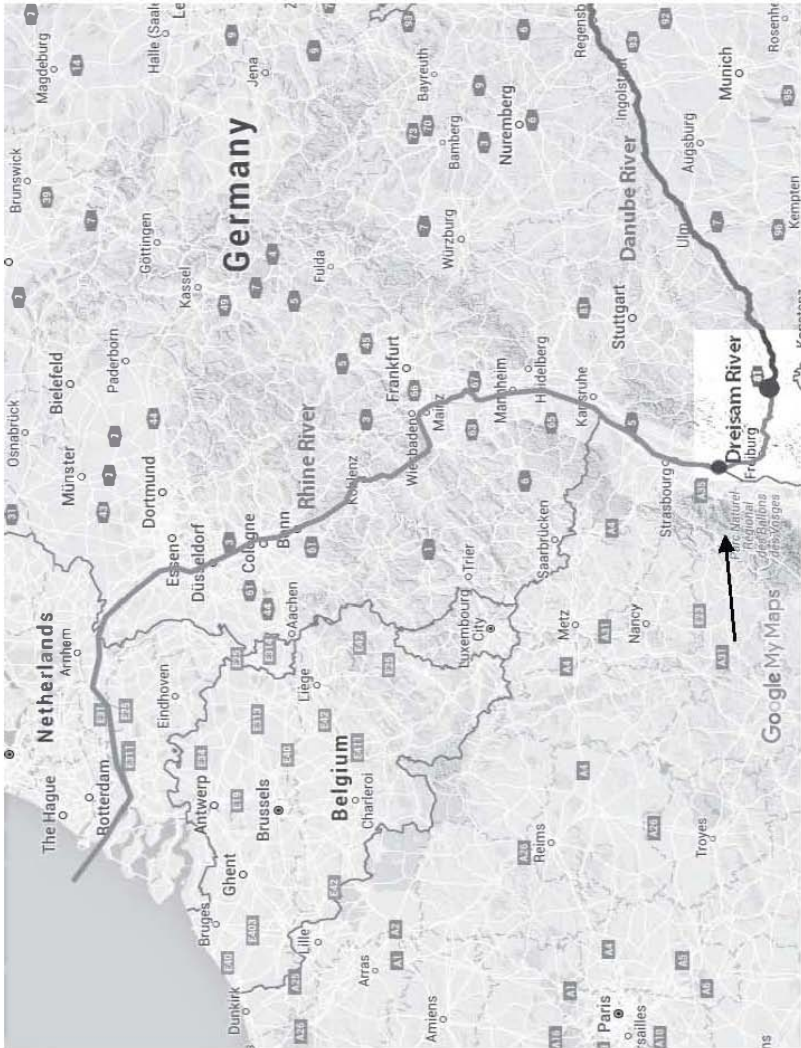


Fig. 2. The itinerary from the Danube to the Riphean Mountains and the Black Forest, and then through the Rhine to the Atlantic Ocean (Cronian Sea). The Dreisam River lies between the Danube and the Rhine; the distance between the two major rivers is approximately 30 km.

3. The “Cronian Sea”: the Route to Circe

The reference in the text that the ship was directed to the “right-hand part of the shore” means a northern direction. This is confirmed by the description that “the sea was sleeping under the Helike and the last waters of Tethys.” Helike was a name given to any of the two Ursa constellations (Ursa Minor and Ursa Major), both signifying the northern direction. Tethys is the wife of Oceanus, whose “last waters” were at its northern edges. The Argonauts, because of a lack of wind, pulled their ship to the pebbles of the beach, moving “swiftly” northwards along the shore for five days. Of course, it would be more reasonable to move southwest in order to pass through the English Channel and return to the Mediterranean Sea through Gibraltar; however, a noticeable ocean current dominates the Channel, which is directed toward the northeast (see Fig. 3 below).

On their sixth day in the ocean they reached the Macrobian, who live in “meadowy” places, the Cimmerians, and the “Acheron River” near a “rough prominent turn and a shore protected from the wind,” a region characterized as “cold.” They also reached the “low” (flat) Hermionia with its many “pastures.” These descriptions fit the region of the Netherlands, the northern shore of Germany, and the Jutland peninsula (Denmark). The speed of a walking person is four to five km/hour.^[4] If the Argonauts traveled during both daytime and nighttime, then in six days they could cover a distance of 600 km, i.e. the distance Rotterdam-Esbjerg (see Fig. 4a below). The coastal area of Ho Bugt near Esbjerg, with its sand dunes, forming an extended lagoon, could fit the description that “the waters of ‘Acheron’ (the Varde stream/river?) have a silvery but also golden color,” as the yellow color could originate from the erosion of the dunes. Additionally, we note that, while the ship was previously being pulled upon pebbles, it is written that in this region “the vast waters of the Ocean hum over the sand.” The dark nature of the region of the Cimmerians is not attributed to the long winter nights of the far northern regions, but rather the fact that the region is located between high mountains, so that sunlight cannot find a direct way to the ground (v. 1120–6).

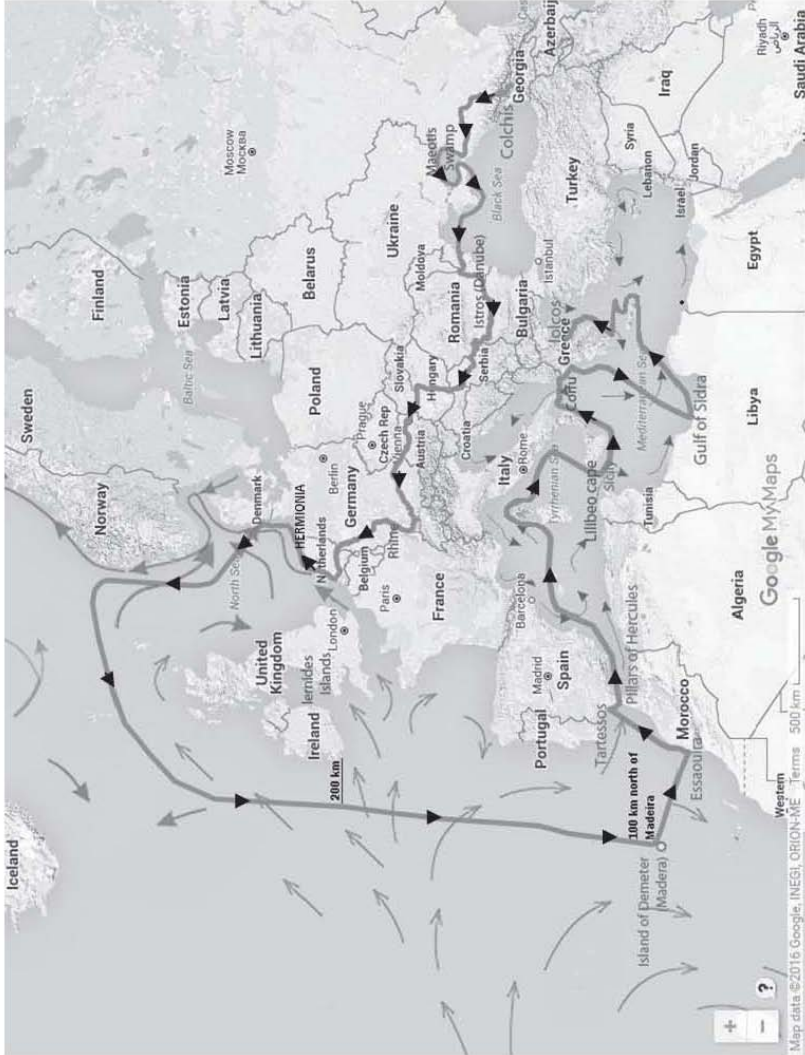


Fig. 3. The itinerary of the Argonauts according to *Argonautica Orphica* (thick blue line) and their direction (black arrows on the blue line). The other arrows indicate the direction of the ocean currents.

In this region, the Argonauts encountered a change in weather, as calmness turned into a strong wind, so they prepared to sail. As for the currents, here we meet the Norwegian Current (see Fig. 3 above) that comes from the west and in this region turns to the north, on its way to Norway. The Argonauts circumnavigated the island of Ierne (Ireland, or possibly the British Isles), pushed from behind by “a black storm with thunders that bullied the sail and the boat ran fast.” As the author had previously alluded to the direction of the wind, the “push from the back” means that they went west, or west-northwest if we add the effect of the Norwegian Current. In this way, they managed to travel to the north of the British Islands (see Fig. 3 above).

Turning then to the south, obviously aided by favorable winds, they passed Ireland from the west at a distance of about 200 km; so they were in the open sea and for twelve days saw no land. In Fig. 3 above, the route traced, at a calculated speed of six to seven km/h, corresponds to approximately 2,000 km. Note that the ancient ships moved at an average speed of four to six knots (7.4 to 11.1 km/h).^[5]

Then, they would follow the southern route of the ocean current of the Canary Islands to reach Gibraltar (see Fig. 3 above). However, they saw “from very far away” an island with a “great cloud forming a circle around it.” Indeed, the southernmost tip of that route (see Fig. 3 above) is a few tens of kilometers from Madeira, so that it could be barely visible, mostly due to the orographic clouds that covered the peaks of its mountains (1,861 m being the height of the highest peak, Pico Ruivo), a way to locate land well known to sailors.

The identification of the specific island known as the “Island of Demeter,” the goddess of agriculture, was a sign that they had overshot Gibraltar, so they had to change their route. The *Argo* turned to the left (east) in an attempt to reach Gibraltar; however, they were already on the wide Canary Current, a surface ocean current that flows southwest about as far as Senegal. Thus, their effort failed and they made landfall in northwest Africa, several hundred kilometers from Gibraltar. Even by navigating today, it is difficult to track down this passage.^[6]

They arrived at a peninsula (*cherson*, v. 1208), not an island in the contemporary sense of the word, where Circe resided. Indeed, it seems that the *Argo* reached the Essaouira of western Morocco (near the foot of Mount Atlas) three days after they passed Madeira (see Fig. 3 above and 4b below). The distance of approximately 700 km is covered within this

time span at a speed of 9–10 km/h, i.e. the speed of 6–7 km/h added to the speed of the Canary Current of 1 km/h. As seen in Fig. 4b below, the Mogador Island lies a mere 1.5 km (less than a mile) from the small peninsula of Essaouira. Thousands of years ago, this island was probably united with the mainland. Thus, the appearance of the peninsula would resemble a long “island.”

The *Argo* moored near a rocky area, and some crew members disembarked in order to explore this “endless land.” However, Circe appeared from the opposite direction, preventing them from proceeding further.

The determining expression “Λυκαῖον ποτί χέρσον” (v. 1206, Leipzig edition 1764), from the root *hyc* = light, recalls the “Mountain of the Sun” mentioned by Ptolemy in his *Geography* (IV, 1, 3, 1). This topographic feature corresponds to the coordinates of Essaouira (31° 30′ 47″ N, 9° 46′ 41″ W). Besides, Circe was the daughter of Helios, the Greek sun god, while in the same region the Greeks placed the residence of Eos (*Odyssey* XII, 1–5), the personification of the dawn and sister of both Helios and Selene (the moon goddess).

The “island” of Circe is described by Homer (*Odyssey* X) as densely forested, and Essaouira is near the foot of the Atlas Mountains. The ship of Odysseus approached a deep harbor, as indeed a natural harbor is formed there, since the Mogador Island, combined with the edge of the peninsula, forms a safe mooring place. Nearby, there was a river, by which Odysseus killed a tall deer. Indeed, there is the river Oued Ksob, only about 2 km from Essaouira. Moreover, a subspecies of red deer, the “Barbary stag” (*Cervus elaphus barbarous*, or Atlas deer), still lives in the region. Finally, wolves and lions lived in the residence of Circe, along with the African golden wolf (*Canis anthus*) and the Barbary lion (*Panthera leo*, Atlas lion) in the Atlas region. Consequently, the Essaouira peninsula fits the Homeric account of Circe’s “island” in multiple ways.

However, there are some problems:

- (1) The Cimmerians are reported as living both on the shore of the Atlantic Ocean and amidst the tall mountains of Central Europe. It is mentioned that sunlight is obscured in the early morning by the Riphean Mountain, in the noon hours by Phlegra, and before sunset by the Alps. Yet, the Alps are to the east and the Riphean Mountain (the Black Forest) lies to the west. Hence, the east-west orientation



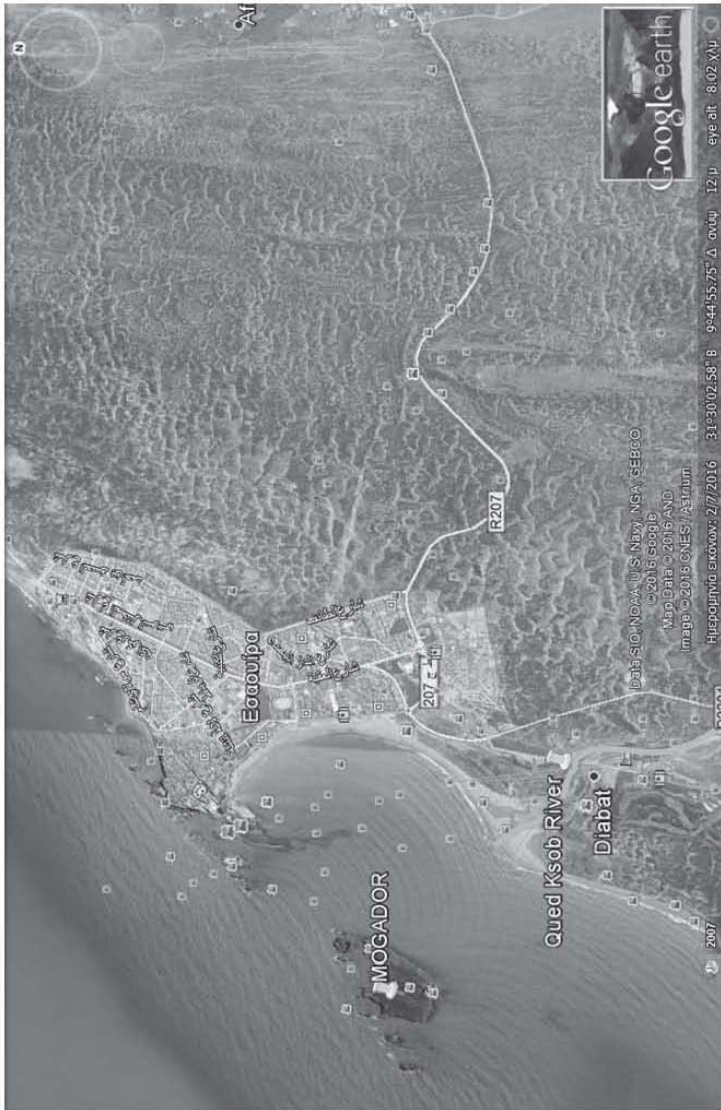


Fig. 4. (a) The Esbjerg region of the Jutland peninsula (Denmark); the Ho Bugt coastal area with its dunes and the Varde River are marked (light blue line); (b) The Essaouira city and peninsula in Morocco; the Qued Ksob River is indicated in the lower left (light blue line). It is also noted that the mountains near Essaouira are the foot of the Atlas Mountains.

reported in the text is exactly the opposite from the one generally accepted

- (1) During the period in which the source texts for *Argonautica Orphica* were written, the Cimmerians were located to the north of the Black Sea and Maeotis (Hecataeus of Miletus, *Fragmenta* 195, 5–6; Polybius, *Histories* IV, 39, 3, 1; Herodotus IV, 12, 4). However, in the *Argonautica* there is absolutely no mention of Cimmerians in that region during the Mycenaean period. It seems that this ethnic group appeared in the region much later. What was the relation of the Black Sea's Cimmerians with the Cimmerians mentioned in the *Argonautica Orphica* and the *Odyssey*?

4. The Voyage in the Mediterranean Sea

The Argonauts then departed sailing toward the “mouth” of Tartessus (“ἀνά στόμα Ταρτηρσοῦ ἰκόμεθα”), approaching the Pillars of Heracles (the Strait of Gibraltar). According to the Liddell-Scott-Jones’s *Lexicon*, the syntax of the preposition *ανά* with accusative case denotes a motion from a lower to an upper part. The “mouth” of Tartessus (a city on the Atlantic coast of Spain) is given as an allusion for the Pillars of Heracles, from where they entered the Mediterranean Sea. After they passed from Sardinia, the Ausonian islands and the Tyrrhenian shores (Italy), they reached the Lilybeum Strait; this is the strait between Sicily and northern Africa, named after the city of Lilybeum (today’s Marsala), i.e. the “city that looks toward Libya.” In this region (Campi Flegrei Mar Sicilia) there are many volcanoes under the sea as well as volcanic islands (see Fig. 3 above), where the Argonauts met with Charybdis.

A wave of hot water came up from the bottom of the sea and flowed around ship’s bow, while, in the form of boiling water, it fell on the edge of the sail. The boat was immobilized and then started to rotate about a “cavity on the sea,” risking going down and being stuck to the muddy seabed. This description fits perfectly a sea whirlpool caused by the eruption of an underwater volcano.¹⁷¹

After this incident, Argo reached a nearby protruding “skopelos.” This word, according to the Liddell-Scott-Jones *Lexicon*, denotes a tall rock or peak, a precipitous shore or promontory. The sea under it is pressured through openings, causing the waves to make a humming noise. On the top of this rock sit the Sirens, who emit a “ligyre” voice. According to the said dictionary, this Greek word means a clear, whistling, acute, and intense sound.

The Argonauts left the oars and the *Argo* headed toward the Sirens, who were sitting on a “προβλήτω κολωνόν,” that is a protruding “hill” and not a precipitous rock (“πέτρα ἀπορρώξ”), as mentioned just a few verses before. This description recalls the emergence of a volcanic islet as the result of an eruption of an underwater volcano. The “acute and intense sound” that accompanies the volcanic eruption as a result of turbulent flows and friction by the hot gases as they accelerate upward after they leave the crater together with fragments of magma, ash, and other solidified particles, could indeed be paralleled to the “voice” of the Sirens. The sounds produced by volcanoes are very strong and can cause loss of hearing and even material damage.^[8] One could imagine that, because of the deafening sound, the Argonauts dropped the oars to cover their ears with their hands, while Orpheus is presented as covering the sound by playing his phorminx.

Then, from another “snow-covered” (“νιφόεντα”) rock, the Sirens emitted a terrible sigh and committed suicide by falling into the sea from the edge of the precipitous rock, immediately transforming into small rocks. The odd description of the second rock as “snow-covered” presumably denotes the white constituents of volcanic matter, such as perlite and pumice, covering it. The Sirens fell on the sea like discs (“δίσκουσαν”); in other words, they fell while rotating, just like discs thrown by a discus thrower. This description aptly conveys the motion of volcanic bombs, i.e. pieces of viscous molten rock ejected during a volcanic eruption. If they were human bodies, the text would speak of a vertical fall, because of their weight. Falling volcanic bombs create volcanic stones.

Hence, it is reasonable to assume that both Charybdis and the Sirens, as mentioned in the *Argonautica Orphica*, are actually metaphors for a underwater volcanic eruption to the south of Sicily. On the other side, the Sirens, Scylla, and Charybdis mentioned in the *Odyssey* are located closer to the island of Circe (XII 165–7). Odysseus, unlike the Argonauts, first meets the Sirens and later the Scylla-Charybdis pair. And, if we stick to the mythical chronological order, it is impossible for the same Sirens to appear in both works, since the ones in *Argonautica* were transformed into rocks decades before Odysseus met his Sirens as sweetly-singing women in a meadow of a larger island (XII 37-45, 165–70). Moreover, Scylla is not mentioned in the *Argonautica*, while the description of Charybdis is markedly different; the Homeric Charybdis draws the seawater three times a day, recalling the tidal cycle with a strong tidal bore.^[9]

5. The Voyage in the Greek Seas

When the Argonauts left Sicily, they crossed the Gulf of Taranto and continued eastward to Corfu, the Homeric island of the Phaeacians. They avoided the dangerous Libyan Sea (see Fig. 3 below). However, at the same time the Colchian fleet arrived at Corfu. It seems that they waited for the Argonauts to the south of the island, for if they were in the north they would have intercepted them before they could reach Corfu. Maybe they had settled on the Paxoi islands.

After reaching an agreement with the Colchians, the Argonauts sailed south toward the Ambracian Gulf. Unfortunately, the strong wind pushed them across the Mediterranean to the African Gulf of Sidra. From there they reached Crete, where the metallic giant Talos prevented them from disembarking. They struggled with the waves of the Sea of Crete, trying to reach the “Melanthian Rocks.”

According to Scylax of Caryanda (*Periplus*, 113, 1), these rocks were between Mykonos and Icaria, not far from Delos. This is compatible with the following myth. Paean (Apollo) shot an arrow to point to a new island, at the center of the ancient Sporades Islands (modern Cyclades), for the Argonauts as a shelter from the storm. Because that island “ἀνεφάνη” (reappeared) out of the darkness and the tempest, it was named Anafi. Anafi lies to the south of Mykonos, and the Melanthian Rocks are probably the two rocky islets (nowadays known as Pacheia and Makra) just to the south of Anafi (Apollonius Rhodius, *Argonautica*, 307).

The Argonauts finally arrived at Cape Maleas of Peloponnese, where Orpheus disembarked and climbed the Tainaron hill where there was an entrance to Hades. The other Argonauts continued their voyage to Iolcos.

However, the following issues arise:

- (1) The Argonauts in Corfu met King Alcinous and his wife Arete, whom Odysseus would meet there decades later, along with their daughter Nausicaa. This is an event incompatible with the time that elapsed between *Argonautics* and the voyage of Odysseus
- (2) In the *Odyssey* there is no mention of Kerkyra/Corcyra (Corfu), while the inhabitants of “Scheria,” which is not characterized as an island, are called Phaeacians. Besides, Strabo in his *Geographica* (I, 2, 18–14), suggests that Scheria and Gygia are located in the Atlantic Ocean

- (3) The Phaeacians of the *Odyssey* were not indigenous to Scheria, but they had moved there from Hypereia (a place near the region where the Cyclopes lived, i.e. either Sicily or on the adjacent shore of northern Africa). The darker-skinned inhabitants of northern Africa would be aptly called “Phaeacians,” since in Ancient Greek *phaeos* meant “dark-colored”; similarly, the dark-skinned inhabitants of eastern Africa were called “Aethiopes,” i.e. “burned faces.”

6. Conclusions

By studying the text of *Argonautica Orphica*, one concludes that the itinerary reported is feasible. The Minyans knew the route through the rivers Danube and Rhine, which allowed for communication between the Black Sea and the “Cronian Sea.” It also seems that they knew the ocean currents of the Atlantic and used them for their voyage. By following the route described, one identifies Madeira as the “Island of Demeter” and Essaouira, in today’s Morocco, as the “island” of Circe.

We point out the inaccuracy of “transferring” the mountains of Central Europe to the shores of North Atlantic, and, with an opposite orientation, an utterly unjustified mistake for a chresmologue and scholar such as *●nomacritus*.

By comparing *Argonautica Orphica* with the *Odyssey*, we notice different adventures appearing under the same names (Charybdis and Sirens, Cimmerians, Phaeacians, etc.) If *●nomacritus* actually modified *Argonautica Orphica*, we propose as a topic for further study whether a some of our points of observation can also be his modifications, and what was his purpose in doing this.

References

- [1] Stephan von Byzanz, *Ethnika*, edited by A. Meineke. Berlin: Reimer, 1849, 650, 3.
- [2] Aeschylus, *Fragmenta*, edited by H. J. Mette. Berlin: Akad. Verlag, 1959, 32, play B, 330, 2.
- [3] Anonymous, *Geographiae Expositio*, edited by K. Müller, Vol. 2. Paris: Didot, 1861, 45, 8.
- [4] R. C. Browning, E. A. Baker, J. A. Herron, and R. Kram, “Effects of *●besity* and Sex on the Energetic Cost and Preferred Speed of Walking.” *Journal of Applied Physiology* 100 (2) (2006): 390–8.

- [5] L. Casson, "Speed Under Sail of Ancient Ships." *Transactions of the American Philological Association* 82 (1951): 136–48.
- [6] Z. Petrides, *Odyssey, a Naval Epic of Ancient Greeks in America*. Athens, 1994.
- [7] J. C. Carracedo, F. P. Torrado, A. R. González, V. Soler, J. L. Turiel, V. Troll, and S. Wiesmaier, "The 2011 Submarine Volcanic Eruption in El Hierro (Canary Islands)." *Geology Today* 28 (2) (2012): 53–8.
- [8] J. Wendel, "Sound Waves Help Scientists Track Volcanic Eruptions." *Eos* 97 (2016).
- [9] H. Chanson, *Tidal Bores, Aegir, Eagre, Mascaret, Pororoca. Theory and Observations*. Singapore: World Scientific, 2011.

Notes

- ¹ **Ch**ronomacritus (Greek: **Χ**ρονόμακρῖτος; ca. 530 ca. 480 BC), was a Greek chresmologue, or compiler of oracles, who lived at the court of tyrant Pisistratus in Athens. He is said to have prepared an edition of the Homeric poems, and was an industrious collector, as well as a forger of old oracles and poems.

3.3

THE ORPHIC COSMOGONIC THEORY: DIALECTICS OF ALL

MARIA J. SIDERIS, ATHENS
WRITER-INDEPENDENT RESEARCHER

Abstract

What preceded the physical world? What interfered as a procedure of the space-time, the multiverse genesis? Which were the first steps and the various transitions that led to its actual, relatively stable state?

What could be said about the causes and laws that caused its creation? Were these reasons and foundations just random or chaotic, or, on the contrary, conscious and beyond any experimental confirmation? What is the true nature of matter, force, and energy?

The introductive part of the Greek Orphic Theology, better known as Cosmogony, among others, deals with such questions. It does so in an integral, continuous, open, and complete way (being, at the same time, fully aware of its incompleteness), through the path of the widely praised dialectic process [1].

The purpose of the present is to expose very briefly the main aspects of the Orphic Cosmogony as composed in Otto Kern's "Fragmenta Orphicorum" collection, especially those found in the first volume of the Greek edition.

Other philosophers (Orphic or not) will also be quoted in order to support and denote the continuity, on common grounds, of the entire Greek cosmologic philosophy, starting from its first specific source.

However, as widely admitted, Orpheus was not literally the first theologian. He couldn't have been inspired by this astonishingly wise theory while

living in a world of ignorance! What in fact he did was to interpret, complete, and disseminate his theory beyond the boundaries of the royal/prelatic mysteries, in which he took part as a member of the prime-royal class.

Introduction

Ancient Greece, a model for the modern world, is best defined by the Orphic Cosmology-Ontology, a science of a dialectic methodology. Indeed, from the basic axioms about the initial stages of Genesis of the perceivable world, or *Ὀόν* (Egg) in Orphic terminology or as called today, the “Universe” in which there exist the systems of ordinary matter, everything follows and presents in a resolute manner, unequivocally, the fundamental law of Dialectic science:

Position-Refusal entail higher grade position.

Of course, in the dynamic act of this law, as its terminology and consequence, the law of “denial of denial” exists as well, and of course all the other laws of the Dialectic methodology. The Orphic Dialectic theory is open to reductive as well as to abductive thought. This is not an end neither a precisely defined start. The above highlights are obvious at the following summary of the ordinary stages of the cosmogenic process as set out in the Orphic theory.

The treaty-based inaugural Authority is the pre-ontological spheroid Principle *Ἐν* (One), immaterial, contains the Chronos-point and the *Ψυχή* (soul) named *Ἀνάγκη* (Need) and Judging Spirit, named *Ἀδράστεια* (Adrasteia, the Inevitable).

The *Ἐν* releases two dynamic laws, prerequisites of *Γίγνεσθαι* (gignesthae = evolution process, becoming): The principle *Ἔλη-Γῆ* (Matter-Earth), cause of division, and the Principle *Ἔδωρ* (water), cause of synthesis.

The interaction of the two principles generates the infinite *Χρόνος* (Chronos, Time), the active foundation force of Reality.

Chronos transforms inside him the “Matter-Earth” into potential matter, Chaos (*Χάος*), and the “Water,” *Αἰθήρ*, (Ether) into pure matter-energy.

Mutually penetrated, Ether and Chaos create a strong gravitational activity, causing the first material creation of forms: the cone (vortex) *Ἰλιγξ* (Iligx-whirlpool) which correspond to Black Holes.

The mixture of chaotic “roots,” and Aether, inside the *ἄλλυζ*, strikes the background field of Πνεῦμα (Pneuma, Spirit).

The Spirit is drawn into the mixture, recomposing the elements and forcing the *ἄλλυζ* to eject its positively charged content, which is now transformed to an expanding sphere raising to the Aether and pumping spin from the Chaos.

This is the Orphic *ᾠόν* (Egg), the real Space. The Aether inside the *ᾠόν* is stabilized as a common membrane, a fifth element, adapted to every tendency/state of the matter, carrying the energy released in Space.

Inside the full-of-radiation *ᾠόν* a hot core of Ether-Spirit, matter, is formed. As this hot core is growing, the *ᾠόν* is overheated beyond its limits and cracks, spawning flaming Light and Spirit, merging with the World of Ideas and every enlightened value between the *Ἔν* and the reconstituted *ᾠόν*, drawing now from its offspring the fundamental existential conditions [2].

The *Ἔν* (One): The First Conceivable Duality

“Let’s realize that *Ἔν* is the Primal Principle” [3]. The Orphic Theology according to Orpheus Sacred Words, as collected by Hieronymus and Hellanicus, indicates that: “in the beginning there were *Ἵδωρ* (Water) and *Ἔλη* (Matter)—or their mixture called *Ἄβς* (Mud), from which earth was coagulated; and these he establishes as the first two principles, water and earth, the latter as capable of dispersion, and the former as providing coherence and connection for material elements. The single Principle before the two, however, he leaves unexpressed, his very silence being an intimation of its ineffable nature” [4].

The Orphic Cosmogony begins by referring to the highest first level of cosmogony, the one that “future followers of Orpheus” (Hesiod, Homer, etc.) never mention. There are many among them who consider it as the absolute basis, using various names to define it. It is called the “Unutterable Principle,” “looking like unity,” the “Intelligible Intellect” (the first).

On Pelagian inscriptions the word “*Ἔν* = **One**” means, among others: “It”; “One”, “Overlord/master”; “Divinity” [5]. As for the imposed silence, it does not prove the rejection of the *Ἔν* (One) itself, but of public accounts of it. It was an ordinance equivalent of the sacred “ineffable” and the legislated secrecy surrounding the Ancient Greek mysteries.

The “ineffable and unconceivable” of the first causes [6] is originally named “*Ev/One*” in the Orphic Sacred Words. For instance: “the Gods exist permanently within the *Ev* [7], and the primordial principle, called *Ev* and “entirely good” by theologians, after which follows the mystic dualism, superior of all ontological systems [8].

In the Greek consideration, the notion of absence is absent; zero, emptiness, and everything related to narrow, self-referential systems are rejected. Therefore, despite all theoretical restrictions, a lot has in fact been said about the *Ev* and its properties. It is proclaimed as being perfect.

All theologians and natural philosophers believe, without exception, that the First Cause is unequivocally unborn, and self-existent [9].

This perfection is exalted especially via Beauty (*Κάλλος*), which is attributed to the *Ev* as its basic attribute:

“And so, Orpheus said that Φάνης (Phanes, “the one who appeared”) can be conceived by intellect. So, as Beauty pre-existed Phanes in the first supreme beings as relevance and continuity, he called him Beautiful God. Because he was the first to be confined with secret ineffable beauty” [10].

Shape consists of the aesthetic manifestation of the content as well as a categorical of form through which the being is identified.

The ideal form of the Sphere is defined by the conception of the otherwise inconceivable *Ev*. “The sphere is the shape corresponding to the Creator God, as it pre-exists in his primitive principles within the secret cosmos” [11].

The Sphere is considered as an emblazonment of the highest of values such as: Justice, Truth (Parmenides), and Friendship (Empedocles), but also the Perfect Being.

According to the authentic Orphic theology, the *Ev* corresponds partially to the Parmenidian vision as an unchangeable content/substance, wherever, and as long as, no alterations and events occur.

Before we proceed, it is important to keep in mind the following rule: “*We should not isolate any conceivable part from the rest but accept that their union is unbreakable*” [12].

Any arbitrary distinction can be realized for the sake of practical approaches and only after the first conceivable duality has emanated from the

Unexpressed Principle, which is the starting point of the evolution process (*Γίνεσθαι*).

The *Ev* is not empty. However, its mass should be considered null without any properties of active matter.

Its texture is presented as follows: “*The primal principle fills in everything, the Intellect, Worlds and Beings, with divine light.*”

The Light revealed by Chronos (Time) consists of the purest phase of the inconceivable principles’ world, the sun offers the world the light as a manifestation of Truth, revealing at the same time the inconceivable worlds [13].

Light, the main expression of energies, is also the dominant element of the spheroidal *Ev*. We know [14] that gravitational forces attract not only bodies with mass but energy as well, with positively curved light deflection being a perfect example.

One Orphic thesis is the fact that the’s content is filled by different/dissimilar forces: “So, this otherness is neither without substance, but it is understood that it exists within the *Ev* ... Originated from the *Ev* it advances and divides itself into material unities” [15].

The pre-existing difference manifests itself when the *Ev* opens, in contrast to divisible and continuous force, pre-signifying the genesis of real matter-energy. The distant origin of “our” similar systems is implied by the immaterial nature of gravity (among others), as undetectable, zero mass waves, moving at the speed of light. This is a reminder that anything concrete corresponds to a partly transmuted abstract: “Nature loves to hide” (Heraclitus) or “beings are nothing but force” (Plato).

According to Aristotle, we distinguish three evolutionary phases of the homologous with substance and matter: “potential,” “energetic,” and “perfected.” Essence (*Ousia*) is not subject to the usual birth and decline/degeneration process. It is defined as that which was *a priori* possible to become. Due to its supremacy compared to the phenomena, when the substance is being studied, it leads, through subtraction, to the final analysis of the latter. The last and beyond time result is their substance, the predominant cause.

These three phases of the being - “potential,” “energetic,” and “perfected”- can be associated in a restrictive way, with the current characterizations of

matter (“potential,” “real”) and in a wider approach with “energy,” and so forth. The force is the Essence of movement and change, in other words energy.

Putting aside philosophers such as Democritus, Anaximander, or Anaxagoras and their accounts on size, mass, or transitions of matter, we arrive at the modern discovery of wave-massless particles—photons and gravitons. Therefore, the Orphic axiom according to which some material principle dominates the *Ἔν*’s content is confirmed in the physical world as well. This principle is called *Νύξ* (Night).

The Ancient Greek thought rejects both the notions of null and “spaceless”. The *Ἔν* exists in a familiar environment, which proves that, despite its indestructible nature, it is not literally “unborn”/without beginning. Whenever we deal with ontology in a positive way of thinking, all sorts of distinctions vanish through the dialectic *ἐναντιοδρομία*: “interaction between opposite tendencies” (Democritus). For instance, it is mentioned that: “Indeed, we conclude that the pre-universal place and the colorless, shapeless and unapproachable substance, and every transcendent width ... includes all the intellectual entities as well the Principle of the eternal all, the *Ἔν*” [16].

The description of a width containing the *Ἔν* itself fits to *Νύξ* (Night):

“Orpheus said that dark *Νύξ* possesses everything (...) meaning that *Νύξ* precedes everything else”. Therefore, the *Ἔν*’s environment resembles *Νύξ*. It is possible that whatever gave birth to the *Ἔν* remained intact, as its environment, and whatever was received into the sphere, was transmuted according to the defined space’s conditions.

Νύξ (Night) and *Ἰλῆ* (Matter)

The first referred differentiation of *Νύξ* takes place when the (infinite) part of her (infinite) “quantity” derives from the *Ἔν* as Matter-Earth or *Ἰλῆς* (Mud). Since the first Intellectual Duality has an intensively metaphysical character, to understand the properties of *Νύξ* it is important to relate it to Chaos, with which it seems to have a correlation to the Aether.

The main attributes of these two principles are the same:

“Chaos is a field of potential birth of forms (...) it has no boundaries, no bottom (...) dense darkness (...) is there (...) that is why Orpheus concludes that matter (Chaos is ‘potential’ matter) was produced by the First of

Intellectual Beings that is the *Nύξ*. Because there, abundant darkness and lack of limits rule (...) these characteristics are more evident in than in her derivative states" [17].

Chaos is also interpreted allegorically as *Πέλαγος* (open sea), with the connotation of "width"; in addition. Agitations today attributed to negative curvatures are also indicated.

Nύξ is an affirmative principle: it has the power/will to be dark; Chaos has neither this ability nor the opposite, according to the following part of the previous quotation.

Nύξ corresponds to the definitions of substance and movement as prime "eternity," self-existence.

Chaos is not exactly a "substance," as it is "shapeless." As an absolute denial, it anticipates its homologous absolute thesis (Aether) to become subsistence.

Modern physics may be able to arrive at a "representation/image" of the Night, an equivalent to dark matter, dark energy, particles-carriers of interaction, etc. In philosophical terms, it can be defined as "reason of matter," according to Aristotle, and its antecedent, "Number" (*Ἀριθμός*), because Number, as the power of harmony, is called *προ-ἄνουσίος* (anousios= without substance) [18]. So, Reason and Number are not substances (by superiority).

Moreover, *Nύξ*, in the content of the *Ἔν*, has the position of Cognition. Cognition is equivalent to reasonable Mind. Philosophers refer to Mind as any absolute causal subsistence, super-divine or divine, and also the *Ἔν* (from the word *Νόα*: in Dorian Dialect meaning Source).

The Intelligible Mind is called "Metis." (*Μῆτις*). A cross-sectioned sphere presents three basic components: a core, a perimeter, and the space between them. Considering them distinguished within the *Ἔν*, we name the core "Mind" (the source of emission of every conception), the space between we name *Nύξ*, and the perimeter *Λόγος*. The term "Logos" means, among others, "collect" and "cradle."

Nύξ evaluates the Mind's suggestions and forwards them to Logos, where they gather. Philosophers described the material universe based on the model and structure of the En. For instance, Leucippus and Democritus believe that the world is surrounded by a "stretched tunic." The interaction

of the Unexpressed Principle's three "places" is a discontinuous procedure. Anaxagoras's estimations about the Mind's pushing and mechanical activity within the world are very close to that hypothesis.

Manifestation of Noesis (Intellect)

"After the intelligible and indivisible unity, it became necessary to distinguish all those that appeared apart from the En. This distinction was made by 'Arithmos' (Number). Ineligible's female precedes them all ... [19]".

Plato repeats Orpheus's words: "The concise divination of *Núξ* is the center of each true science ..." [20]. The simple pre-existing difference is also expressed through "abstract" values, such as "The Hours of *Núξ* ... The first foresees and foretells—a characteristic of Science. The second is called *Σωφροσύνη* (Sophrosyne, Wisdom). The third brings Justice into our world ..." [21].

The words mentioned above show the main property of *Núξ*—Intellect. Later, she will express herself as Metis, the feminine part of the first-born God, Zeus's embodiment, *Τιτανίς* (Titanis, i.e. of titanic nature), Cosmic consciousness, and human inventiveness.

Núξ is also genuine in the world, as invisible nature-*Είμαρμένη*: "Eimarmeni is the substance binding all beings, or Logos according to whom the world evolves" [22].

The pair Matter-Earth/Water, the first "clear distinction," attracts the Soul, *Ανάγκη* (Anagae, Necessity), Persuasion (Spirit), and Logos.

The transcendental soul is simple: pure will, Schopenhauer's absolute *Wille*. This duality corresponds to urge and capability of life, conditions that activate all laws.

While the soul and the spirit nest mostly within matter, water relates by nature to Logos-Shape. Their interaction gives birth to Chronos (Time), born before space.

The distinction between space and "something else" containing matter is mentioned in the Orphic words: "(Chaos) ... Is not a place but a huge chasm ..." [23]

Chronos before space is called “Un-ageing,” i.e. Unattached to real matter. Chronos-point pre-existed within the *Ἔν*. The discontinuity places him at the center of the Sphere and “Hercules.” because he wants and acts to satisfy Soul’s and Matter’s will.

The Orphic Cosmogony concludes that the “spinning” Anangae-Necessity and the “whole” Adrastia (meaning inevitable, another name of Nemesis) are considered as being of the same origin as Chronos. Necessity shows a restrained but intense motional activity: “All mighty Necessity binds the *Ἔν* with strong ties” [24], and “this Cosmos in its origin was generated as a compound, from the combination of Anangae-Necessity and Νοῦς-Mind. And in as much as Mind was controlling Necessity by persuading her to conduct to the best end the most part of the things coming into existence, thus and thereby it came about, through Necessity yielding to intelligent persuasion ...” [25].

Necessity holds the “spindle,” stretched, through which the spheres spin [26]. Adrastia seems immobile, overstretched, and tangent to all points of the sphere; a repulsive/ expansive force, opposite to Necessity, identical to Spirit/Persuasion.

Chronos-point reveals the Soul within the intact *Ἔν*: “the beginning and cause of every movement” (Plato).

Chronos-Chaos-Aether

●out of the interpenetration of Matter-Earth and Water came Chronos. They released Aether, equivalent to Water, and Chaos, equivalent to Matter. So, the Second Intellectual Trinity was formed: the duality Aether-Chaos, and the unit Chronos. The expulsion of the pair’s biggest part from Chronos creates the conditions of space, by nature a continuum of Chronos.

Aether and Chaos are not superior to the various transcendent ontological systems. Their components consist of the foundations of worlds, e.g. of future ontological systems: “shaped substance.”

Chronos is allegorically described as a “waving snake,” with the heads of Taurus (chthonic powers) and Lions (solar celestial powers) on the sides, wings on the shoulders, and the “face of God,” illustrating a push forward and the tendency toward the future that now begins to show.

Water and Matter remain unexpressed within Chronos. Aether’s movement defines Chronos as a continuous, rhythmical, high-frequency flow of power

dynamic and kinetic. The temporality of Chaos, on the contrary, reveals disorder and instability.

The current description of the negative curvature static field of vacuum resembles the Chaos: “The first one guarantees the completion of beings, whereas Chaos is the beginning of continuous evolution. The one is the root of everything; the other has no beginning and no end” [27].

Therefore, the “Roots” are not the minimum sizes, proportionate to “subatomic particles” and the question of their further division. They are, however, attributed to the cognitive of Nature and Soul tetractys, which is structured. According Aristotle: “soul, is the first integrality (ἐντελέχεια, entelechy).” Plato in *Timaeus* refers to the structural elements of soul as well.

Aether is called, among others, “wet Aether” [28], and the “Perfect element of Cosmos” (Orphic Hymn to Aether).

Desirable results will be achieved by the intensified interaction between Aether and Chaos, always attached to Chronos. Aether is the bearer of the roots of *Γιγνεσθαι* (Gignesthae, the evolution process), the fourth unit of the one “Law/Logos.”

“The universal Law expands infinitely within the vast Aether and the fully shed light of Sun,” and Aether “sunk into matter” [29].

Under free conditions, Aether moves in waves (a spiral “River,” according to the dragon-Chronos model). In a positively curved space, it is considered as a stretched membrane that covers the universe internally like a “hymen,” and externally as a “shining” tunic, according to the example of Adrasteia [30]. But the lack of motion within a restless environment derives from its divine nature. It is extremely sensitive to every impulse, movement, or any other behavior of matter and energy, where it adapts regulatory. Therefore, its immobilization is a primal or ultimate state.

Aether should not be identified with “any other” form of matter or energy, nor with fire or light. It is everywhere, dense or thin. Aether is identified with Zeus, as a substance, thanks to its “sticky-attractive property. Zeus is transformed to *Ἔρως* (Eros) when he creates according to Pherecydes. In the world of Gignesthai it is obvious that he is Eros unstoppable, in contrast with his calmness in the Conceivable World” [31].

It acts as a pair with Spirit (Metis), so its compositions are not random but viable-dynamic. So, Zeus asks *Νύξ-Νόησις*:

“● Most High ... tell me how to hold the will of the gods with my hands?”

“(...) take all that revolves within Aether (...)” [32].

Plato in *Timaeus*, after the description of the other four platonic solids, says: “God projected into the Universe a fifth structure.” In *Ἐπινομίς* (Epinomis) he clarifies: “The elements are five ... Fire ... Water ... Air ... Earth ... and the fifth is Aether” [33].

Aether adapts to every condition/impulse of matter, while it bares energies logically by place and quality. Pure, it corresponds to the material form “plasma”: thunder, northern lights, the “soup of subatomic particles in the Universe,” even melting rocks and minerals.

Aether, although correlated with the Higgs field, is by no means a laboratory production. It is in absolute interdependence with Chronos, but within the world, as a god, he acts “non in tempore, sed cum tempore” (Augustine).

Space-time cannot “repeal” the substance or the conscience which, according to Hegel, “falls” inside “our” time. The universal noesis (Mind) might be included in Gödel’s theorem, within the true suggestions it predicts.

Modern physicists recall the Orphic Cosmology. Weinberg assumes the existence of one Super-Universe and many “universes” [34]. N. Prantzos, a Greek physicist, assumes a “bubble” from another universe that fertilized our own universe [35].

Genesis of the Universal World (Ἠόν/Egg)

The First Principles, denying their *principii essenti* state, advanced to the *principia fiendi* state, aiming at the accomplishment of a *principium cognoscendi* Whole.

● Orpheus says that the universe was born, in the following way: the ancient matter was animated and inside it was merging another substance ... that repeated millions of imperfect mixtures, smashing themselves into that disorder. But at some point, all this infinite “pelagos” started spinning like a whirlpool and mixing all substances as if they were in a funnel ... that whirlpool containing everything, attracted the Spirit which added logic to

the content. Just like liquids form bubbles, a spheroid body was formed moving upwards. It looked like an egg and its speed kept it flying. It is clarified that the *Ωόν* (egg) was revolving [36].

So, the space where universes of all physical worlds would be formed, was created. The whole procedure is described in detail in “**●**Orphei Sacred Words” [35]. However, it is interesting to mention:

- (1) Thermal forces and their role in the shape and distinction of material qualities, and,
- (2) The distinction but also the strong relation between pure Aether and its absolute next, Air, as a common substance, a bearer of spirit.

The World of Ideas/the Light

At first, the *Ωόν* is full of free, cold radiation. However, gradually, a hyper-thermic core of Aether and positive matter, pervaded by Spirit, is formed. While the core expands, it increases in heat so that, at some point, it exceeds the tolerance of the defined space. Therefore, the sphere cracks and the exceeding heat is released. Burning light and Spirit form a new world existing in between the Intellectual World and the Perceivable World. That is the World of intelligible beings and especially the World of light; a light like the solar one but diffused all over that world and of a total homeostatic temperature. It is defined that the *Ωόν*'s core consists of the birthplace/the womb of the First-born God, Phanes (Light), Metis (Noesis-Mind), *Ἐρικεπαῖος* (Erikepaios = Eros, Life), who brings into being the “Aforementioned Light, that traversed Aether” (~ Cosmic rays) [37, 38].

His body is the source of the Ancestral Light—the common root essence of beings—whose transformations are the source/origin of the energy equilibrium and positive evolution of all, as well as of matter itself.

The suns of the perceivable universes are material manifestations of Phanes, the progeny and mate of *Νύξ* (Night)-*Νόησις* (Cognition) and primeval matter [39].

As for the light, the ultimate condition of existence, brought forth by Aether, is proof of the ideal origin of things that we should aspire to and defend.

Perhaps this is the most essential influence that the modern world should receive from Ancient Greece.

Bibliography

1. Aristotle *Metaphysics* 10.7.7: "Theology is the first philosophy."
2. Otto Kern's "Orphicorum Fragmenta" collection. Fragments 1 - part A, vol. 1. Translating and comments by Maria J. Sideris. Edition by Pyrinos Kosmos Athens Greece, vol. 1 (2005) vol. 2 (2007).
3. Ibid. Kern's collection fragment 54-part A and fragm. 54, 60, 65, 86, 98. Part B, vol. 1. Also Kern's introduction in part B, vol. 1 in "Orphei Sacred Words in 24 rhapsodies".
4. Ibid. Kern's coll. Fragment 1. Part A, vol. 1.
5. J. Thomopoulos "Pelagians" page 802 Publisher PELEKANOS Athens 1912/2007.
6. Ibid. Kern's coll. fragm. 27 part B, vol. 1.
7. Ibid. Kern's coll. Introduction in "Orphei Sacred Words in 24 rhapsodies" page 141.
8. Ibid. Kern's coll. fragm. 51. Part B, vol. 1.
9. Aristotle "About of Heaven" G1. Otto Kern's Fragn. Introduction in "Sacred Words in 24 Rhapsodies. Also, Neoplatonic philosopher Simplicius "Explicative Notes in Aristoteles About heaven" III p. 298.
10. Ibid. Kern's coll. fragm. 20-part B, vol. 1.
11. Ibid Kern's coll. Frag. 18 G part B, vol. 1.
12. Ibid Kern's coll. fragm. 21 Part B, vol. 1.
13. Ibid: Kern's coll. fragm. 31-part, vol. 1.
14. Max Plank "The principle of equal forces" and "Aspects of Physic's theory" Publisher KATOPTRON- Athens.
15. Ibid. Kern's coll. fragm. 43-part B, vol. 1.
16. Ibid. Kern's coll. fragm. 34 Part B, vol. 1.
17. Ibid. Kern's coll. fragm. 13 Part B, vol. 1.
18. Aristotle "About of Number" as pre-existing "previous to the substance" being subject "in action". Also, Aristotle: "ΛΟΓΟΣ ΤΟ ΤΙ ΗΝ ΤΗΣ ΟΥΣΙΑΣ" i.e. The Logos pre-determines a priori what can be the substance. "Metaphysics" 6. See also note 22 and Kern's coll. fragm. 42- and 112-part B, vol. 1.
19. Ibid. Kern's coll. fragm. 42 Part B, vol. 1.
20. Ibid. Kern's coll. fragm. 47 Part B vol. 1.
21. Ibid. Kern's coll. fragm. 43Part B vol. 1.
22. Zeno of Cilium (Kition - Cyprus) Greek Hellenistic Thinker and Philosopher founder of the Stoic School: *PHYSICA. STOICORUM VETERUM FRAGMENTA* Collection Ab. Armin volume I Editio Prima Stuttgart Germany.
23. Ibid. Kern's coll. fragm. 13 Part B, vol. 1.

24. G. S. KERK - J.E. RAVEN -M. SCHOFIELD: "The Pre-Socratic Philosophers" Second Edition (1983) Cambridge University. Greek Edition Cultural Institute of the National Bank of Greece- Athens 2001. Extract 298 "Parmenides' notes in Symplicius Physics" 145.
25. Plato: Timaeus 48a.
26. Ibid. Kern's coll. fragm. 1 Part A, vol. 1.
27. Ibid. Kern's coll. fragm. 13 Part B, vol. 1.
28. Idem note 27.
29. G. S. KERK - J.E. RAVEN -M. SCHOFIELD: "The Pre-Socratic Philosophers" Second Edition (1983) Cambridge University. Greek Edition Cultural Institute of the National Bank of Greece- Athens 2001. Extract 413, 372 Empedocles and Aristotle' s Rhetoric A/13. See also Orphic Hymn 'Aether'.
30. Encyclopaedia ELEFTHEROUDAKIS: word "Aether". See also Ed. Witten' s M – Theory.
31. Ibid. Kern's coll. fragm. 3 Part A, vol. 1. Also, fragm. 12- and 31-Part B, vol. 1.
32. Ibid. Kern's coll. fragm. 108- and 109-Part B, vol. 1.
33. Plato's EPINOMIS and TIMAEUS 56.
34. S. Weinberg, Gravitation and Cosmology, John Wiley and Sons, New York, 1972.
35. N. Prantzos, in A. Nicolaidis (Ed.) The World in Science and in Religion (In Greek), Kyriakides Bros, 2018.
36. Ibid. Kern's coll. fragm. 18. Part B and fragm. 3 Part A. See also Gödel' s Theory about Spinning Universe, also R. Goldstein' s "Prisoner in Mathematics" publisher: Travlos – Athens Greece. See also Steven Hawking' s *A briefer history of time*. Page 218 and following. Publisher KATOPTRON -Athens. As far as the birth of the cosmic Egg (Eon) and the entire spheroid Space- Time or Weinberg' s "Super- Universe" or Karel Velan' s "Multiplex Cosmos". Also, Alan's Guth's "Cosmic Inflation" theory and "An Eternity of Bubbles".
37. Ibid. Kern's coll. fragm. 3 Part. A. Vol. 1.
38. Ibid Kern's coll. fragm. 12 and 17 Part B, vol. 1.
39. The Orphic thesis as presented in the entire Greek (Orphic) Theology – Philosophy teaching that the Cosmos is the product and the containing of a Universal Intellect, and that, finally, it is an alive Being, having soul and breath, prevails in the contemporary scientific world of physics and mathematics. This thesis is also developed by P. Davis: "Why is the Universe Just Right for Life?", Erwin Schrödinger: "The Nature and the Greeks". Others e.g. M. Plank and S. Weinberg support the hypothesis that the human mind cannot understand the Cosmos.

3.4

DECIPHERING THE MYTH OF THESEUS

DR. SOCRATES CHRISTODOULARIS

OSTEOPATHOLOGIST, ATHENS

Abstract

The well-known myth of Theseus accounts for a lot of achievements of the hero performed against the bandits Periphetes or Korynitis, Skiron, Sinis, Procrustes, and Kerkyon. However, the labors committed correspond to the ways of healing applied by the modern science of osteopathy.

Theseus: Hero and King

Theseus¹ was born in Troezen² of Argolis and was the son of princess Aethra and Aegeus or Poseidon. He was one of the first kings of Athens and is considered a descendant of Erechtheus. According to the legend, Aegeus placed his sandals and sword under a huge stone and ordered that if the child being born would be a boy, he should lift the stone, get his fathers' bequest, and secretly come and meet him in Athens. Theseus as a teenager began his journey to Athens and achieved feats similar to those of Hercules. He did away with bandits, sending them to the underworld. He arrived in Athens through the Sacred Way and was saved from death when Medea, then married to Aegeus, tried to poison him. Theseus was recognized by his father, chased away Medea and her children, and passed on part of his kingdom to Theseus.

As a king, Theseus continued his labors by incorporating the villages and towns of Attica into the state of Athena, and naming it "Athens," in plural. It is not clear when and where he died, but there is a story saying that he was pushed off a cliff by a contesting king. The temple of Thesseion³ is alleged to house his bones, where they were deposited in 473 BC.

The Myth of Theseus

Theseus, traveling from Troezen to Athens,⁴ met the first robber at Epidaurus, the giant Periphetes, or Korynitis, who, by “swinging” a clave (bat),⁵ killed passing travelers. Theseus killed Periphetes and retained the club, which was Theseus’s emblem thereafter.

At Kechreai, one of the two harbors of Corinth, where the road turned towards the Isthmus, was Sinis, another dangerous man who put strangers through a horrific ordeal. Sinis was called Pityokamptis, i.e. the tree-bender, since he bent *Pitis* [pine trees] trees to the ground. Travelers not strong enough to prevent the springing up of the trees were flung into the air and crashed to the ground. Theseus triumphed again by defeating Sinis the pine-bender.

At Megara, Theseus killed Skiron, who robbed travelers and threw them over the precipice into the sea. The rocks were steep and the Megarians recounted a story about a sea turtle, an animal of Hades, which shredded and devoured people. They also recount that Skiron sat on one of these rocks and forced passersby to wash his feet. While the travelers tried this, Skiron would kick them into the sea to be eaten by the turtle. The rocks are today known as the Skironides Stones.⁶

The Megarians believed that Skiron was not a robber but a punisher of thieves and a friend of the righteous Kychreus, father-in-law of Aeacus. Skiron was also believed to be a God of the Underworld.

Another feat of Theseus performed on his way to Athens was confronting Procrustes, who stretched and hammered passersby, like the blacksmith hammers and stretches heated iron. Others recount that the deadly workshop was on the Korydallos mountain range, where the road to Athens led through the Sacred Way from Eleusis. They even say that a bed was sculptured from one of the rocks, and if the bed was too long, he stretched them to fit it by dismembering them. If, on the other hand, they were taller than the bed, he would chop off the protruding parts.

According to an old story, Theseus, upon arrival in Eleusis, met Cercyon, i.e. the one with a tail, a wrestler. Cercyon forced travelers to wrestle with him and killed them in the process. On the road connecting Megara with Eleusis, local gentry showed the place where Cercyon performed his deadly act. Theseus lifted him up and threw him forcefully to the ground, smashing his bones. It is said that Theseus was the first to discover the art

of wrestling and that he defeated Cercyon with his dexterity rather than by sheer strength.

Deciphering the myth

Many years of studies and observations, but mainly a longstanding application and implementation of osteopathy, have led the author to the conclusion that the above feats of Theseus are related to the methods of Hippocratic medicine.

The first “bandit” whom Theseus met was Periphetes, or Korynitis, who used the clave as a lever or a hammering tool. Today, the lever method is used to break down or soften up chronic contractions or spasms involved in the displacement or lesions of the vertebrae. These lesions intervene by pressing or even “throttling” nerve roots, thereby reducing the neural capacity and strength, i.e. the current which ought to be directed to the diseased part of the body.

Today, apart from the Asculapian lever (the corina or clave of Korynitis) being used as a lever, it is also used for rhythmic knocking on trigger points, with due caution. Initially, the rhythmic knock (percussion) was in use. Then the little hammering rejuvenator (activator method) was invented. Recently, the use of the “knocker/anvil” method was reinstated, although applied sparingly due to the intense reaction of the body. My observations have shown that the results are extremely positive.

The next “robber” *en route* was Sinis the Pityokamptis. Today, we use the inverse gravity-jolting machine in order to reduce a dislocated hip. Thus, with a sudden tug of the leg, the necessary reduction is obtained.

The third “thief” is Skiron, who, after the therapeutic care of the travelers, ordered them to wash his or their feet, making them lean forward. Nowadays, we ask our patients to bend forward so as to verify any positive or negative results of our treatment. If Skiron failed, he threw them over the cliff into the sea, where they were eaten by a gigantic turtle. But “turtle” is the name of a bowl at the mining company in Lavrion which has the shape of a boat. Could we exclude the probability of the bundling off of travelers within this turtle-shaped tub and sending them to their death by sea (after paying a ransom of course)?

The fourth “thief” is the still notorious Procrustes or Polypimon, who is reported to have invented the first traction table. Today, traction is used

when the muscles of the lumbar region are so tight or painful that the normal muscle relaxants do not contribute to the mobilization or reduction of the vertebrae. Hippocrates had a reduction or traction table, as described clearly in his book *Mochlikos*.

Our treatment consists of a type of kinesiotherapy where we exert all our strength to quickly restore the malfunctioning of the body structure, particularly in difficult cases. Since some patients are classified as rather sedentary types, their joints are stiff and seize up suddenly when lifting heavy loads or performing violent movements. This resembles the Greek “free for all” wrestling. In this way, to the eyes of the uninitiated, we may associate this with the wrestler Cercyon, who killed his opponents while wrestling with them.

Theseus, the son of King Aegeus, with the Greek mitochondrion, an acquisition from his mother Aethra, was urged to organize this regime into the Scientific Therapeutic Hippocratic Medicine.

My conclusion is that Theseus killed or distanced those who in an uncontrolled way monopolized medical care on the Troezen-Athens route and possibly selected all who were dealing with medical care within a controlled area, so that their knowledge would evolve and contribute in founding the Scientific Hippocratic Medicine.

Bibliography

- 1) D. Apostolidis Panos, *Dictionary of Hippocratic Words* (Athens: Gavrielides Publications, 1997).
- 2) Hippocrates Surgical, introduction and translation by Dimitrios Lypourlis, (Editions Zitros, 2001).
- 3) Ragavi P. Alexander, *Dictionary of Greek Archaeology, Inhibitory Edition* (Athens: Institute of Book-A. Kardamitsa, 1996).
- 4) Skarlatos D. of Byzantium, *Greek Dictionary* (Athens: Edition: Andrew Koromila, 1852).
- 5) Stageiritis Athanasius, *Ogygia or Archaeology, Vol 1*, (Athens: Eleutheri Skepsis, 2011).
- 6) Triantafyllides Constantinos, *Genetic History of the Greeks, the DNA of the Greeks* (Kyriakidis).
- 7) Paul Decharme, *Mythology of Ancient Greece*, translated by Alexander M. Karalis (Athens: “Dimiourgia” Ap. A. Harisis, 1996).

- 8) Scott Haldeman, DC, PhD, MD, *Modern Developments in the Principles and Practice of Chiropractic* (New York: Appleton-Century-Crofts, 1980).
- 9) K. Kerényi, *Mythology of the Greeks*, translated by Dimitris Stathopoulos (Athens: John. D. Kollaros & SIA, 2006).
- 10) Virgil V. Strang, *Essential Principles of Chiropractic* (Davenport: Palmer College of Chiropractic, 1985).

Notes

- 1 P. Ragavi, "Alexander," *Dictionary of Greek Archaeology*, Anastatiki Edition Institute Book-A (Athens: Kardamitsa, 1996), sel. 386 and on.
- 2 K. Kerényi, *The Mythology of the Greeks*, translated by Dimitris Stathopoulos (Athens: John. D. Kollaros & Co., 2006), 458.
- 3 *Ibid.*, 489.
- 4 Paul Decharme, *Mythology of Ancient Greece*, translated by Alexander M. Karalis (Athens: Dimiourgia Ap. A. Harisis, 1996), 624.
- 5 D. Skarlatou, *Byzantine, Greek Dictionary*, edited by Andrew Koromila (Athens, 1852), 745.
- 6 Kerényi, *The Mythology of the Greeks*, 462.

3.5

HEPHAESTUS: THE SMITH GOD WITH TWO LAME LEGS

EUTERPE BAZOPOULOU-KYRKANIDOU
PROFESSOR EMERITA, UNIVERSITY OF ATHENS

Abstract

Hephaestus, the Olympian god of metallurgy, famed for inventions, taught humans glorious crafts. The fixed epithet for Hephaestus, used by Homer, Hesiod, and other ancient authors up to the fifth century AD is “Αμφιγυής,” the god of the two lame legs. He is also called “κυλλοποδίων” [“clubfooted”]. His posture and typical gait are characteristically described by Homer and help in making a diagnosis.

Vase paintings of the sixth century BC depict Hephaestus’s lameness, but this was not emphasized in the fifth century and thereafter. His anomaly is described as being congenital, and two sons are reported as having deformed feet. For this disablement, several interpretations and contemporary medical diagnoses have been proposed. Furthermore, literal and visual indications suggest that Hephaestus performed the first recorded craniotomy on Zeus’s skull.

In this article, a combination of the information derived from the Ancient Greek texts and illustrative arts is presented. It is concluded that Hephaestus’s disability appears as a congenital bilateral *talipes equinovarus*, or clubfoot.

1. Introduction

The scientific and medical study of human abnormalities continues to greatly expand in our present day. However, empirical observations on malformed individuals can be traced in Ancient Greek, Latin [1, 2, 3, 4],

and Hebrew [6] literature, and in pictorial representations on vase paintings, coins, sculptures, and other works of art [5, 6, 7]. For today's clinician, it is a challenge to study the descriptions and illustrations of malformed people given by authors and artists in those ancient sources and to make a "diagnosis." Such an effort provides an opportunity to appreciate acute observations by ancient "non-medical specialists" and their contributions, which gradually led to modern medical knowledge. In early ancient writings, myth and reality are inextricably interwoven, and it is difficult to separate out the truth. Probably the best way to approach and appreciate past knowledge is to try and uncover the truths hidden beneath each verse. In this work, based on literary and visual sources, I will try to present Hephaestus, the malformed god of the Ancient Greek pantheon.

Hephaestus is essentially a divinity of the "Pelagic" Aegean area and his cult principally developed on the island of Lemnos and the neighboring regions [8]. He is also connected with the city of Athens. Here, as a result of his thwarted encounter with goddess Athena, he became father of one of the first kings of Athens, Erichthonios, and ancestor of the Athenians. Athena fostered the child. Earth's involvement in Erichthonios's birth was probably meant to preserve Athena's image as a virgin goddess. Fowler [9] has argued that the myth of Erichthonios may well be a "notion of immaculate conception."

In the Classical Age, a monumental temple was accorded to Hephaestus, along with Athena, sometime after 450 BC [10].

Hephaestus, god of fire and technology, was born on Mount Olympus, the fabled abode of the greater Greek gods. He had crippled feet, making him an outsider among the perfect Olympians. For this disability, realistic, mythological explanations [4, 10, 15, 16] and medical diagnoses have been proposed [18, 19, 20, 21, 22, 23].

In this article, I attempt to interpret this god's disability in medical terms, using the relevant evidence from Ancient Greek writings and visual arts.

2. Evidence for Hephaestus's lameness

2.1 Literary Sources

The most important evidence for Hephaestus's lameness remains in literary sources: Homer, Hesiod, Herodotus, Apollonius Rodius, Diodorus Siculus, Apollodorus, Pausanias, and Nonnos.

According to Herodotus, Homer and Hesiod first declared the external forms of the gods [25].

2.2 Conception and Birth

Hera bore Hephaestus by parthenogenesis [11, 12]. According to Homer [26], his parents were Hera and Zeus. Both versions are cited by Apollodorus [27].

2.3 Congenital Anomaly

Hephaestus says that his anomaly was congenital. His mother Hera repeats this, and expresses her disappointment [26].

In the Homeric references, there is no clear evidence to show that his legs were broken when he was hurled down from Olympus, but this is suggested later. Hera, ashamed of her baby's deformity, flung him from Olympus [29]. Zeus also did the same [26]. This time, the fall caused his lameness; this was written late, in the first or second centuries AD [27].

The sequel of Hephaestus's expulsion, which tells us how he took his revenge by ensnaring his mother in an artfully constructed throne, from which she was eventually released by Hephaestus only after Dionysus brought him back drunk to Olympus, became a favorite subject for Dionysian vase paintings of the sixth and fifth centuries BC.

This story was cast in literary form by Alcaeus [30] around 600 BC [19], and was recorded by Pausanias [31].

So Hephaestus, nine years after his expulsion from Olympus [29], was called back to the divine abode where he lived thereafter in his own palace, working in his forge.

3. Type of anomaly

Hephaestus's fixed epithet is *αμφιγυήεις* [9]. There has been much debate about this word among scholars [29]. Most of them [32, 33, 34, 35, 36, 37] argue that the meaning is "with both feet crooked" "severely bow-legged."

In the second edition (1999) of the first and second volumes of the *Iliad*, revised by W. F. Wyatt, the epithet *αμφιγυήεις* is translated as: "the god of

the two lame legs,” replacing the older “of the two strong arms” given by A. T. Murray in Loeb Classical Library I (1924–88) and II (1925–85).



Fig. 1. A curved piece of wood on a plough (Folk’s Museum “The Village,” Corfu, Greece)

The word *αμφιγυήεις* consists of two words: *αμφί* and *γυήεις*. The word *αμφί* is a preposition that means “bilateral.” On the other hand, *γυής* was the curved piece of wood in a plough to which the share was fitted (Fig 1).

This kind of plough and its *γυής* was described by Hesiod in his *Works and Days* [38]. The similarity between *γυής* and the form of a clubfoot is obvious (see Fig. 2 below).



Fig. 2. Infant with bilateral congenital clubfoot.

So, the meaning of *αμφιγυήεις* should be taken as “bilaterally clubfooted.”

Hephaestus is also called *κωλοποδίων* [clubfooted and bandy-legged], which more clearly refers to the abnormality of his feet.

In addition, Hephaestus had slender legs; he was shriveled of foot, crooked. He was born weak, halting [26].

Hephaestus’s lameness is not a secret and is mentioned on many occasions by epithets that refer to his halting gait [38, 39, 12, 26, 40].

Surprisingly, his lameness does not prevent him from having beautiful wives: Charis, Aphrodite (Venus), and Aglaea. He also had an encounter with the goddess Athena.

Now, let us turn to stories about some of Hephaestus's glorious craftsmanship, the "Hephaestoteucta," and at the same time about his physical appearance and manner of walking, from Homer's narrative. The first story is about the visit of Achilles's mother Thetis, who came to ask Hephaestus to make her son new armor:

He spoke and rose from the anvil, a huge, panting bulk, limping along, but beneath him his slender legs moved nimbly ... and with a sponge he wiped his face and both his hands, and his mighty neck and shaggy breast, and put on a tunic, and grasped a stout staff, and went out limping; and there moved swiftly to support their lord handmaids made of gold in the semblance of living girls. In them is understanding in their minds, and in them speech and strength ... They busily moved to support their lord, and he, limping near to where Thetis was, sat down on a shining chair [29].

Summing up Hephaestus's physical status, as given in the literary sources, we see that Hephaestus appeared as a large man, with a mighty neck, hairy chest, massive shoulders, slender legs, and bilateral clubfoot.

4. Hephaestus in Illustration

Original representations of the gods appear from about 700 BC. Gods are not fixed and motionless objects of veneration; they are drawn into the hurly-burly of mythical action [9].

A cannon of iconographical attributes to identify the gods was developed. Hephaestus carries a hammer and tongs or a double axe [8].

Art in the Classical Age tends to dispense with attributes and to characterize the gods solely by their ethos.

In the *Lexicon Iconographicum Mythologiae Classicae* (LMC) (1988) [41] there are more than one hundred illustrations of Hephaestus from vase paintings, sculptures, coins, and other works of art. Most date from the Archaic and the Early Classical ages. Some clearly depict Hephaestus's lameness, while others simply indicate it. Two vase paintings and a carnelian scarab with a design in intaglio are very important, for these four items definitely depict his lameness. The first is a Corinthian amphora of the first quarter of the sixth century BC (see Fig. 3 below).



Fig. 3. Corinthian amphora of the first quarter of the sixth century BC, National Archaeological Museum, Athens

The amphora depicts Hephaestus on his return to Olympus as a beardless individual with crooked feet, drinking, while riding on one side of a donkey. One more painting in a Caeretan hydria dating to 525–520 BC illustrates Hephaestus as a young, clubfooted boy riding a donkey on his return to Olympus, since, according to the Homeric tradition, he should be about nine years old at the time [41, p. 103].

A carnelian scarab (Etruscan) dating from 520–510 BC depicts Hephaestus, bilaterally clubfooted, between Thetis and Achilles, who is receiving his armor [41, p. 18].

In the rest of the illustrations of archaic art, Hephaestus is generally represented as a middle-aged, bearded man riding a donkey on his return to Olympus, or sitting on a winged chariot [41, p. 44], or wearing winged sandals, as his feet are turned inward and backward [41, p. 198].

The riding of the donkey, the winged chariot, and sandals indicate his incapacity for normal locomotion, a characterization of the god fundamental in the *Iliad* [8].

Of special interest is the vase painting from about 540 BC depicting Hephaestus having just split open the skull of Zeus, while Athena springs fully armed from his head. He holds a two-headed axe, evidently used to perform the craniotomy (see Fig. 4 below).



Fig. 4. Athena springs from Zeus's split head (© The Trustees of the British Museum)

Hephaestus's lameness is no longer emphasized from the fifth century and thereafter [43]. After 470–460 BC, Hephaestus is illustrated as a perfectly normal bearded man. He stands naked with Athena and Gaea (Earth) at Erichthonius's birth, or at Athena's birth from Zeus's head, where he wears a short, sleeveless tunic and carries a double axe, or else a hammer and tongs.

From this review of the relevant sources, it seems that the literary evidence on Hephaestus's lameness is more reliable than depicted in visual art.

5. Discussion

Hephaestus's lameness has been a favorite subject, indeed a diagnostic challenge, for several authors in recent medical literature. Five papers [1, 18, 19, 20, 21], a letter to the editor [18], and observations based on illustrations [41, pp. 129, 103] by Silverman, Bartsocas, and Schadewaldt [7], have made the diagnoses: achondroplasia [17, 18], diastrophic dysplasia [18]. Hephaestus was short, a dwarf [18, 19, 20], bilateral clubfooted [20, 21], occupational disease, i.e. peripheral acquired arsenic-neuritis (Verkerdi 1986, cited by [19]).

The diagnosis of achondroplasia by Aterman [17, 18] was mainly based on two points: firstly, his thesis is based on the conviction that Hephaestus is a direct descendant of the Egyptians gods Ptah and Bes, both of whom were depicted as deformed, bow-legged dwarfs. But Herodotus [26] describes an image of Hephaestus in Egypt which did not necessarily show the same as the Greek images of the god. From this text it becomes

apparent that this particular image of Hephaestus was not like the other known images.

Secondly, Aterman [17] argues that Hephaestus “was originally thought of as a dwarf,” and his unsuccessful attempt to rape Athena, ending with an ejaculation “against her thigh, a little above the knee” is in keeping with this image.

The text [40] refers to the leg in general and not any particular site. Besides, how would a dwarf ever dare attempt to rape a normal woman standing erect?

Coming to the diagnosis of diastrophic dysplasia [19, 22] based on Fig. 3 above, we repeat that Hephaestus was not short. He appeared as a “huge, panting bulk.” Besides, how would an individual with diastrophic dysplasia, having deformities of the hands, such as hitchhiker’s thumb, symphalangism, and limited mobility and dislocation of major joints [43], ever be able to construct the marvel Hephaestoteucta, including tripods and robot handmaids [29]? The automatic nature of these constructions has been theoretically ascribed to Hephaestus’s magical power to infuse life into inanimate materials [16]. But why call him “magician” and not “inventor”? Hephaestus was famous for his skill and art. His automatic constructions appear to be the very first examples of automata, i.e. figures which simulate the actions of living beings—robots [44]. It seems that “each generation needs” not only “a new translation of Homer” [45], but also a reinterpretation of the legend under the contemporary technological knowledge.

A diagnosis of bilateral clubfoot has been made by Bartsocas [20], Bartsocas and Schadewaldt [7], and Jobba [21] based mostly on the early vase paintings [41, p. 129]. There is no particular mention in the sources that Hephaestus’s birth was premature. His deformity was non-syndromic but congenital, so it could not be an occupational disease, such as paralysis brought on by arsenic bronze (Verkerdi 1986, cited by [21, 23]). Consequently, we can agree with Bartsocas, Schadewaldt, and Jobba that, most likely, congenital bilateral clubfoot made Hephaestus lame.

Warkany [6, 1005] gives a description of the patient with clubfoot that parallels the detailed and vivid one of Hephaestus made by Homer: “The deformity may be so severe that the patient walks on the outside of the foot, which is turned directly inward, upward and backward. The muscle

mass of the gastrocnemius is reduced and located very high, just below the knee, so that the lower part of the leg appears very thin.”

Clubfoot is one of the most frequent malformations noticeable at birth, averaging 1.8/1,000 from various countries [6, p. 1004]. Clubfoot may be rarely transmitted as an autosomal dominant trait [6, p. 1007, 45].

The birth of Athena, described by Hesiod in the *Theogony* circa 700 BC, has been analyzed from different perspectives. From a medical perspective, however, her birth represents the first record of a rudimentary craniotomy. The figure of Hephaestus was endowed with characteristics similar to those expected of a surgeon during the time of Hesiod: highly skilled, clever enough to accomplish a craniotomy without resources, and disregarded by the upper classes. Not surprisingly, Hephaestus was chosen to perform the first craniotomy among the gods.

This myth describes the association between an intracranial lesion and the development of headaches, and depicts the rudimentary use of craniotomy for medical purposes [47].

Craniotomies in the form of trepanation were practiced throughout most of the ancient world. Nonetheless, it was in Greece that craniotomies were first described in texts by Hippocrates and Galen [48].

6. Hephaestus's sons

Hephaestus's sons, Palaemonius and Periphetes, are reported as having crippled feet: Palaemonius was one of the Argonauts [27, 40], while Periphetes was a criminal [27].

7. Conclusions

From these analyses of the ancient descriptions of Hephaestus and his sons, we can say that there is a reflection of reality in this mythical individual. He represents a hardworking charismatic craftsman even able to construct automatic mechanisms reminiscent of modern robots. Not surprisingly, Hephaestus was chosen to perform the first craniotomy among the gods. His physical condition appears to be an example of congenital bilateral clubfoot, *talipes equinovarus*.

Indeed, to quote the Modern Greek Nobel Laureate poet Odysseus Elytis, these myths “broke the gates of their silent palaces shouting a new truth” [49].

References

1. S. C. Bartsocas, “An Introduction to Ancient Greek Genetics and Skeletal Dysplasias.” *Progress in Clinical and Biological Research* 104 (1982): 3–13.
2. S. C. Bartsocas, “Goiters, Dwarfs, Giants and Hemaphrodites.” In *Endocrine Genetics and Genetics of Growth*, edited by C. J. Papadatos and C. S. Bartsocas. New York: Liss, 1985, 1–18.
3. E. Bazopoulou-Kyrkanidou, “Mythos and Logos in Hesiod’s *Theogony*, circa 700 BC.” *American Journal of Medical Genetics* 62 (1996): 125–44.
4. R. Garland, *The Eye of the Beholder: Deformity and Disability in the Graeco-Roman World*. Ithaca, NY: Cornell University Press, 1995, 61–3, 113–14.
5. A. Czeizel, “Life and Death of Tutankhamun from Human Genetic Aspects.” *Ther Hung* 28 (1980): 40–3.
6. J. Warkany. *Congenital Malformations*. Chicago: Year Book Medical Publishers, 1980, 6–20, 425, 1004–9.
7. J. Kunze and I. Nippert, *Genetics and Malformations in Art*. Berlin: Grosse Verlag, 1986, 44, Fig. 47, 45, Fig. 48.
8. A Hermaray and A Jacquemin, “Hephaistos” in *LIMC* IV (1) (1988): 627–54.
9. W Burkert, *Greek Religion*. Cambridge, MA: Basil Blackwell, 1985, 123-4, 167–8.
10. M Fowler, “The Myth of ‘Επιχθόνιος.” *C Ph* 38 (1943): 28–32.
11. Hesiod, *The Theogony*, edited and translated by Glenn W. Most. Cambridge, MA: Loeb Classical Library, 2006, 927–8.
12. Nonnos, *Dionysiaca*, translated by W. H. D. Rouse. Cambridge, MA: Loeb Classical Library, 1962, II. 224–6; IV. 956–8; V. 140–1, 218–19; IX. 228–31; XXX. 95.
14. The Homeric Hymns, *To Hephaestus*, 1–7. In Hesiod, *The Homeric Hymns and Homerica*, translated by H. G. Evelyn-White Loeb. Cambridge, MA: Loeb Classical Library, 1982.
15. Diodorus of Sicily. Translated by C. H. Oldfather. London: Heinemann/Cambridge, MA: Harvard University Press, 1970, V. 1–4; V. 74. 2–4.

16. R. E. Paulys, *Realencyclopädie der Classischen Altertumswissenschaft*. Stuttgart: Druckenmüller, 1930, VIII, 333–7.
17. M. Delcourt, *Hephaistos ou la Légende du Magicien*. Paris: Societe d'Édition "Les Belles Lettres"; 1957, 56–7, 110–36.
18. K. Aterman, "Why did Hephaestus Limp?" *The American Journal of Diseases of Children* 109 (1965): 381–92.
19. K. Aterman, "From Horus the Child to Hephaestus Who Limp: A Romp through History." *American Journal of Medical Genetics* 83 (1999): 53–63.
20. F. N. Silverman. "RE: Why did Hephaestus Limp?" *The American Journal of Diseases of Children* 109 (1965): 392.
21. S. C. Bartsocas, "Hephaestus and Clubfoot." *Journal of the History of Medicine and Allied Sciences* 27 (1972): 450–521.
22. G. Jobba, "What Could Have Caused the Limping of Hephaestus?" *British Journal of Rheumatology* 29 (1990): 451–3.
23. M. Ramachandran and J. Aronson, "The Diagnosis of Art: Diastrophic Dysplasia and Hephaistos." *Journal of the Royal Society of Medicine* 99 (2006): 584–5.
24. R. Amott, "The Diagnosis of Art: Diastrophic Dysplasia and Hephaistos." *Journal of the Royal Society of Medicine* 100 (2007): 67.
25. A. Lesky, *A History of Greek Literature*, translated by J. Willis and C. de Heer. London: Methuen, 1966, 14, 91, 307, 728–9, 778, 817, 856–7.
26. Herodotus, Book II. 53; III. 37. Cambridge, MA: Loeb Classical Library, 1975.
26. Homer, *Odyssey*. Revised by George E. Dimock. Cambridge, MA: Loeb Classical Library, 1995, 7, 88, 312, 316–17, 316–20, 571–2, 586–94, 921–7.
27. Apollodorus, *The Library*, translated by J. G. Frazer. Cambridge, MA: Loeb Classical Library, 1954–6, I. iii. 5; I. iii. 6; I. iv. 4; I. ix 16; III. xiv. 6; III. xvi. 1.
28. The Homeric Hymns, III. *To Pythian Apollo*, 316–18; XX. In Hesiod, *The Homeric Hymns and Homerica*, translated by H. G. Evelyn-White. Cambridge, MA: Loeb Classical Library, 1982.
29. Homer, *Iliad*. Revised by William F. Wyatt. Cambridge, MA: Loeb Classical Library, 2001, 16, 118, 217, 373–7, 369–422, 395–402, 410–22, 417–18, 586–94.
30. D. Page, "Sappho and Alcaeus: an Introduction to the Study of Ancient Lesbian Poetry," 3. The Hymn to Hephaestus. Oxford: Clarendon, 1955, 258–61.

31. Pausanias, *Description of Greece, Attica*, I. xx. 3; *Elis I*, V. xix. 8. Translated by W. H. S Jones. Cambridge, MA: Loeb Classical Library, 1966.
32. H. G. Liddell, R. Scott, and H. S. Jones, *A Greek-English Lexicon*. New York: Oxford University Press, 1990.
33. G. S. Kirk, *The Iliad: A Commentary*, Vol. I, Book 1. Cambridge, MA: Cambridge University Press, 1985, 114.
34. B. Snell, *Lexicon des Frühgriechischen Epos*. Gottingen: Vandenhoeck & Ruprecht, 1955, 674.
35. Etymologicum Magnum, T. Gaisford. Oxford, 1848.
36. Schmidt's MIAE. *Lexicon of the Greek Language*. Athens, 1888.
37. I. Stamatakou, *Lexicon of the Ancient Greek Language*. Phoenix, 1972
38. Hesiod, *Works and Days*, edited and translated by Glenn W. Most. Cambridge, MA: Loeb Classical Library, 2006, 70–7, 427, 436, 571–2.
39. Hesiod, *The Shield*, edited and translated by Glenn W. Most. Cambridge, MA: Loeb Classical Library, 2002, 70–1, 218–19.
40. Apollonius Rhodius, *The Argonautica*, edited and translated by William H. Race. Cambridge, MA: Loeb Classical Library, 2008, I. 202–6; III. 37; III. xiv. 6; IV. 956–8.
41. “Lexicon Iconographicum Mythologiae Classicae” (LMC), 1988, IV. 1. 627–8, 650–9, 681–4. IV. 2. 386–405.
42. J. Boardman, *Athenian Red Figure Vases: the Archaic Period*. London: Thames and Hudson, 1991, 225.
43. W. A. Horton, D. L. Rimoin, R. S. Lachman, F. Skovby, D. W. Hollister, J. Spranger, C. I. Scott, and J. G. Hall, “The Phenotypic Variability of Diastrophic Dysplasia.” *The Journal of Pediatrics* 93 (1978): 609–13.
44. W. Little, H. W. Fowler, and J. Coulson, *The Oxford Universal Dictionary Illustrated*. Oxford: Clarendon, 1967.
45. Homer, *Iliad*, translated by R. Fagles. London: Penguin Books, 1991. Interview in H. Καθημερινή (Athens), November 3, 1996.
46. J. Wang, R. M. Palmer, and C. S. Chung, “The Role of Major Gene in Clubfoot.” *American Journal of Human Genetics* 42 (1988): 772–6.
47. B. C. Brasiliense, et al., “The Legacy of Hephaestus: the First Craniotomy.” *Neurosurgery* 67 (4) (2010).
48. S. Missios, “Hippocrates, Galen, and the Uses of Trepanation in the Ancient Classical World.” *Neurosurgery Focus* 23 (1) (2007): E11.
49. O. Elytis, “Orientations.” Dionysos. Athens: Icaros, 1966.

4.

THE RIDDLE OF TARTESSUS

4.1

PALEO GEOGRAPHY OF THE GULF OF CADIZ IN SOUTHWESTERN IBERIA DURING THE SECOND MILLENNIUM BC

ANTONIO RODRÍGUEZ-RAMÍREZ

UNIVERSIDAD DE HUELVA, HUELVA, SPAIN

AND JUAN J. R. VILLARÍAS-ROBLES

CENTRO DE CIENCIAS HUMANAS Y SOCIALES, MADRID, SPAIN

Abstract

A remarkable feature of the geomorphological processes at work on the coasts of the Gulf of Cádiz in southwestern Iberia is the estuarine mouths of a number of large-flowing rivers: Guadiana, Piedras, Tinto-●diel, Guadalete, and Guadalquivir. These mouths exhibit sandy barriers and marshlands. ●ver the most recent millennia, these five estuaries have been conditioned by fluvial-marine dynamics, climate change, neo-tectonics, and anthropogenic activity. The systems of sandy littoral barriers and marshlands built up during phases of progradation and aggradation, and were interrupted at intervals in the course of the Holocene by erosional phases of “extreme wave events” or EWEs (storm surges or tsunamis) and subsidence. A multidisciplinary study from a number of cores drilled in the Guadalquivir paleo-estuary has made it possible to identify evidence of as many as three EWEs in the area in the second millennium BC: A (~2000 cal yr BC), B (~1550 cal yr BC), and C (~1150 cal yr BC). Evidence of these three events has been recognized elsewhere along the Iberian coasts of the Gulf. The three events caused significant geographical changes, which may have affected human settlements established in the area during the Neolithic and Copper Age periods, as well as the subsequent Middle Bronze Age. They may have affected, for instance, the site where the city of Cádiz now stands. In the Middle Bronze Age, which EWE C probably terminated, the present-day peninsula of Cádiz was divided into at least three islands, one of them

being Erýtheia, mentioned by Greek geographer and ethnologist Strabo of Amasia around AD 1 in connection with the legend of Geryon or Geryones, King of Tartessus. This legend is intertwined with that of Bronze Age Greek hero Heracles. A large temple dedicated to this character (the Herákleion) on one of the islands, arguably Erýtheia, made Cádiz famous in Antiquity. Strabo also mentions a settlement by the name of the Port of Menestheus, as well as the Oracle of Menestheus upon the shores of the Gulf of Cádiz. In all likelihood, this Menestheus was the same as the Athenian leader Menestheus who fought in the Trojan War, according to Homer in the *Iliad*.

1. The Wickboldt-Kühne Hypothesis

The Hinojos Project started in 2005. It began as a small project with an aim that was simple and straightforward, testing the basic tenet of a hypothesis that had been published, in somewhat different versions, in 2003 and 2004 by the German scholars Werner Wickboldt and Rainer W. Kühne (Wöstmann 2003a; 2003b; Kühne 2004). These researchers had analyzed images of the RS satellite of the lower Guadalquivir river basin in southwestern Spain, where they were able to identify a number of large geometric outlines that appeared to be the marks of humanmade structures—specifically, elements of a large archaeological site from Antiquity and perhaps even earlier, from Prehistory. This site could be that of the celebrated, but elusive, pre-Roman city of Tartessus, or the political and religious core of Atlantis as described by Plato in his dialogues *Timaeus* and *Critias*; or perhaps both—provided that both names, “Tartessus” and “Atlantis,” belonged to different yet parallel traditions of the same place. The outlines identified by Wickboldt and Kühne showed at least two rectangles within two circles (see Fig. 1 below). These features stood in the Marsh of Hinojos within the Guadalquivir paleo-estuary; hence the name of our project: “Hinojos Project.”

The Wickboldt-Kühne hypothesis soon reached the popular media as well as academic circles; therefrom, it circulated all over the world. This quick, worldwide diffusion of the hypothesis was due in large part to the internet, but also its scientific significance. In order to grasp this significance, we must first comprehend the geomorphological and archaeological contexts that the hypothesis touched on.



Fig. 1: BBC News announcing R. W. Kühne's Paper "A Location for Atlantis?" (2004). Illustration Altered

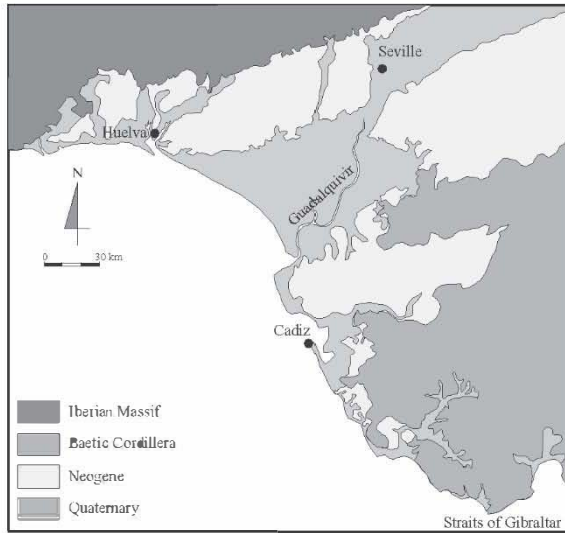


Fig. 2. Geology of present-day southwest Iberia

2. Geomorphological Features of the Gulf of Cádiz and Southwest Iberia

The Marsh of Hinojos is one among many freshwater marshes that today extend over most of the Guadalquivir paleo-estuary, which is the largest geomorphological feature of the Iberian side of the Gulf of Cádiz (see Fig. 2 above). Much of this paleo-estuary makes up Doñana National Park, a well-known UNESCO MAB Biosphere Reserve. The remaining area covers the Guadalquivir river itself, other rivers that converge into the marshland (such as the Guadimar River), and two spits or sandy coastal barriers—known as “Doñana” and “Algaida”—that separate the marshland from the Atlantic Ocean. The spits are largely covered by active dunes. The marshes flood in the rainy season, from October through to May.

Other large-flowing rivers in southwestern Iberia that empty into the Atlantic Ocean are Guadiana, Piedras, Tinto-Diel, and Guadalete. Like the estuary of the Guadalquivir River, the estuaries of these other rivers and their hinterlands include spits and marshlands, which are the end product of a complex process of land formation that started some five thousand years ago, following the highest level of the ocean after the last Ice Age (Zazo et al. 2008). Energized by the intertwined dynamics of the rivers as well as

that of the ocean, this complex process is still active. While the rivers have been filling the estuaries with sediments of clay and silt, the ocean has been impinging upon and sand-filling the shores by drift currents, wave movement, and tidal flux.

The littoral barriers and marshlands were built up during phases of progradation and aggradation, and interrupted at intervals by erosional phases of “extreme wave events” or EWEs (i.e. storm surges or tsunamis), as well as subsidence (Rodríguez-Ramírez et al. 2014). Progradation develops in periods of slightly low-stand or stability of the marine level, which result in the formation of coastal barriers and extensive tidal plains. By contrast, aggradation takes place in periods of high-stand marine levels and results in vertical accumulations of sediment along the coasts.

Storm surges are one of the effects of the climate fluctuation pattern known as the North Atlantic Oscillation (which has a periodicity of about six years) and the cycles of sunspot irradiance (of some eleven years each). Tsunamis result from sudden, violent movements in the crust of the earth along the Azores-Gibraltar Fault or shorter faults connected with it. The Azores-Gibraltar Fault, running from east to west, marks the westernmost boundary between the tectonic plates of Europe and Africa.

On the middle and the upper continental slope of the Gulf of Cádiz, mud volcanoes and mud diapirs are common structures. Following the main NE-SW and NW-SE alignments, they are found at a depth of 350 to 2000 m in the eastern domain of the Gulf (Medialdea et al. 2009). The major tectonic structures—thrust faults, extensional faults, strike-slip faults, and diapirs—have provided escape pathways for over-pressured material and fluids or have favored upward fluid movement along a sedimentary column to eventually generate the build-up of a mud volcano. The main difference between a mud volcano and a mud diapir is that while the former is characterized by actively extruding material, the latter is the product of a massive movement (Milkov 2000). Other types of structures in the Gulf related to fluid escapes, besides mud volcanoes, are mud-carbonate mounds, pockmarks, and slides.

3. An Area Peopled Since at Least the Neolithic Period

The effects on the landscape of human activity must be considered as well. Archaeological evidence suggests that the coasts and hinterlands of the Gulf have been settled by human communities since at least the Neolithic period, which started in the area in the sixth millennium BC, if not earlier (Morales

et al. 2014; Barich 2014). In the 1920s, Anglo-French archaeologist George E. Bonsor and German linguist Adolf Schulten conducted excavations at the site of Cerro del Trigo—near the present-day mouth of the Guadalquivir river, where Roman remains had been unearthed—while attempting to find and dig out evidence of the city of Tartessus (Bonsor 1922; 1928; Schulten 1924). The research team included geologist O. Jessen and cartographer A. Lammerer. Like scholars before him, and like Wickboldt and Kühne after him, Schulten—though apparently not Bonsor—believed that the lost city of Tartessus was the same as the political and religious nucleus of Atlantis which Plato described.

Both names, “Tartessus” and “Atlantis,” may indeed refer to the same place or area in different, yet contemporary oral and literary traditions in Antiquity. The city of Tartessus was the capital of a kingdom in southwest Iberia, also called “Tartessus,” that, according to Herodotus, traded regularly with Ionian Greece in the seventh and sixth centuries BC, mostly through the city-state of Phocaea. These trade relations soon combined with a political and military alliance between the two powers in the western Mediterranean that rivalled the alliance there between Phoenicians, Carthaginians, and Etruscans. Herodotus points out that the liaison between the realm of Tartessus and the maritime empire of Phocaea became so close that the king of Tartessus, Arganthonios, offered the city of Phocaea financial and humanitarian assistance with which to stave off the attack of the Persian Empire.

An erstwhile king of Tartessus, Geryon, or Geryones, stands prominently in Greek mythology—particularly as recorded in Hesiod’s *Theogony*—in connection with the story of the labors of demigod Heracles. In the best-known version of this story (Graves 1960, 69–70; 1996, 451–62), King Geryon is portrayed as a mighty, superhuman figure who ruled in the far west of the known world. His large body was equipped with three trunks and three heads above the waist; furthermore, he had with him a vicious two-headed watchdog, Orthrus. King Geryon owned a large herd of red cattle which Eurystheus, then paramount king of Greece, wanted Heracles to steal for him. Eurystheus had been prompted to this commission by the goddess Hera. Heracles deferred to Eurystheus’s authority and set out for the western end of the Mediterranean Sea. There he opened a sea chanel to take the king of Tartessus by surprise—today’s Strait of Gibraltar—and landed on an island called Erytheia, where he confronted Geryon. Heracles killed him and his watchdog, stole the herd of cattle, and returned to Greece by marching across the Pyrenees and along the northern Mediterranean coast.

As a younger man, Heracles had participated in Jason's nautical expedition to the land of Colchis—at the farthest end of the Black Sea—to retrieve from King Aeëtes the golden ram's fleece that had belonged to Prince Phrixus of Boeotia. In the Orphic version of the story of this eventful voyage (West 1983, 37; Anonymous 1987) the participants, known as the Argonauts, return home by sailing along the coasts of northern and then western Europe, stopping at the mouths of the river Tartessus on their way to the Strait of Gibraltar and ultimately the Mediterranean Sea (Anonymous 1987, 164). Authors such as E. D. Phillips (1966) and K. Kalachanis et al. (2016) have argued that this homeward itinerary may have followed a trade route that had been opened in Mycenaean times.¹

King Geryon, according to seventh-century poet Stesichorus of Himera—as quoted by geographer cum ethnologist Strabo of Amasia (*Geographiká* Bk. III, Ch. 2, Par. 11; 1966, 45)—had been born in a cave “near the streams” [“pará pagás”] of the river Tartessus and “roughly opposite” [“schedòn antipéras”] the island called Erytheia, where he would eventually meet Heracles and die. In Homeric Greek, the plural noun *pagai* meant “streams” as well as “springs” (Liddell and Scott 1968, 1399); moreover, the reference to an island in the quotation speaks for the first meaning rather than the second. Strabo, quoting Pherecydes of Athens (who lived in the fifth century BC), also wrote (*Geographiká* Bk. III, Ch. 5, Pars. 3–4; 1966, 84–6) that Erytheia was the long island—some 100 stadia or 18 km long—that in Strabo's time housed the core (*didyme*) of the multi-sited city community (*polis*) of Cádiz, to which he referred, appropriately, as “Ta Gádeira,” literally “The Cadizes” (see Fig. 3 below).

Close by the city community, at the northwestern end of Erytheia, stood a temple for the worship of Cronus: “The Krónion.” Greek mythology represents this character (Roman Saturn) as the king of the Titans, who had ruled humankind during its golden age, before the time of the Gods (Graves 1996, 43). North of Erytheia was a smaller island, where “the anti-polis” of the core of the city community stood. A third island lay between Erytheia and the mainland in the Bay of Cádiz—the present-day island of Leon.

There were settlers from the city somewhere on the mainland as well. In addition, a few decades before Strabo's time, a new port, Tò Epíneion, was built on the other side of the bay, in all likelihood where Puerto de Santa María now stands. Timaeus of Tauromenium, who wrote in the third century BC, referred to the one hundred-stadia island as Kotinoussa because of the many olive trees that one could see on it (Schulten 1925, 95). Strabo also mentions (*Geographiká* Bk. III, Ch. 1, Par. 9; 1966, 29), regarding the Guadalete

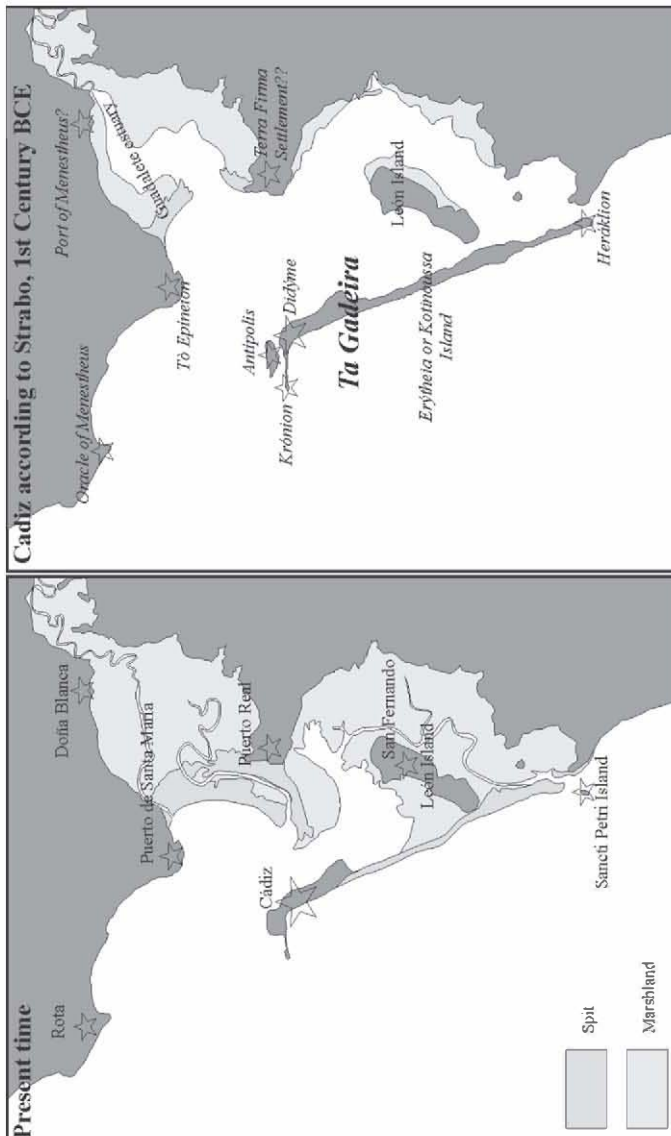


Fig. 3. The islands and bay of Cadiz and their vicinity in the present and according to Strabo of Amasia. Geomorphological data partially referred to in Alonso et al. (2015) and Dabrio et al. (2000)

paleo-estuary, one “Port of Menestheus,” so called after the leader of the Athenians in the Trojan War as told by Homer (1987, 77), arguably a former port of the city. Elsewhere on the littoral of the bay sat one “Oracle of Menestheus.” Strabo’s narrative suggests it was at or near the present-day town of Rota, where apparently the Roman and pre-Roman remains of a temple or a shrine turned up in the seventeenth and nineteenth centuries (De San Cecilio 1669, 497–504; Sociedad Geográfica de Madrid 1878). According to Flavius Philostratus the Athenian, who wrote in the third century AD, Menestheus was the object of a cult among the citizens of Cádiz (in Grosse 1959, 320–7).

The Heracles of Greek mythology is commonly associated with a character in Near Eastern mythology known as Melkarth, who was the object of an agricultural cycle-related cult in the Phoenician city-state of Tyre from the tenth century BC onwards. Near Eastern mythology represents him as a former divine king of this city-state who had been responsible for daring commercial expeditions and colonization in the Mediterranean Sea (García y Bellido 1963, 72–4). Strabo suggests (*Geographiká* Bk 1, Ch. 3, Par. 2; 1945, 210–12) that the city of Cádiz was founded a few years after the end of the Trojan War by Tyrian explorers who were searching the far west of the known world for the trail of Heracles’s—i.e. Melkarth’s—exploits. The element in King Geryon’s story of Heracles’s opening up the Strait of Gibraltar for his labor of stealing the cattle of the king of Tartessus may be interpreted as meaning that Melkarth was thought to have been the first among Easterners in the Mediterranean Basin to open the sea route for trading with Tartessus, or the first to set the terms to the Tartessian authorities for such trading, or both. Upon reaching the long island of Cádiz, Strabo also wrote (*Geographiká* Bk 3, Ch. 3, Par. 5; 1966, 86), the Tyrian explorers founded the city of Cádiz at its farthest end while erecting a temple for Heracles, known as Herákleion, at the nearest end.

The Book of Kings, in the Old Testament of the Bible (I Kings 10, 21–22; The New Jerusalem Bible 1994, 448) makes reference to a faraway country across the Mediterranean Sea called Tarshish, to which the joint trade fleets of King Solomon of Israel and King Hiram of Tyre would sail in search of “gold and silver, ivory, apes and baboons.” Many a scholar—including Schulten and others before him—has pointed out that this “Tarshish” was nothing but the Old Hebrew name for the land, river, kingdom, and city that Herodotus, Strabo, and other ancient Greeks called “Tartessus.”

Plato, who wrote in the fourth century BC, mentioned no kingdom or city of Tartessus, let alone the land of Tarshish. The reference to Atlantis—Plato

wrote—originally came from Solon of Athens, who had lived in the first half of the sixth century BC. Solon heard the Atlantis story from the priests of Sais, then the capital city of Egypt, on a visit that he paid there.

Schulten and Bonsor were quite familiar with most of these and other pieces of information from Antiquity about Tartessus, Tarshish, and Atlantis. Nevertheless, they failed in their archaeological pursuit at the site of Cerro del Trigo. They found no city there below the remains of the Roman settlement—only sand and the water table. Elsewhere in the paleo-estuary, however, at a number of separate locations, they ran into isolated artefacts—especially ground axes—from the Neolithic period and the Copper Age in southwest Iberia, which together compounded the time span of a long cultural development in the paleo-estuary that ended ca. 2000 BC. In addition, the geologist in the team, Otto Jessen, drew a map of the geomorphological composition of southwest Spain which suggested that the paleo-estuary had taken thousands of years to turn into the landscape of marshes, river channels, small lagoons, levees, and spits that he saw. From the Tartessian to the Roman period, much of the paleo-estuary had become a large coastal lagoon. Jessen also noticed that many graves in the Roman necropolis at the Cerro del Trigo site were flooded with seawater, which he took to mean that the paleo-estuary was subsiding since or had subsided at one time after the graves had been dug.

Shortly after Bonsor & Schulten's project, Spanish classical scholar Juan Fernández Amador de los Ríos (1925) argued for an alternative place within the paleo-estuary for the remains of the city of Tartessus and the center of Atlantis—the alluvial island of Tarfia, a few kilometers upstream from Cerro del Trigo. This hypothesis, however, was never tested, as it ran counter to the implications of Jessen's geomorphological report—namely that Tarfia, like any other alluvial island near the mouth of the Guadalquivir river, could not be old enough to have housed a city in pre-Roman times, not to mention prehistoric times. These implications were later reinforced by the conclusions of Spanish geologist and mining engineer Juan Gavala y Laborde, who from the 1920s to the 1950s did extensive research on the geomorphological evolution of the Spanish southwest during the Holocene. Gavala wrote (1927; 1936) that the slow, gradual process of sedimentation and filling of the Guadalquivir and other paleo-estuaries in the Gulf of Cádiz made it very unlikely that any of these environments could have carried a significant human settlement before the Middle Ages, when this process reached the point at which such an occupation could have started.

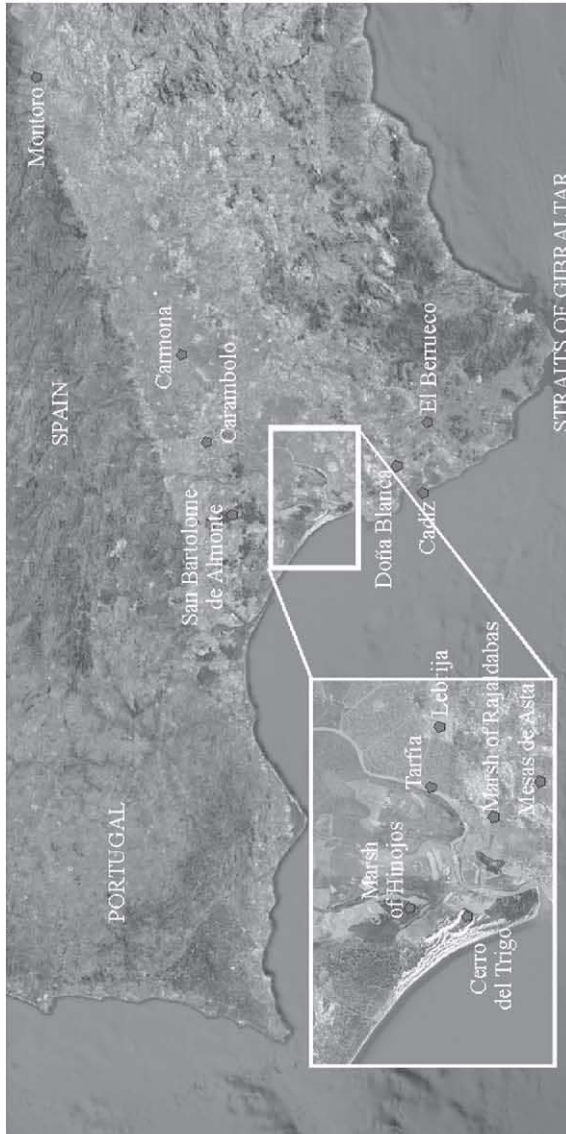


Fig. 4. Archaeological areas and sites in southwest Spain with deposits from pre-Roman times.

In assuming Jessen's and Gavala's uniformitarian reconstruction of the formation of the landscape in the lower Guadalquivir river basin, subsequent archaeological projects in the area were carried out on the banks of or in sub-areas outside the paleo-estuary rather than in sub-areas of fluvial or marine influence inside it.

These projects (Collantes de Terán 1969; Cerdán Márquez et al. 1975; Escacena and Belén 1991; Campos et al. 1995; Campos and Gómez-Toscano 1997; Costa-Caramé et al. 2010) brought to light abundant evidence of the rich cultural development that took place in southwest Spain during the Neolithic period and the Copper Age. Near the northwestern bank of the paleo-estuary, this effort included excavating the settlement site of San Bartolomé de Almonte, where archaeologists discovered a clear discontinuity between a Copper Age occupation and a Late Bronze Age occupation; i.e. a hiatus of close to one thousand years by most estimates— from the early second to the early first millennium BC—largely based on inferences from style variations of structures or artefacts across sites rather than direct radiocarbon determinations from organic remains collected at these sites (Ruiz-Mata 1981; Ruiz-Mata and Fernández-Jurado 1986; García-Sanz and Fernández-Jurado 1999).

South and west of the Marsh of Hinojos, a survey project led by J. M. Campos yielded a widespread dispersion of surface findings: flaked and polished stone tools dating to Paleolithic and Neolithic times, pottery shards from the Neolithic period and the Copper Age, and construction materials and pottery sherds from the Roman period, the Middle Ages, and the sixteenth to the eighteenth centuries AD. Closer to the Marsh, planting and canal digging projects turned out two ground axes from the Neolithic period and the Copper Age, very similar to the axes found at other locations in the paleo-estuary by Schulten and Bonsor in the 1920s. Only a handful of these dispersed findings can be ascribed with any assurance to the long span between the Copper Age and the Roman period (Campos et al. 1992; 1993; Campos and Gómez-Toscano 2001, 189–94).

At Lebrija and nearby sites on the eastern and southeastern sectors of the paleo-estuary, such as the Marsh of Rajaldabas, archaeologists identified two hiatuses: the first between the Copper Age and the Middle Bronze Age (i.e. from the early to the middle second millennium BC), and the second between the Middle Bronze Age and the final phase of the Late Bronze Age (i.e. from ca. 1200 to ca. 900 BC) (Menanteau 1981, 115–17, Figs. 70 and 92; Tejera-Gaspar 1985; Caro-Bellido et al. 1987). Comparable discontinuities

were encountered at other sites in the lower and middle Guadalquivir river basin and its vicinity.

The long hiatus registered at San Bartolomé resembles the interruption encountered in the same time span at Mesas de Asta (near Xeres), Castillo de Doña Blanca (in the Guadalete paleo-estuary), and El Carambolo (west of Seville). Lebrija's two-hiatus anomaly also turned up at El Berrueco (Medina Sidonia, in the province of Cádiz), Carmona, Acinipo (near Ronda), and Montoro (in the middle Guadalquivir river basin) (Escacena and Belén 1991, 40).

In present-day Cádiz, geophysical exploration revealed evidence of an erstwhile natural outlet of the bay through the northern half of today's peninsula (Bendala-Galán 2000, 109–10; Cerpa-Niño 2015, 82). This discovery substantiated Strabo's description of the old city community of Tá Gádeira as sprawling across the long island of Erýtheia and a smaller island north of it.

Shards of Mycenaean pottery from the thirteenth or early twelfth centuries BC were found at Montoro (Martín de la Cruz 1984–5, 213; Bendala-Galán 2000, 65). The presence in the middle Guadalquivir river basin of this foreign pottery is the only clear archaeological evidence thus far that substantiates some form of cultural contact between southern Iberia and the East Mediterranean Sea in the second half of the second millennium BC.

Following the second hiatus, the final phase of the Late Bronze Age in southwest Iberia, which began in the ninth century BC, as well as the subsequent Early Iron Age—both periods being the archaeological correlates of the historical kingdom of Tartessus—are exceedingly well represented in terms of both number of sites and cultural deposits recognized in them.

4. The Hinojos Project

The significance of Wickboldt's and Kühne's hypothesis of 2003 and 2004 lay primarily with vindicating the old search for the city of Tartessus inside the Guadalquivir paleo-estuary, along with bringing back to life in scientific circles the notion that the story of Atlantis may have a basis in historical fact. In 2006, Kühne would also recall the old argument by F. Kluge and W. Leaf that a different version of the story of Atlantis can be identified in Homer's *Odyssey*; specifically, in the information about the Phaeacians of the remote, "at the world's edge" land of Scheria (Homer 1980, 55–153).

Kühne, however, considered it more likely that Plato backdated the information about Tartessus that he had learned in Sicily to late Mycenaean times.

The Wickboldt-Kühne hypothesis, in any case, like Fernández Amador de los Ríos's hypothesis, runs against the Jessen-Gavala model of the evolution of the Guadalquivir paleo-estuary during the Holocene.

As remarked earlier, the Hinojos Project was originally designed to simply establish whether or not there were archaeological remains in the Marsh of Hinojos, as Wickboldt and Kühne contended, and, if there were, to answer the question of how old they could be. Though thus easily conceived of, the Hinojos Project had to be interdisciplinary as it had to address issues of multifarious aspects. Carrying it out required at least a biologist (José Antonio López-Sáez), two geologists (Antonio Rodríguez-Ramírez and José-Noel Pérez-Asensio), two archaeologists (Sebastián Celestino-Pérez and Enrique Cerrillo-Cuenca), a historian and aircraft pilot (Ángel León), and a historian and cultural anthropologist (Juan J. R. Villarías-Robles). From the standpoint of geological research, the project was part of a larger scientific context that focuses on the rapid geomorphic dynamics at work along the coasts of southwest Iberia in the Holocene (see, for instance, Menanteau 1981; Vanney and Menanteau 1985–9; Zazo et al. 1994; Lario 1996; Goy et al. 1996; Rodríguez-Ramírez et al. 1996). This interest had arisen in the 1970s and concerned the Jessen-Gavala model to the extent that it predates the C-14 revolution and, more importantly, Plate Tectonics Theory. In 1998, Antonio Rodríguez-Ramírez, in a study that included the first geomorphological mapping of Doñana specifically, published sedimentary and geomorphic evidence of at least two high-energy, ocean-born erosive EWEs that had significantly altered the Guadalquivir paleo-estuary in prehistoric as well as historical times. Each of these events resulted in the rupture of the coastal barriers and, subsequently, the formation inside the paleo-estuary of sets of long sandy and shelly ridges (known as “cheniers”) that the Jessen-Gavala model could not account for. The first prehistoric event took place around 2000 BC.

In testing the material implications of the Wickboldt-Kühne hypothesis, we began by checking the satellite images that the two German scholars had examined with images from other satellites. We then compared these images with aerial photographs from different series of photographs and different years; we wanted to know if the apparently humanmade features on the ground that Wickboldt and Kühne had identified could also be seen in such independent satellite images and aerial photographs. Some of them,

as it turned out, could be seen, while others could not. In the process, we identified features that Wickboldt and Kühne had missed. We then conducted extensive surface surveys of the area. In addition, we took samples of the soil, after drill coring it at three locations down to a depth of 12 m, and ran different types of lab analysis of the sedimentation: mineralogical, litho-stratigraphic, and paleontological. Furthermore, we searched those samples for pollen content and radiocarbon dating.

The analyses confirmed the importance of the role played by neo-tectonics in the rapid geomorphological transformations in the Guadalquivir paleo-estuary during the Holocene—a historical fact that neither Jessen nor Gavala knew about, but one that researchers after Gavala suspected, yet failed to explore. In effect, the paleo-estuary is crisscrossed by a number of SW-NE oriented fault alignments that cut other fault alignments following E-W and NW-SE directions. The most conspicuous of the SW-NE alignments is the Torre Carbonero-Marilópez Fault (TCMF), which divides the paleo-estuary roughly in half (Rodríguez-Ramírez et al. 2014).

We corroborated the high-energy event of ca. 2000 BC that Antonio had identified in the 1990s. Evidence of this EWE has also been recognized on the littoral of Barbate, some 50 km southwest of the city of Cádiz (Koster and Reicherter 2014). In addition, we discovered evidence of a second EWE in prehistorical times, which occurred about one thousand years later than the first in ca. 1150 BC (Rodríguez-Ramírez et al. 2014). Evidence of this second event has also been identified in the Guadalete estuary (Lario et al. 1995; Dabrio et al. 1999; Luque et al. 2001), as well as the Tinto-Odiel estuary (Morales et al. 2008).

The radiocarbon dates that we obtained from organic material in the soil revealed that the geometric features on the ground, though most certainly humanmade, cannot be old enough to date back to Tartessian or earlier times—the organic material of that age is too deep (several meters down) below the ground surface for the archaeological remains of the same age to leave marks up on the surface that can be detected in satellite images or aerial photographs.

Paradoxically, however, the period that followed the marine transgression of ca. 2000 BC produced alluvial soils that left types of pollen and other by-products of human activity somewhere in the paleo-estuary, specifically cereal agriculture and pastoralism. So did the alluvial soils of the period following the second event, ca. 1150 BC. Such biological evidence suggests that during long time spans in the second and first millennia BC, much of

the paleo-estuary was above sea level—as it is at present—and could have sustained a human community of some form, the material remains of which lie buried in the ground and are therefore hidden from view.

On the basis of these first results, we then proceeded to explore the surface and analyze the sedimentation at additional locations in the Marsh of Hinojos and elsewhere in the paleo-estuary. We wanted to compare the new results arrived at with those of colleagues in other sectors of the paleo-estuary, in other paleo-estuaries in the Gulf of Cádiz, and in the present-day municipality of Cádiz and its neighboring districts. Our aim was no longer testing the Wickboldt-Kühne hypothesis, but reconstructing the geomorphological transformations and cultural moments on the Iberian side of the coasts of the Gulf in the course of the Middle and Late Holocene. For this reconstruction we would take into account the neo-tectonics active in the Gulf as a factor, in addition to factors already considered in the received literature, such as climate change or the dialectic between marine and fluvial dynamics.

We had the Marsh of Hinojos and elsewhere in the paleo-estuary drill-cored at additional points, to depths ranging from 1.5, 12, and 18 m, depending on the geomorphological context of the points. As with the cores extracted in the first phase of the project, we analyzed the sedimentation in these additional cores and obtained samples from them that could yield C-14 dates for the deposits found in each core. Thereafter, we correlated the deposits by their lithic, mineralogical, and paleontological composition as well as by the C-14 dates obtained for them. Finally, we compared the results with those of other projects of other colleagues in the same study area (see Fig. 5 below).

We thus discovered that south of the Torre Carbonero-Mary López Fault, the paleo-estuary experienced a marked subsidence from about 2000 BCE (the date of the first prehistorical EWE) to the first centuries of the Christian era (Rodríguez-Ramírez *et al.* 2014). The subsidence proceeded through a series of sedimentary sequences of retrogradation and aggradation within a context of relative sea-level rise. The EWE of ca. 1150 BC compounded this sinking development. From the first centuries of the Christian era up to the present, the subsidence has remained relatively dormant, with progradation of the littoral systems and infilling of the marshland progressing within a context of sea-level stability (Rodríguez-Ramírez *et al.* 2014). In addition, we found evidence of a prehistorical EWE in between, ca. 1550 BC, apparently of lesser magnitude than the other two (Rodríguez-Ramírez *et al.* 2015). This event can be correlated with an earthquake that

has been suggested for southwest Portugal in ca. 1600 BC (Vizcaino et al. 2006).

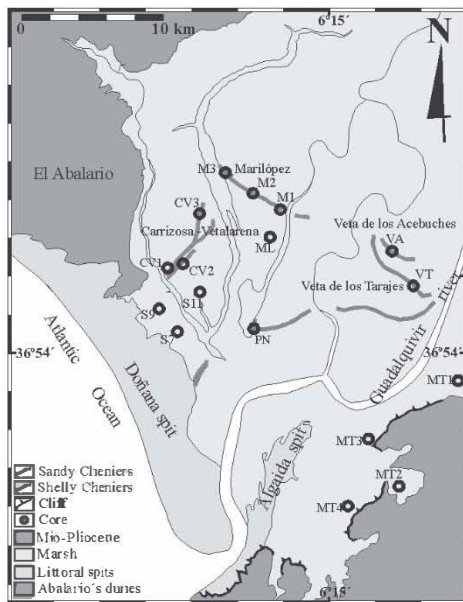


Fig. 5. Location of core-drilling points in the Guadalquivir paleo-estuary (Rodríguez-Ramírez et al. 2015)

Table 1 below shows the main characteristics of the evidence of the three EWEs that we have identified for the second millennium BC. Fig. 6 below represents the geomorphological effects of these three events in the Guadalquivir paleo-estuary.

	S7	S11	MT3 and MT4	MT2 and MT1
Event C	<p>Muddy matrix Alien lithoclasts Massive layer and erosive base Mixture of disarticulated valves, shell fragments and whole bivalves (estuarine) Moderate transport of benthic foraminifera and hyaline foraminifera High d/p ratio High diversity of species from different environments (mostly estuarine)</p> <p>Paleogeography: marginal area of a confined estuary behind a littoral barrier (Doñana Spit)</p>	<p>Silty sandy matrix Alien lithoclasts Finning-upward sequence and erosive base Mud pebbles Upper part of the succession shows bioturbation Mixture of disarticulated valves, shell fragments, and whole bivalves (estuarine) Transported benthic foraminifera and porcelanaceous foraminifera High diversity of species from different environments (mostly estuarine)</p> <p>Paleogeography: central basin of a confined estuary behind a littoral barrier (Doñana Spit)</p>	<p>Sandy and sand-silty matrix Alien and large lithoclasts Massive layer and erosive base Mixture of disarticulated valves and shell fragments of marine environments Transported benthic foraminifera and relatively high P/B ratio High diversity of species dominated by estuarine forms</p> <p>Paleogeography: area of estuary exposed to marine dynamics by inlet channel</p>	<p>Mud-sandy matrix Mud pebbles Scarce lithoclasts Archaeological remains Upper part of the succession shows bioturbation Low percentages of transported benthic foraminifera and P/B ratio dominated by estuarine forms. Mixture of estuarine and terrestrial (Gastropoda) species</p> <p>Paleogeography: area away from the coast and confined</p>

Event B	<p>Silty sandy Finning-upward successions Gradual contact whole shells (two valves) and disarticulated valves Moderate transport of benthic foraminifera and hyaline foraminifera High P/B ratio and d/p ratio Moderated diversity of species, dominated by estuarine forms</p> <p>Paleogeography: lower-energy extreme wave event in a semiconfined estuary behind a littoral barrier (Doñana Spit)</p>	<p>Sandy silty matrix erosive base Decreasing grain-size sequences whole shells (two valves) and disarticulated valves Transported benthic foraminifera and porcelanaceous foraminifera Moderated diversity of species of different environment</p> <p>Paleogeography: lower-energy extreme wave event in a semiconfined estuary behind a littoral barrier (Doñana Spit)</p>	No data	No data
----------------	--	--	---------	---------

<p>Event A</p>	<p>Heterometric sandy matrix Gravel and alien lithoclasts Massive layer and very erosive base Mixture of disarticulated valves, shell fragments, and whole bivalves Transported benthic foraminifera and porcelanaceous foraminifera High diversity of species dominated by open marine forms Paleogeography: breaking of littoral barrier by overwash and washover fan by large extreme wave event</p>	<p>Heterometric sandy and sandy silt matrix Lesser ratio of gravel and alien lithoclasts Wood Moderate fining-upward sequence and erosive base Moderate bioturbation Mixture of disarticulated valves, shell fragments, and whole bivalves Transported benthic foraminifera and porcelanaceous foraminifera High diversity of species (mixture of marine and estuarine) Paleogeography: central basin of an open estuary</p>	<p>No data</p>	<p>No data</p>
-----------------------	--	--	----------------	----------------

Table 1. Characteristics of the evidence of EWEs A, B, and C in the Guadalquivir paleo-estuary in the second millennium BC (Rodríguez-Ramírez et al. 2015)

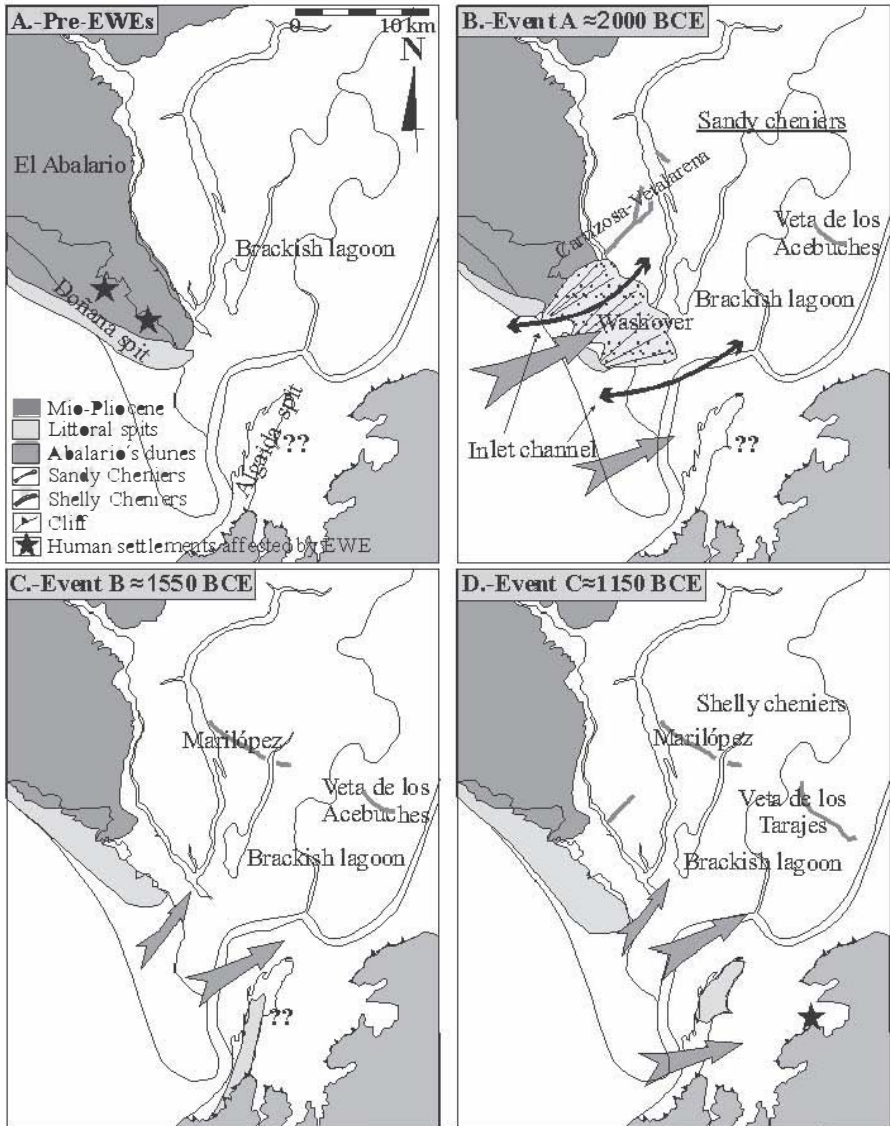


Fig. 6. Geomorphological effects of EWEs A, B, and C in the Guadalquivir paleo-estuary in the second millennium BC (Rodríguez-Ramírez et al. 2015)

Upon the marine transgression of each of the three events, the regular low-energy dynamics of the ocean and rivers resumed. Within a few centuries of the third event, progradation of the Doñana coastal barrier all but isolated the erstwhile wide estuary of the Guadalquivir from the ocean, generating a coastal lagoon as a result.

The first event—to which we refer as Event A, ca. 2000 BC—impinged far and wide on the paleo-estuary. It included the generation of a washover fan that caused strong erosion in the then-forming Doñana sandy barrier as well as in the aeolian systems of El Abalario, to the northwest. These significant paleo-geographic changes must have severely affected human settlements established in the sub-areas around the paleo-estuary in the Neolithic period and the Copper Age, resulting in the wide dispersion of artefacts from these periods that have been found in the marshland since the 1920s and in the hiatuses identified at San Bartolomé de Almonte and Lebrija that mark the end of the Neolithic and Copper Age occupation. The magnitude of the event may have been strongly conditioned by the intense subsidence of much of the ground of the paleo-estuary at the same time (Rodríguez-Ramírez et al. 2014).

The second event—Event B, ca. 1550 BC—looks like it had lesser paleo-geographic effects in the paleo-estuary, possibly because its center may have been in southwest Portugal rather than the Gulf of Cádiz.

The third event—Event C, ca. 1150 BC—may have had the same magnitude as Event A, as it also covered an extensive geographic area and cataclysmically affected the Middle Bronze Age settlement of the Marsh of Rajaldabas, near the present-day mouth of the Guadalquivir river. This third event may also explain the second hiatus at Lebrija and other sites of the Spanish southwest. The marine transgression severely eroded the Doñana spit and turned the Algaída spit into an island.

The record of this third event in the paleo-estuary might be correlated with that of an event recognized in the Tinto-Odiel and Guadalete estuaries. The cultural effect in southwest Iberia overall may have been the end of the Middle Bronze Age in the region, like the overall cultural effect of Event A may have been the end of the Neolithic Copper Age tradition there. The Middle Bronze Age in southwest Iberia was the period of possible trade or other forms of contact with Mycenaean Greece and other cultural formations in the eastern Mediterranean, as the finds of Mycenaean pottery in the Guadalquivir river basin suggest. These finds appear to lend some

credence to the old stories of Geryon and Heracles, the Titans and the Gods, ●dysseus and Menestheus.

Acknowledgment

We would like to thank professors Papamarinopoulos and Paipetis for allowing us to present, in this magnificent place, ●lympia, the current results of the Hinojos Project in Spain with respect to the geomorphological evolution of the coasts of southwestern Iberia in the second millennium BC. These results are relevant to any discussion regarding contact and knowledge of that area by Greeks of the Bronze Age, as echoed in the writings of later authors such as Homer, Hesiod, Stesichorus of Himera, Strabo of Amasia, and, perhaps, even Plato, the philosopher.

References

- Alonso, C., F. J. Gracia, S. Rodríguez-Polo, and C. Martín-Puertas. “El registro de eventos energéticos marinos en la bahía de Cádiz durante épocas históricas.” *Cuaternario y Geomorfología* 29 (1–2) (2015): 95–117.
- Anonymous. *Les argonautiques orphiques. Texte établi et traduit par Francis Vian*. Paris: Les Belles Lettres, 1987.
- Barich, B. E. “The Introduction of Neolithic Resources in North Africa? A Discussion in light of the Latest Holocene Research between Libya and Egypt.” Paper presented in XVIIe Congrès Mondial de l’UISPP. Burgos, Spain, September 1–7, 2014.
- Bendala-Galán, M. *Tartessos, iberos y celtas: Pueblos, culturas y colonizadores de la Hispania Antigua*. Madrid: Temas de Hoy, 2000.
- Bonsor, G. E. *El coto de Doña Ana (una visita arqueológica)*. Madrid: Revista de Archivos, Bibliotecas y Museos, 1922.
- . *Tartessos: Excavaciones practicadas en el Cerro del Trigo, término de Almonte (Huelva)*. Madrid: Junta Superior de Excavaciones y Antigüedades, 1928.
- Campos, J. M., F. Borja, F. Gómez-Toscano, J. Castiñeira-Sánchez, and J. M. García-Rincón. “Proyecto: Dinámica de asentamientos y evolución de sistemas naturales. La secuencia holocena del litoral y pre-litoral entre el Guadiana y el Guadalquivir. ●cupación y territorio en la Tierra Llana de Huelva.” In *Investigaciones Arqueológicas en Andalucía (1985–1992): Proyectos*, edited by J. M. Campos and F. Nocete, 779–98. Seville: Junta de Andalucía, Dirección General de Bienes Culturales, 1992.

- . “Medio natural y condiciones de hábitat en las formaciones arenosas de Doñana: Prospección arqueológica superficial.” *Anuario Arqueológico de Andalucía* 2 (1993): 235–8.
- Campos, J. M., F. Borja, F. Gómez-Toscano, J. Castiñeira-Sánchez, and J. M. García-Rincón. “Prospección Arqueológica superficial en la campiña de Huelva: Sector Guadiamar-Candón.” *Anuario Arqueológico de Andalucía* 1992 2 (1995): 231–6.
- Campos, J. M., and F. Gómez-Toscano. “La ocupación humana entre los tramos bajos del Guadiana y el Guadalquivir. Su incidencia en la costa holocena.” In *Cuaternario ibérico*, edited by J. Rodríguez-Vidal, 305–13. Huelva: AEQUA, 1997.
- . *La tierra llana de Huelva: arqueología y evolución del paisaje*. Seville: Junta de Andalucía, Consejería de Cultura, 2001.
- Caro-Bellido, A., P. Acosta-Martínez, and J. L. Escacena. “Informe sobre la prospección arqueológica con sondeo estratigráfico en el solar de la calle Alcazaba (Lebrija, Sevilla).” *Anuario Arqueológico de Andalucía* 1986 II (1987): 164–78.
- Cerdán Márquez, C., G. Leisner, and V. Leisner. “Sepulcros megalíticos de Huelva.” In *Huelva: Prehistoria y Antigüedad*, edited by A. Beltrán, 41–108. Madrid: Editora Nacional, 1975.
- Cerpa-Niño, J. A. *Los fenicios: Marco geográfico, costumbres y su expansión colonial*. Cádiz: Paraíso Romántico, 2015.
- Collantes de Terán, F. “El dolmen de Matarubilla.” In *Actas del V Symposium Internacional de Prehistoria Peninsular (Jerez de la Frontera 1968)*, edited by J. Maluquer, 47–61. Barcelona: Universidad de Barcelona, 1969.
- Costa-Caramé, M. E., M. Díaz-Zorita Bonilla, L. García-Sanjuán, and D. W. Wheatley. “The Copper Age Settlement of Valencina de la Concepción (Seville, Spain): Demography, Metallurgy and Spatial Organization.” *Trabajos de Prehistoria* 67 (1) (2010): 85–117.
- Dabrio, C. J., J. L. Goy, and C. Zazo. “The Record of the Tsunami produced by the 1755 Lisbon Earthquake in Valdelagrana Spit (Gulf of Cadiz, southern Spain).” *Geogaceta* 23 (1999): 31–4.
- Dabrio, C. J., C. Zazo, J. L. Goy, F. J. Sierro, F. Borja, J. Lario, J. A. González, and J. A. Flores. “Depositional History of Estuarine Infill During the Last Postglacial Transgression (Gulf of Cadiz, Southern Spain).” *Marine Geology* 162 (2000): 381–404.
- De San Cecilio, P. *Annales de la Orden de Descalzos de Nuestra Señora de la Merced, Redención de Cautivos Christianos, Parte Primera*. Barcelona: Dionisio Hidalgo, 1669.

- Escacena, J. L., and M. Belén. “Sobre la cronología del horizonte fundacional de los asentamientos tartésicos.” *Cuadernos del Suroeste 2* (1991): 9–42.
- Fernández Amador de los Ríos, J. *Atlántida: Estudio arqueológico, histórico y geográfico*. Zaragoza: Atheaneum, 1925.
- García-Sanz, C., and J. Fernández-Jurado. “La época calcolítica de San Bartolomé de Almonte.” *Huelva Arqueológica* 15. Huelva: Diputación Provincial de Huelva, 1999.
- García y Bellido, A. *España y los españoles hace dos mil años: según la “Geografía” de Strabon*. Madrid: Espasa-Calpe, 1945.
- . Hercvles Gaditanvs. *Archivo Español de Arqueología* 36 (107) (1963): 70–153.
- Gavala y Laborde, J. “Cádiz y su bahía en el transcurso de los tiempos geológicos.” *Boletín del Instituto Geológico y Minero de España* 3ª serie 49 (9) (1927): 1–29.
- . *Memoria explicativa de la Hoja 1017: El Asperillo, del Mapa Geológico de España, escala 1:50.000*. Madrid: Instituto Geológico y Minero de España, 1936.
- Goy, J. L., C. Zazo, C. J. Dabrio, J. Lario, F. Borja, F. J. Sierro, and J. A. Flores. “Global and Regional Factors Controlling Changes of Coastlines in Southern Iberia (Spain) During the Holocene.” *Quaternary Science Reviews* 15 (1996): 773–80.
- Graves, R. *Greek Gods and Heroes*. New York: Dell, 1960.
- . 1996. *The Greek Myths*. London: The Folio Society.
- Grosse, R. (ed.). 1959. *Fontes Hispaniae Antiquae VIII: Las fuentes desde César hasta el siglo V d. de J. C.* Barcelona: Bosch.
- Homer. *Iliad, Translated with an Introduction by Martin Hammond*. London: Penguin, 1987.
- . *Odyssey, Translated by Walter Shewring with an epilogue on translation*. Oxford: Oxford University Press, 1980.
- Kalachanis, K., P. Preka-Papadema, I. Kostikas, E. Theodosiou, V. N. Manimanis, and E. Panou. “The Return Voyage of the Argonauts According to *Argonautica Orphica*.” Paper presented in the international conference Ancient Greece and the Modern World, Olympia, Greece, August 28–31, 2016.
- Koster, B., and K. Reicherter. “Sedimentological and Geophysical Properties of a ca. 4000 Year-old Tsunami Deposit in Southern Spain.” *Sedimentary Geology* 314 (2014): 1–16.
- Kühne, R. W. “A Location for ‘Atlantis’?” *Antiquity* 78 (300) (2004). <http://antiquity.ac.uk/ProjGall/kuhne>

- . “Did Ulysses Travel to Atlantis?” In Proceedings of the Symposium ‘Science and Technology in Homeric Epics,’ Olympia, Greece, August 27–30, 2006, edited by S. A. Paipetis (ed.)
www.beepworld.de/members/atlantis_rainer_kuehne.
- Lario, J. “Último y presente interglacial en el área de conexión Atlántico-Mediterráneo (sur de España). Variaciones del nivel del mar, paleoclima y paleoambientes.” Unpublished PhD dissertation, Universidad Complutense de Madrid, 1996.
- Lario, J., C. Zazo, C. J. Dabrio, L. Somoza, J. L. Goy, T. Bardají, and F. Borja. “Record of recent Holocene sediment input on Spit Bars and Deltas of South Spain.” *Journal of Coastal Research* 17 (1995): 241–5.
- Liddell, H. G., and R. Scott. *A Greek-English Lexicon*. Oxford: Clarendon, 1968.
- Luque, L., J. Lario, C. Zazo, J. L. Goy, C. J. Dabrio, and P. G. Silva. “Tsunami Deposits as Palaeoseismic Indicators: Examples from the Spanish Coast.” *Acta Geologica Hispanica* 36 (2001): 197–211.
- Martín de la Cruz, J. C. “Problemas en torno a la definición del Bronce Tardío en la Baja Andalucía.” *Cuadernos de Prehistoria y Arqueología* 11–12 (1984–5): 205–15.
- Medialdea, T., L. Somoza, L. M. Pinheiro, M. C. Fernández-Puga, J. T. Vázquez, R. León, M. K. Ivanov, V. Magalhaes, V. Díaz-del-Río, and R. Vegas. “Tectonics and Mud Volcano Development in the Gulf of Cadiz.” *Marine Geology* 261 (2009): 48–63.
- Menanteau, L. “Les marismas du Guadalquivir. Exemple de transformation d’un paysage alluvial au cours du Quaternaire récent.” Unpublished PhD dissertation, Université de Paris-Sorbonne, 1981.
- Milkov, A. V. “Worldwide Distribution of Submarine Mud Volcanoes and Associated Gas Hydrates.” *Marine Geology* 167 (2000): 29–42.
- Morales, J. A., J. Borrego, E. G. San Miguel, N. López-González, and B. Carro. “Sedimentary Record of Recent Tsunamis in the Huelva Estuary (Southwestern Spain).” *Quaternary Science Reviews* 27 (2008): 734–46.
- Morales, J., L. Peña-Chocarro, G. Pérez-Jordá, M. L. Zapata, Y. Bokbot, J. C. Vera-Rodríguez, and J. Linstäder. “Origins and Spread of Agriculture in North Africa: New Archaeobotanical Evidence from Morocco.” Paper presented in XVIIe Congrès Mondial de l’UISPP, Burgos, Spain, September 1–7, 2014.
- Phillips, E. D. “The Argonauts in Northern Europe.” *Classica et Mediaevalia* 27 (1966): 178–94.
- Rodríguez-Ramírez, A. *Geomorfología del Parque Nacional de Doñana y su entorno*. Madrid: Ministerio de Medio Ambiente, Organismo Autónomo Parques Nacionales, 1998.

- Rodríguez-Ramírez, A., J. Rodríguez-Vidal, L. Cáceres, L. Clemente, G. Belluomini, L. Manfra, S. Improta, and J. R. Andrés. "Recent Coastal Evolution of the Doñana National Park (SW Spain)." *Quaternary Science Reviews* 15 (1996): 803–9.
- Rodríguez-Ramírez, A., E. Flores-Hurtado, C. Contreras, J. J. R. Villarías-Robles, G. Jiménez-Moreno, J. N. Pérez-Asensio, J. A. López-Sáez, S. Celestino-Pérez, E. Cerrillo-Cuenca, and Á. León. "The Role of Neotectonics in the Sedimentary Infilling and Geomorphological Evolution of the Guadalquivir Estuary (Gulf of Cadiz, SW Spain) During the Holocene." *Geomorphology* 219 (2014): 126–40.
- Rodríguez-Ramírez, A., J. N. Pérez-Asensio, A. Santos, G. Jiménez-Moreno, J. J. R. Villarías-Robles, E. Mayoral, S. Celestino-Pérez, E. Cerrillo-Cuenca, J. A. López-Sáez, A. Ángel León, and C. Contreras. "Atlantic Extreme Wave Events during the Last Four Millennia in the Guadalquivir Estuary, SW Spain." *Quaternary Research* 83 (2015): 24–40.
- Ruiz-Mata, D. "El poblado metalúrgico de época tartésica de San Bartolomé (Almonte, Huelva)." *Madrider Mitteilungen* 22 (1981): 150–70.
- Ruiz-Mata, D., and J. Fernández-Jurado. "El yacimiento metalúrgico de época tartésica de San Bartolomé de Almonte (Huelva)." *Huelva arqueológica* 8 (1986): 6–243.
- Schulzen, A. *Tartessos: Contribución a la historia antigua de Occidente*. Madrid: Revista de Occidente, 1924.
- . (ed.). *Fontes Hispaniae Antiquae II: 500 a. de J. C. hasta César*. Barcelona: Universidad de Barcelona, 1925.
- Sociedad Geográfica de Madrid. 1878. Antigüedades de Andalucía. *Boletín de la Sociedad Geográfica de Madrid* 5 (año III) (9) (1878): 13–14.
- Strabon. *Géographie: Tome II (Livres III et IV). Texte établi et traduit par François Lasserre*. Paris: Les Belles Lettres, 1966.
- Tejera-Gaspar, A. "Excavaciones arqueológicas en el Huerto Pimentel (Lebrija, Sevilla)." *Noticiario Arqueológico Hispánico* 26 (1985): 88–116.
- The New Jerusalem Bible. *The New Jerusalem Bible: Study Edition*. London: Darton, Longman & Todd, 1994.
- Vaney, J-R., and L. Menanteau. "Mapa fisiográfico del litoral atlántico de Andalucía, escala 1/50.000." Sevilla & Madrid: Junta de Andalucía, Consejería de Política Territorial, Agencia de Medio Ambiente & Casa de Velázquez, Équipe Pluridisciplinaire, 1985–9.
- Vizcaíno, A., E. Gràcia, R. Pallàs, J. García-Orrellana, C. Escutia, D. Casas, V. Willmott, S. Diez, A. Asioli, and J. J. Dañobeitia. "Sedimentology, Physical Properties and Ages of Mass-transport Deposits associated to

- the Marquês de Pombal Fault, Southwest Portuguese Margin.” *Norwegian Journal of Geology* 86 (2006): 177–86.
- West, M. L. *The Orphic Poems*. Oxford: Clarendon Press, 1983.
- Wöstmann, F. “Atlantis lag in Südwest-Spanien.” *Braunschweiger Zeitung*, January 10, 2003a.
- . 2003b. “Forscher Meldet: Atlantis Gefunden.” *Braunschweiger Zeitung*, February 19, 2003b.
- Zazo, C., J. L. Goy, L. Somoza, C. J. Dabrio, G. Belluomini, S. Improta, J. Lario, T. Bardají, and P. G. Silva. “Holocene Sequence of Sea-level Fluctuations in Relation to Climatic Trends in the Atlantic-Mediterranean Linkage Coast.” *Journal of Coastal Research* 10 (4) (1994): 933–45.
- Zazo, C., C. J. Dabrio, J. L. Goy, J. Lario, A. Cabero, P. G. Silva, T. Bardají, N. Mercier, F. Borja, and E. Roquero. “The Coastal Archives of the Last 15 ka in the Atlantic–Mediterranean Spanish Linkage Area: Sea level and Climatic Changes.” *Quaternary International* 181 (2008): 72–87.

Notes

- ⁱ We are indebted to Professor Papamarinopoulos for calling our attention to the relevance of the *Argonautica Orphica* for the early history of the realm of Tartessus.

4.2

THE REPRESENTATION OF THE KINGDOM OF TARTESSUS BY THE ANCIENT GREEKS REVISITED: NEW EVIDENCE FOR A FORGOTTEN CAUSE

JUAN J. R. VILLARÍAS-ROBLES

CENTRO DE CIENCIAS HUMANAS Y SOCIALES, MADRID, SPAIN

AND ANTONIO RODRÍGUEZ-RAMÍREZ

UNIVERSIDAD DE HUELVA, HUELVA, SPAIN

Abstract

Results in the recent studies of the geomorphological evolution of the coastlines of Iberia in the Gulf of Cadiz in the Middle and Late Holocene add up to archaeological evidence accumulated since the 1980s in support of a renewed case for the representation of the pre-Roman Kingdom of Tartessus in the writings of a number of Greek and Roman authors of Antiquity. Herodotus, for instance, made reference to this Iberian kingdom in connection with Ionian navigation, trade, and settlement in the western Mediterranean Sea in the seventh and sixth centuries BC. The accumulated evidence ought to make researchers revise the paradigm for studying Tartessus that has prevailed in the literature since the 1960s. Launched in the wake of a number of sustained archaeological excavations and spectacular finds in the Spanish regions of Andalusia and Extremadura in the late 1950s and early 1960s, this paradigm has two defining characteristics: (1) the resort to archaeology as the practically exclusive source for Tartessus, to the detriment of the narratives from Antiquity, and (2) the concept of this ancient kingdom as a derivative culture in the long history of relations that natives of southern Iberia maintained with Phoenician traders and colonists.

In our previous presentation we mentioned evidence of at least three high-energy events or EWEs in the Gulf of Cadiz in the second millennium BC that significantly altered the otherwise gradual, uniformitarian geomorphological evolution of the coasts of the Gulf.

The coasts of the Gulf that are most relevant for our presentation now are those of the Guadalquivir and Guadalete estuaries. Around 1150 BC, Event “C” was cataclysmic enough to bring to an abrupt end the Middle Bronze Age in at least both estuaries. In the Guadalquivir estuary, the rapid changes in the landscape included a new rupture of the Doñana spit and a rupture in that of Algaida that transformed this second coastal barrier into an island. In the Guadalete estuary, the event must have eroded the Valdelagrana spit and altered much of the sub-aerial extension of the three islands of Cadiz, moving the sandy formations (beaches and dunes) that are associated with rocky ledges eastward.

Following the violent marine transgression in both estuaries, however, the low-energy geomorphological forces at work in the Gulf since the end of the last Ice Age resumed their action. In the Guadalquivir estuary, the Doñana spit started to grow again; this time, more toward the southeast than before. In the process, the erstwhile wide estuary became ever more confined vis-à-vis the Atlantic Ocean, which in a few centuries would result in the formation of a coastal lagoon. The island of Algaida, by contrast, would take longer to become a spit again—as much as 1,500 years, up to the Roman Imperial Period, when the mouth of the Guadalquivir River would approximate its present form and the coastal lagoon would turn into the present-day marshes of Doñana National Park. Because of the magnitude of the Doñana spit, future EWEs hitting the area would affect the seafront far more than the inner sectors of the estuary.

The development of chenier systems in the larger Guadalquivir paleo-estuary is consistent with this evolution. Chenier are relict beach ridges of sandy and shelly deposits with a littoral strand morphology that overlie the clayey infilling of the marshland in the paleo-estuary. They signal the location of ancient shorelines and are evidence of changes in paleo-environmental conditions, specifically in the sediment supply, the river discharge, the sea level, and the frequency of storms. South of the paleo-estuary, near the present-day mouth of the Guadalquivir River, there are sandy chenier systems that are 50–100 m wide and 2.00–2.25 m above sea level. They consist of overlapped strands associated with the two ancient paleo-mouths and inlet channels that the estuary had up to the Roman Imperial Period. The western paleo-mouth, defined by the littoral strands

of Vetallengua, was flanked on the right side of the estuary by the Doñana spit and on the left side by the Algaida spit. The eastern paleo-mouth, defined by the littoral strands of Los Prados, was flanked on the right side by the Algaida spit and on the left side by the hills of Sanlúcar de Barrameda.

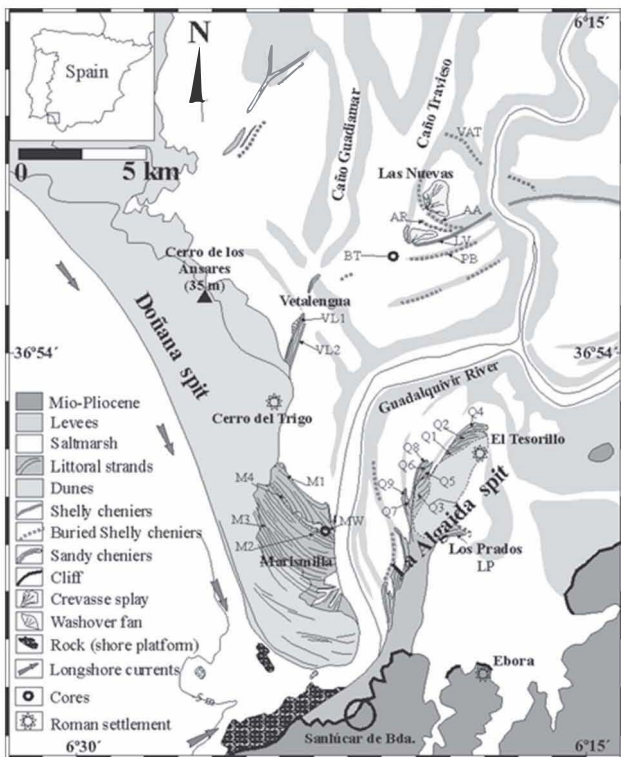


Fig. 1. Chenier systems in the Guadalquivir paleo-estuary

The existence of the two paleo-mouths is confirmed by the testimony of Greek and Roman authors who described the area. One of them was Strabo of Amasia in the first years of the Christian era. He wrote that the Guadalquivir River, known as “Baetis” in Roman times, emptied itself into the Atlantic Ocean by means of two outlets. Some fifty years later, Pomponius Mela of Tingentera, a native to southern Iberia, wrote that the river reached the ocean in the form of two large streams which flowed from a large lake that stood not far from the ocean. The erstwhile spit of Algaida, therefore, would have been an island in at least Roman times,

lying between the two mouths. By way of both, the fluvial current as well as the tidal flows would put the ocean in connection with the coastal lagoon that Mela mentioned.

In the Guadalete estuary, also following the marine transgression of Event C, the Valdelagrana spit resumed progradation toward the south, which would make the Bay of Cadiz as well as the Guadalete estuary itself ever smaller (Alonso et al. 2015). The sandy formations in the southern half of the island of Erytheia, because of the marine dynamics and the EWEs themselves, would tend to move eastward, approaching the island of Leon. This erosive process has been recognized elsewhere on the outer front of the Bay of Cadiz, especially from the Roman period onward (Gracia et al. 1999). Such post-cataclysmic paleogeography would be the setting, we submit, for the founding of a Phoenician colony on the islands of Cadiz sometime after the end of the Trojan War which Strabo also wrote about. Explorers from the city-state of Tyre in search of the trade routes opened in the Bronze Age by the hero Melkart (likely the Greek Heracles) established a settlement at one end of the island of Erytheia while erecting a temple for the cult of Melkart at the other. Strabo also mentions, in the Bay of Cadiz or in the Guadalete paleo-estuary, one “Port of Menestheus,” after the Athenian leader in the Trojan War mentioned by Homer. We think it was an erstwhile port of the city that might correspond to the archaeological site of Doña Blanca, where the remains of a Phoenician settlement in the eighth century BC have been found (Ruiz-Mata and Pérez 1995). Elsewhere on the littoral of the bay, Strabo places one “Oracle of Menestheus.” Judging by the structure of his narrative, we believe this oracle was at or near the present-day town of Rota, where apparently the Roman and pre-Roman remains of a temple or a shrine tumbled up in the seventeenth century and again in the nineteenth century (De San Cecilio 1669, 497–504, Sociedad Geográfica de Madrid 1878).

1. The Issue of Avienus’s *Ora Maritima*

With respect to the coasts of southwest Spain as well as the islands of Cadiz, we submit that our reconstructed paleogeography for the same period following the geomorphic effects of Event C fits the scenario described in another well-known source for the study of southern Iberia in Antiquity, particularly as regards the pre-Roman Kingdom of Tartessus. This additional source is the poem *Ora maritima* by Roman author R. F. Avienus. The credibility of this source, however, has been seriously doubted by many specialists for some fifty years now. The poem dates

from the fourth century AD, but contains references to the sea coasts of the Iberian Peninsula that are much older. Avienus himself mentions many or most of the authors whose works he read and inspired him to write the poem. At least some of these authors—such as Himilco, the Carthaginian explorer; Euctemon, the Athenian geographer; and Herodotus, the Ionian historian and ethnologist—lived no less than seven hundred years before he did. Furthermore, the poem belongs in an intellectual context of revivalism of pre-Christian advancements in philosophy, science, and the arts (Mangas and Plácido 1994, 17–18, 26).

One of his unnamed sources for the poem appears to be an old description of a coastal course, like in a portolan chart or rutter (*periplous*), or a number thereof, to help mariners navigate from the islands *Sacra* and *Albionum* in the North Atlantic down to the “Pillars of Heracles,” which flanked the Strait of Gibraltar, and from there on to the Greek colony of Marseilles along the coasts of southern and eastern Iberia. Avienus cited this ancient rutter at length in many of his verses, even *verbatim*—to such an extent that *Ora maritima* became famous right after it was argued for the first time, by the Danish scholar G. Schöning, late in the eighteenth century, that the poem had an old portolan chart embedded in it. The chart contains a clear reference to the realm of Tartessus, indicates the western and eastern boundaries of this realm, and provides directions as to where exactly the city capital was located. This city—the unnamed author wrote—sat on an island, “the isle of Cartare,” which was within a large river, also called “Tartessus.” The island was near the mouth of the river and could be seen from the sea. The river surrounded the island after flowing through a lake called Lake Ligustinus. The eastern branch projected three channels into the hinterland further east and then joined the western branch south of the island through a “two two-fold” outlet—apparently a sequential bifurcation within a small delta. It then joined the course of the river then emptied into the ocean.

Despite this detailed information, the remains of the city of Tartessus were never found, not even in the Roman period. One reason for this is that the geographical scenario described in the rutter matches no landscape known in southern Iberia today. Another reason is that its author makes reference to additional places and features that are mentioned in no other narrative for ancient Iberia, which makes identification an apparently unsolvable problem.

There is, for instance, the city of Herbi, located somewhere between the mouth of the Guadiana River and the mouth of the Tartessus River.

Avienus commented that this city no longer existed in his time, as it had been destroyed in “past times of wars”—in probable reference to the conflicts and disturbances of the second century AD in southern Iberia.

Beyond the mouth of the Tartessus River, Avienus cited the rutter to remark that the prospective mariner, on his way to the Strait of Gibraltar, could make out on the horizon a feature known as Gerontis Arx (“King Geryon’s citadel”), which received the waters of “a wide river” (*flumen amplum*) that flowed into the sea nearby. Across from Gerontis Arx was Fani Prominens (“The Cape of the Shrine or of the Temple”). Gerontis Arx and Fani Prominens flanked the entrance to Sinus tartessus (“The Gulf of Tartessus”). In addition, Gerontis Arx stood by or was located in the walled city (*oppidum*) of “Gadir,” arguably the core settlement of the Phoenician colony of Cadiz.

A channel (*interfluum*) five stadia wide (some 900 m) separated the walled settlement and Gerontis Arx from the island of Erythia, which must be the same as the 100-stadium island of Erytheia mentioned by Strabo in connection with the story of King Geryon. To the west of this long island stood another island, “consecrated to Venus Marina,” which included a subterranean temple and an oracle.

Suffice these examples to argue that the very rareness of the content of *●ra maritima*—an unfamiliar geography and a sequence of singular names for places and features—supports the authenticity of the chart as much as they evince its lack of credibility. Indeed, the rare names might well be pointed to in contending that they reflect the description of at least two commercial sea routes in a remote past. ●ne was from the city of Tartessus to the islands Sacra and Albionum in the North Atlantic, and back, so as to procure lead and tin. The other sea route would connect the city of Tartessus to the Ionian colony of Marseilles and beyond in the Mediterranean Sea.

So interpreted, the rare information contained in *●ra maritima* can then be dated, as in effect it has been (Mangas and Plácido 1994, 23), to the time of the close relations (political as well as commercial) that Ionians—particularly Ionians of the city of Phocaea, through the colony of Marseilles—kept with the Kingdom of Tartessus in the seventh and sixth centuries BC. More specifically, the information appears to date to the first half of the sixth century BC, as it mentions the colony of Marseilles, founded ca. 600 BC, but fails to mention the colony of Ampuries, which was founded by people from Marseilles ca. 550 BC.

The relations between the Kingdom of Tartessus and the Ionians of Phocaea became close to the point, wrote Herodotus, that the Tartessian King Arganthonios offered the city of Phocaea assistance in resisting the expansion of the Persian Empire. Fierce commercial competition, however, might have existed between the Ionians, on the one side, and the Phoenicians and Carthaginians on the other for the Iberian and the North Atlantic trade.

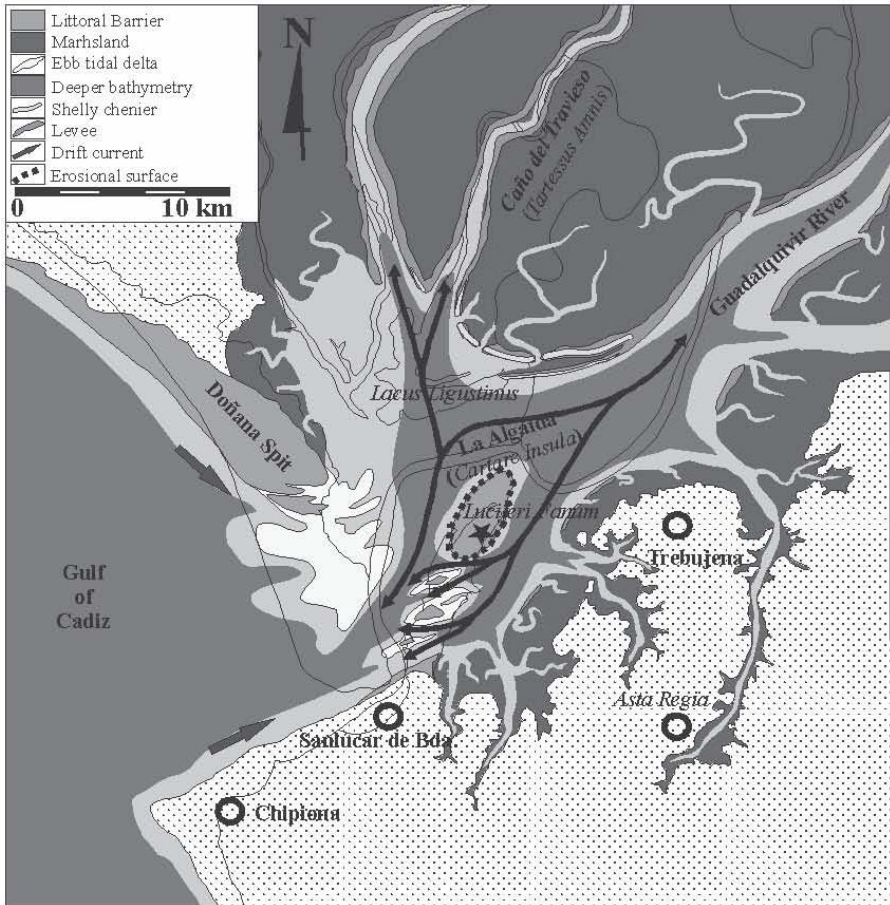


Fig. 2. Paleogeography of the mouth of the Guadalquivir River in the Tartessian period as inferred from geomorphological evidence from the Guadalquivir paleo-estuary

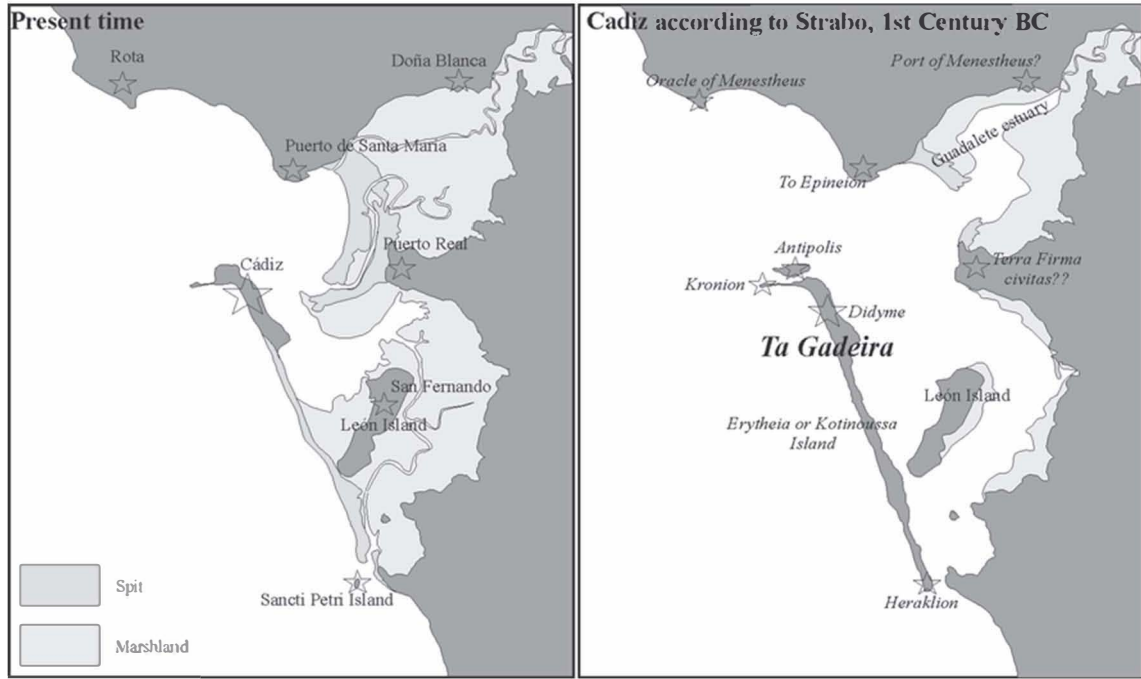
2. Interpretation in Light of the Geomorphological Evidence from the Guadalquivir and Guadalete Paleo-estuaries

Our reconstruction of the geomorphological evolution in the Guadalquivir and Guadalete paleo-estuaries in the course of the Middle and Late Holocene invites us to suggest that the spit of Algaida was from ca. 1150 BC to Roman imperial times the “isle of Cartare” mentioned in *Ora maritima* where the city of Tartessus stood. If so, then the Tartessus River was the present-day Guadiamar River, which flowed across the Guadalquivir paleo-estuary through today’s relict Travieso channel. *Lacus ligustinus* was therefore the coastal lagoon that the progradation of the Doñana spit had formed.

Archaeological remains from the Tartessian period have been found at the present-day spit of Algaida. These remains, however, have been interpreted as those of a Carthaginian shrine (Blanco Freijeiro and Corzo-Sánchez 1983). The spit of Algaida has been pointed to as the location for the city of Tartessus by other researchers (Barbadillo-Delgado 1951; Menanteau, in Palacios 1981), yet they lack the geomorphological evidence presented here.

To continue with the direction of the rutter, Arx Gerontis “King Geryon’s citadel,” we believe stood on the island which geophysical tests in downtown Cadiz revealed lay north of an outlet of the bay, at the present-day beach of La Caleta. This island would later hold the core of the first Phoenician settlement, referred to as Gadir in *Ora maritima*. It is the same island that still later in the first millennium BC, wrote Strabo, would hold the “the anti-polis” of the multi-sited city community of Ta Gádeira. The “polis” counterpart sat across the five-stadia wide outlet of the bay, at the beach of La Caleta on the long island of Erýtheia, where, according to Greek mythology, King Geryon confronted Heracles and died.

Opposite Arx Gerontis, on the other side of the entrance to the bay, stood Fani Prominens, the “Cape of the Shrine or Temple.” Opposite the northernmost end of the Cadiz peninsula today, on the other side of the entrance to the bay, stands the town of Rota, where, as remarked earlier, the Roman and pre-Roman remains of a temple were found in the seventeenth and nineteenth centuries, and where, going from Strabo’s directions, the “Oracle of Menestheus” may have stood. It is then tempting to surmise that the shrine or temple on a cape across Arx Gerontis was the “Oracle of Menestheus” mentioned by Strabo for the coastline of the province



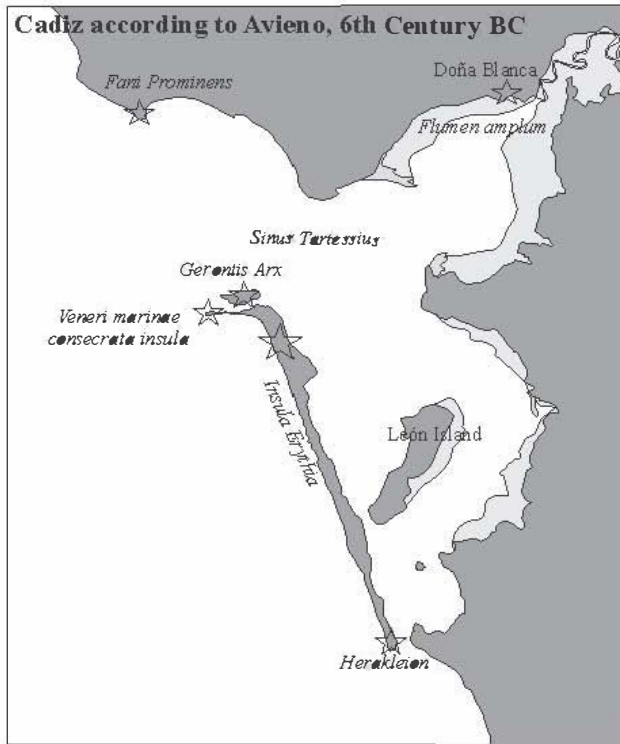


Fig. 3. The islands and bay of Cadiz and their vicinity as described in Strabo's *Geographiká* and Avienus's *Ora maritima*. Geomorphological data partially referred to in Alonso et al. (2015) and Dabrio et al. (2000)

of Cadiz where Rota now stands. Sinus tartessus, "The Gulf of Tartessus," therefore, would be the Bay of Cadiz and the Guadalete paleo-estuary. Flumen amplum would be the Guadalete River.

Finally, the island consecrated to Venus Marina may have been the present-day island—and peninsula, depending on the tidal cycle—of San Sebastián, where, according to Strabo, a temple for the worship of Cronus once stood. Cronus (Roman Saturn) and Aphrodite (Roman Venus) were connected in Greek mythology.

3. The Fall of the Schulten Paradigm

For more than a century, up to the 1960s, the rutter embedded in *Oramartima* was considered geographical information of the utmost importance for research on Tartessus. It was the fundamental evidence, for instance, to which Schulten and Bonsor pointed in the 1920s to announce their hypothesis that the remains of the city of Tartessus lay buried at the site of Cerro del Trigo, on the spit of Doñana. This hypothesis was the archetypal product of a paradigm for the study of Tartessus that can be called here, for the sake of argument, the “Schulten paradigm,” even though it far predates Schulten, as it can be traced as far back as the Renaissance and the rise at the time of modern Classical scholarship.

The defining characteristic of this paradigm was methodological—practitioners placed trust on the comparative analysis and interpretation of all references to Tartessus, whether direct or indirect, contained in the writings preserved from Antiquity. Avienus’s *Oramartima*, Strabo’s *Geographiká*, and Herodotus’s *History* were such writings; yet so were the references in the Old Testament to “the land of Tarshish” (out to which the merchant ships of ancient Israel as well as Tyre would sail) and the references to this same land in the cuneiform texts of Assyria. Information from archaeological projects, or from projects from other scientific disciplines, such as geology, was viewed as supplementary to the information provided by these writings.

In the 1960s, however, this time-honored paradigm was abandoned, and with it the credibility of all those sources from Antiquity, including Avienus’s *Oramartima*. Instead, a different paradigm was adopted, which can be called here the “Xeres Paradigm,” after an important meeting of experts on the subject of Tartessus that took place in the city of Xeres, southern Spain, in September 1968. Although the reasons for the paradigm change were many, few of them, if any, could justify it. It had two defining characteristics: (1) the resort to archaeology as the practically exclusive source for Tartessus, to the detriment of the narratives from Antiquity; and (2) the concept of this ancient kingdom as a derivative culture in the long history of relations that natives of southern Iberia maintained with Phoenician traders and colonists.

Since the 1990s, however, new data and intellectual conditions have increasingly brought about a renovated interest in those narratives. The new data that are most significant are the ever larger amounts of Greek pottery shards and other types of evidence that add up to remains known

for decades which date to periods covered by the written sources, the Middle and Late Bronze Age included. The most spectacular developments have taken place in the cities of Huelva and Cadiz. The references in the Old Testament to “the land of Tarshish,” understood as the realm of Tartessus, have been vindicated from the field of biblical studies (Koch 2003).

The new intellectual conditions are those of an increasing impatience with the limitations of the Xeres Paradigm, which in the face of the fresh archaeological evidence presses its supporters to answer questions about the less material aspects of culture related to this evidence that the paradigm was ill set to pose in the first place; e.g. aspects of social and political organization and economic interaction patterns, precisely the topics that the written sources most inform about.

This new context favoring a renewed interest in the written sources of Antiquity should extend, sooner or later, to Avienus’s *Ora maritima*, too.

References

- Alonso, C., F. J. Gracia, S. Rodríguez-Polo, and C. Martín-Puertas. “El registro de eventos energéticos marinos en la bahía de Cádiz durante épocas históricas.” *Cuaternario y Geomorfología* 29 (1–2) (2015): 95–117.
- Barbadillo-Delgado, P. *Alrededor de Tartessos: Los descubrimientos de La Algaida*. Sanlúcar de Barrameda: Ayuntamiento de Sanlúcar de Barrameda, 1951.
- Blanco Freijeiro, A., and R. Corzo-Sánchez. “Monte Algaida: Un santuario púnico en la desembocadura del Guadalquivir.” *Historia* 16 (87) (1983): 123–8.
- Dabrio, C. J., C. Zazo, J. L. Goy, F. J. Sierro, F. Borja, J. Lario, J. A. González, and J. A. Flores. “Depositional History of Estuarine Infill during the Last Postglacial Transgression (Gulf of Cadiz, Southern Spain).” *Marine Geology* 162 (2000): 381–404.
- De San Cecilio, P. 1669. *Annales de la Orden de Descalzos de Nuestra Señora de la Merced, Redención de Cautivos Christianos, Parte Primera*. Barcelona: Dionisio Hidalgo, 1669.
- Gracia, F. J., C. Alonso, M. Gallardo, F. Giles, J. Benavente, and F. López-Aguayo. “Evolución eustática postflandriense en las marismas del Sur de la Bahía de Cádiz.” *Geogaceta* 27 (1999): 71–4.
- Koch, M. *Tarshish e Hispania: Estudios histórico-geográficos y etimológicos sobre la colonización fenicia de la Península Ibérica*.

- Translated by M. Prieto Vilas. Madrid: Centro de Estudios Fenicios y Púnicos, 2003.
- Mangas, J., and D. Plácido. Introducción. In *Testimonia Hispaniae Antiqua I: Avieno, Ora maritima, Descriptio orbis terrae, Phaenomena*, edited by J. Mangas and D. Plácido, 19–30. Madrid: Ediciones Historia 2000.
- Palacios, J., 1981. “Aquí estaba Tartessos.” *Gaceta ilustrada* 1278 (1981): 28–39.
- Ruiz-Mata, D., and C. J. Pérez. *El poblado fenicio del Castillo de Doña Blanca (El Puerto de Santa María, Cádiz)*. El Puerto de Santa María: Ayuntamiento de El Puerto de Santa María, 1995.
- Sociedad Geográfica de Madrid. “Antigüedades de Andalucía.” *Boletín de la Sociedad Geográfica de Madrid* 5 (año III) (9) (1878): 13–14.

5.

ENVIRONMENTAL PHILOSOPHY

5.1

THE PSYCHOLOGICAL EFFECTS OF NATURAL DISASTERS FROM CLASSICAL ANTIQUITY UP TO THE PRESENT

OURANIA GEORGIADOU

DEREE-AMERICAN COLLEGE OF GREECE, ATHENS

AND S. A. PAIPETIS

PROFESSOR EMERITUS, UNIVERSITY OF PATRAS, GREECE

Abstract

Besides the direct consequences of natural disasters, such as threats against lives and the welfare of humans, there are also side effects producing most unpleasant results. Such effects are mainly psychological and may have a most adverse influence on people, such as fear, anxiety, insecurity, or even mental disorders, reflecting on their quality of life and financial situation. Such phenomena, closely connected to human nature, have appeared regularly in the course of history, and, although only limited information concerning antiquity is available, one may reasonably assume that mental reactions against natural disasters must be more or less the same. Cases of mental problems, due to various reasons, are accounted for in Greek mythology and drama. Things are certainly worse in modern times, where, in addition to natural disasters, catastrophic human activities, leading to severe environmental problems such as climate change or even the possibility of nuclear war, create more concerns and adverse psychological effects.

1. Introduction

Ancient Greek and Roman records contain many references to natural disasters. Earthquakes, floods, fires, tsunamis, volcanic eruptions, plagues, etc. have always been threatening humans with loss of life and property, immigration, social conflicts, and even wars. A notorious case was the eruption of the Thera volcano 3,500 years ago, followed by a huge tsunami, which supposedly destroyed the Minoan civilization in Crete.

The immediate reactions to the events, as well as the ensuing responses, can only be analyzed if there is dependable evidence. Two case studies offer eyewitness accounts of disaster, as well as archaeological and scientific studies. These are the plague that struck Athens in 430 BC during the Peloponnesian War, described by Thucydides who witnessed and suffered from it, and the eruption of Vesuvius volcano in AD 79, recorded in letters by Pliny the Younger, who witnessed and fled from it. The victims of these disasters were plunged into confusion and uncertainty about their survival. In many cases, social cohesion was dissolved, and individuals broke norms and traditions. Some sought help from the gods, and others felt that no gods existed at all. In the aftermath, leaders responded with actions intended to help people, restored organized society, and rebuilt. Although frustrated by physical and social barriers, they had some success [1]. However, effects following natural disasters adversely influenced all aspects of human activity.

The human reaction to disasters is expected to be similar all over the planet and through the centuries, since it depends on the particular properties of human nature.¹

For example, psychological effects are different with different social classes or even with women in places where they were considered as inferior citizens, and that includes Ancient Greece.

In the latter, it was believed that disasters were sent by the gods along with the mental problems that followed. The goddess *Ati*² was supposed to be the incarnation of such problems along with the Erinyes or Furies [3].

Accounts of persons possessed by the Furies after a personal disaster can be found in Greek drama. Orestes's paranoid call for help to Pylades, his comrade, is a well-known example [3]:

Pylades, do you see her?

Don't you see hell's dragon, how she wants to kill me,

fringed with her dreadful vipers against me?

and the one who breathes fire and slaughter from her robe and wings her way, my mother in her arms

the rocky mass, how she hurls it at me!

Ah, she will kill me! Where can I escape?

In view of the effects of disasters of any kind, lasting for short or long times, on many occasions, the victims need psychological or psychiatric support.

The term "psychiatry" was introduced at the beginning of the nineteenth century. Before that time, the medical care of insanity appeared under different names, many of which are seen in Ancient Greek writings. For example, an explicit reference to "mental disorder" was made by Galen, who wrote in his commentary on Hippocrates (*Of the Epidemics*) that if the "spirit becomes corrupt" or its natural "blend" with the "substance of the brain" is "redirected," then "mental disease or death" will follow. This context of the term is significant, as it probably heralds a major change. Until that time (the second century AD), all illnesses were of the body. For example, *phrenitis* was categorized by Hipparchus the Pythagorean among the somatic diseases, along with pleurisy, pneumonia, dysentery, lethargy, and epilepsy [5]. As a matter of fact, the Ancient Greek medico-philosophical tradition, which was reproduced, filtered, and eventually crystallized in later centuries, has contributed greatly to the development of modern psychiatry. To what extent this tradition will endure in an era characterized by over-specialization and hyperbolic dependence on technology remains to be seen [6].

2. Psychological effects of disasters in the contemporary world

During the last few decades, the number and kind of natural disasters have increased immensely. Besides threats from space [7], overpopulation, environmental problems, climate change, the possibility of nuclear wars, etc. have been added to the "conventional" threats by the elements of nature. The former are much more tangible, and people are regularly informed on their developments and the possibility of life on earth being wiped out, and also, since the situations are getting worse on a constant basis, the respective psychological effects are expected to be, and indeed are, much more severe, as seen in the following cases:

(i) Personal experiences of extreme weather phenomena often create psychological and/or mental health problems, especially in view of repeated events [9].

(ii) Stress and emotional effects due to both natural and technological (human-made) disasters. Symptoms are changing with time and include feelings of mistrust, shock, denial, or anger, appearing immediately after the event, along with feelings of altruism and compassion related to rescuing human lives and property.³ In such cases, psychological support and optimism about the future may play an important role, since this phase, which can last for years, may cause physical health problems, such as headaches, stress, fatigue, and even heart issues.

In situ studies of the Three Mile Island accident,⁴ which took place about eighteen months later, found that people living close to the area exhibited higher levels of norepinephrine as well as disturbances of cognitive abilities as compared with people living close to another nuclear power station, coal power stations, or far away from such stations [9]. Adverse phenomena of this kind are more intense with poorer social classes.

(iii) Insecurity and despair, especially related to the survival of human life on earth [12].

(iv) Numbness and apathy, especially connected with climate change [10, 11].

(v) Feelings of guilt resulting from disasters developing in people believing that they have been inadequate in either preventing the event or supporting the victims, according to their own moral criteria, e.g. they feel morally responsible for the results.

(vi) Focusing on the effects of climate change on the community and society: (a) global warming increases social violence [13]; (b) the relations between social groups are adversely affected [14]; (c) displacement and relocations, among others, undermine mental health [15]; (d) reactions towards social-economic inequalities, especially in rich and poor countries [15]; and (e) complications with social justice [16, 17].

3. Conclusion

The main feeling governing psychological effects of natural or human-made disasters, considered either as “acts of god” or results of human inadequacy to deal with its own existential problems, is the sense of a sudden and

absolute shift from normal existence to an overwhelming encounter with death. The absolute fear of the death of the individuals, of their family and friends, their progeny, and eventually all humanity, is best reflected in the following account given by a then thirteen-year-old shopkeeper in Hiroshima, who was at a distance of 1,400 meters from the bomb's hypocenter, and survived [18]:

I was a little ill ... so I stayed at home that day ... There had been an air-raid warning and then an all-clear. I felt relieved and lay down on the bed with my younger brother ... Then it happened. It came very suddenly ... It felt something like an electric shock – a bluish sparkling light ... There was a noise, and I felt great heat – even inside of the house. When I came to, I was underneath the destroyed house ... I didn't know anything about the atomic bomb, so I thought that some bomb had fallen directly upon me ... and then when I felt that our house had been directly hit I became furious ... There were roof tiles and walls – everything black – entirely covering me. So I screamed for help ... And from all around I heard moans and screaming, and then I felt a kind of danger to myself ... I thought that I too was going to die in that way. I felt this way at that moment because I was absolutely unable to do anything at all by my own power ... I didn't know where I was or what I was under ... I couldn't hear the voices of my family. I didn't know how I could be rescued. I felt I was going to suffocate and then die, without knowing exactly what had happened to me. This was the kind of expectation I had ... which remains with me indefinitely: the sense of a more or less permanent encounter with death.

References

1. J. Donald Hughes, "Responses to Natural Disasters in the Greek and Roman World," in *Forces of Nature and Cultural Responses*, edited by Katrin Pfeifer and Niki Pfeifer (New York: Springer, 2012), 111–37.
2. Susan Blundell, *Women in Ancient Greece* (Cambridge, MA: Harvard University Press, 1995).
3. Euripides, *The Complete Greek Drama*, edited by Whitney J. Oates and Eugene O'Neill Jr. in two volumes, 1: *Iphigenia in Tauris*, verses 285–91, translated by Robert Potter (New York: Random House, 1938).
4. Galen's comment in N. Papavramidou N. (ed), "The meaning of 'mental condition' and 'mental disease' in the Hippocratic, Aristotelian and Galenic texts (in Greek), doctoral dissertation (Thessaloniki, 2006).
5. Stobaeus, *Florilegium*, Hipparchus Pythagorean from *On Levity*, Book 4, chapter 44, sect. 81. Cited in J. Pigeaud, *La maladie de l'âme. Etude sur la relation de l'âme et du corps dans la tradition medico-philosophique antique* (Paris: Les Belles Lettres, 1989), 72.

6. Ath. Karavatos, D. N. Ploumpidis, and G. N. Christodoulou (eds.), "The Origins of Psychiatry in Ancient Greece," in *Anthology of Greek Psychiatric Texts* (Athens, BETA medical publishers, 2011).
7. J. Craig Wheeler, *Cosmic Catastrophes: Exploding Stars, Black Holes, and Mapping the Universe* (Cambridge: Cambridge University Press, 2007).
8. I. Peek and D. S. Mileti, "The History and Future of Disaster Research," in *Handbook of Environmental Psychology*, edited by R. B. Bechtel and A. Churchmans, 511–24 (New York: John Wiley, 2002).
9. J. G. Fritze, G. A. Blashki, S. Burke, and J. Wiseman, "Hope, Despair and Transformation: Climate Change and the Promotion of Mental Health and Wellbeing," *International Journal of Mental Health Systems* 2 (13) (2008). doi:10.1186/1752-4458-2-13.
10. D. Hamilton, and R. Gifford, "Illusory Correlation in Interpersonal Perception: a Cognitive Basis of Stereotypic Judgments," *Journal of Experimental Social Psychology* 12 (4) (1976): 392–407.
11. D. Hamilton, and R. Gifford, "Illusory Correlation in Interpersonal Perception: a Cognitive Basis of Stereotypic Judgments," *Journal of Experimental Social Psychology* 12 (4) (1976): 392–407.
12. J. G. Fritze, G. A. Blashki, S. Burke, and J. Wiseman, "Hope, Despair and Transformation: Climate Change and the Promotion of Mental Health and Wellbeing," *International Journal of Mental Health Systems* 2 (13) (2008). doi:10.1186/1752-4458-2-13.
13. C. A. Anderson, W. E. Deuser, and K. DeNeve, "Hot Temperatures, Hostile Affect, Hostile Cognition, and Arousal: Tests of a General Model of Affective Aggression," *Personality and Social Psychology Bulletin* 21 (1995): 434–48.
14. William R. Reuveny, "Thompson, Uneven Economic Growth and the World Economy's North–South Stratification," *International Studies Quarterly* 52 (3) (2008): 579–605.
15. M. T. Fullilove, "Psychiatric Implications of Displacement: Contributions from the Psychology of Place," *American Journal of Psychiatry* 153 (12) (1996): 1516–23.
16. R. D. Bullard and G. S. Johnson, "Environmental Justice: Grassroots Activism and Its Impact on Public Policy Making," *Journal of Social Issues* 56 (3) (2000): 555–78.
17. S. C. Moser and L. Dilling (eds.), "Creating a Climate for Change: Communicating Climate Change and Facilitating Social Change," *Écoscience* 14 (4) (2007): 545–6.
18. Robert Jay Lifton, "Psychological Effects of the Atomic Bomb in Hiroshima: the Theme of Death," *Daedalus* 92 (3) (1963): 462–97.

Notes

¹ See a “theorem” by S. A. Paipetis – similar systems, under similar conditions, produce similar responses.

² Ati (*Ἄτη*), a deity of the Greek mythology, daughter of Zeus and Eris, goddess of strife. She was the incarnation of disaster. In Ancient Greek, “Ati” meant “confusion of mind” and recklessness due to delusions caused by the Gods. Ati was the personification of brain damage and thoughtless deeds, as well as their effects, and led to divergence and irresponsible behavior by both gods and humans. Ati had a deleterious effect on people’s brains, blinding their minds and causing disasters. The opposite deity was *Μῆτις* (*Mētis*=wisdom).

³ See William Shakespeare’s *The Tempest*, Act I, Scene II, for an excellent account of such an emotional response. Miranda, upon hearing of the alleged loss of King of Naples vessel, exclaims:

●, I have suffered/ With those that I saw suffer: a brave vessel,/ Who had, no doubt, some noble creature in her./ Dash’d all to pieces. ●, the cry did knock/ Against my very heart. Poor souls, they perish’d.

⁴ The 1979 accident at the Three Mile Island nuclear power station in Dauphin County, Pennsylvania, United States, suspended the development of nuclear technology in the country for at least thirty years, during which no new nuclear power stations were permitted, just the ones under construction being completed. As a result, the United States lost its forefront position in this area.

5.2

THE PURPLE DYE INDUSTRY IN GREECE FROM PREHISTORY TO THE END OF THE BYZANTINE EMPIRE

LILIAN KARALI-GIANNAKOPOULOU
PROFESSOR EMERITA, UNIVERSITY OF ATHENS

Abstract

Purple, the secret of purple-dye production, the origins, symbolism, diffusion, and purple dyed goods trade are some of the most popular research topics among scholars worldwide. This paper presents a project of the Laboratory for Environmental Archaeology, National and Kapodistrian University of Athens. The aim is to define the workshops, variations of the red/purple color shades based on the sea species used for the preparation of the dye, and the variations of price according to shade and distance. Purple dye has been a valuable trade good from prehistory to the end of the Byzantine Empire. The study is based on the archaeological and archaeo-environmental remains of the purple dye production centers in the Eastern Mediterranean from prehistory to history. A database, a GIS, and a digital map are under construction. The project will systematically compare places and periods in order to generate new perspectives on critical issues of social, economic, and cultural change and provide a scientific background for this important discussion. The subject is strongly thematic, diachronic, comparative, and interdisciplinary.

1. Mediterranean Sea, Environmental Archaeology and Mollusks

On the Mediterranean shores, from prehistory to the present, great civilizations have flourished. Communication in the Mediterranean Sea

was and still is an important cultural issue. From prehistory it has enabled contact and exchange of goods, knowledge, ideas, and technology to such a degree that detecting the origins of many inventions and innovations is not always easy.

Excavations in coastal sites brought to light a great amount of archaeo-environmental data about marine, aquatic, and terrestrial fauna and flora. Among them, the archaeomalacological material (land snails and sea mollusks) reflects specific environmental and human behavioral patterns, if considered within a concrete archaeological context.

2. Archaeomalacological Material in an Archaeological Context

The shells of gastropods and lamellibranches are frequently found on archaeological sites, quite often near coastal sites. Mollusks may give a variety of indications having to do with environmental and climatic conditions, the date of the deposit, ways of consumption, and fishing techniques. Furthermore, shells, processed or not, have been used as tools, ornaments to decorate ceramic pots, building materials (sediments, ingredients, and for insulation purposes), pigments, mortar, in the ceramic clay, and for the production of lime and purple dye. Mollusks, and their form and properties, have been a source of inspiration, as shown by artistic and symbolic representations (Karali 1999). Some mollusks and relevant products have been traded around the world and the Mediterranean. However, uses of shell cannot be easily detected if the appropriate methodology is not meticulously applied.

3. Purple Dye Production

Nowadays, among natural dye sources for the production of natural dyes, about three hundred plants and thirty animals (marine mollusks and insects) are known worldwide. From antiquity up to the present, shell purple dye has been the most expensive type. The preparation of this expensive dye has been kept secret for many centuries. The existing knowledge about the whole procedure, and the variety and differentiation of the methodology applied by the groups of different geographic areas, is not yet understood in detail. The mollusk species may vary according to the biotope and the general environmental conditions. In the Mediterranean and the Aegean area, three murex species have been used in order to obtain a vast range of red shades: *Murex/Bolinus/brandaris* Linne,

Murex/Hexaplex trunculariopsis/trunculus Linne, *Buccinum haemastoma* Linne and *Thais haemastoma* Linne/*Buccinum cingulatum* Lamarck. It is known that *Murex brandaris* L. gave a more reddish-purple color; *Murex trunculus* L. gave a more blue-purple color; and murex and Thais, combined in different proportions, were used for a more bluish/reddish dye (Karali, Reese).

4. Purple Dye: Archaeological Evidence

At the Greek coastal sites, large deposits of shells are found, many of them from the muricidae family. However, a murex is not by itself a safe indicator for purple dye production, as the archaeological context, the mollusk species, and the morphological variations on the original shell must be seriously taken into consideration before concluding on the above specific use (Fig. 1):

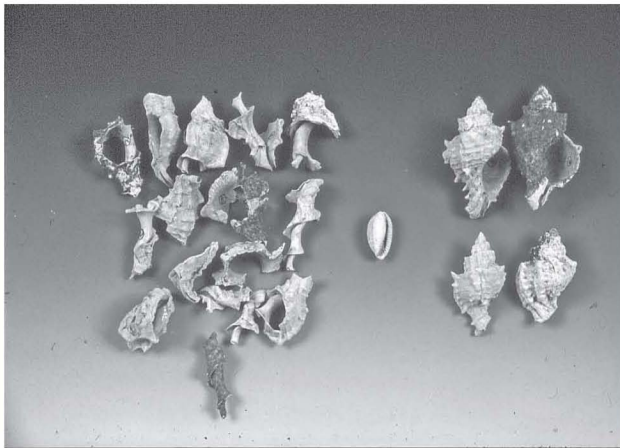


Fig. 1. Fragmented Murex species found in excavations

- The typology of the shell—most of the shells found in excavations are fragmented.
- The fragmentation techniques vary according to the chronological periods—in the prehistoric deposits most of the shells are not carefully broken; later on, there is a hole on the larger (ventral) part, or the shell is broken in larger pieces.

- Installations (cisterns, water canalization, etc.) are imperative. However, in prehistory, such evidence is not always available, and in a number of sites there is small-scale production.
- Relevant objects (pots, woven materials, etc.) are important indicators of the product, the storage vessels, and its secondary uses in a variety of materials that were usually dyed.

The invention and production of purple in Greece

Greece played an important role in the emergence of eminent prehistoric civilizations in the southeastern Mediterranean. During the Bronze Age in Crete, a close relation with the main world is attested to. Archaeomalacological research has developed particularly in the Aegean region. The archaeomalacological data from Crete suggest that the purple-dye production began on the island around the end of the Middle Minoan I period or during MM II (ca. 1900–1700 BC), and was widespread among the Aegean centers (see Fig. 2 below).



Fig. 2. Bronze Age Aegean purple-dye production centers

The archaeological evidence available today indicates that shell purple dye was most probably produced in the Aegean during the Middle Bronze Age (Reese 1987; Stieglitz 1994; Karali 2003) before being introduced into the Near East (Stieglitz and Reese have surveyed and studied the earliest archaeomalacological sites of purple dyeing in Near Eastern sites). Additionally, the Levantine Phoenicians of the Iron Age were producing the famous Tyrian purple, from the Late Bronze Age onward. The archaeological evidence from Greece shows that significant amounts of murex shells and dye-related installations were found in Crete and the Aegean Islands. In the Greek mainland, the number of murex shells is considerably smaller. Therefore, it seems that widespread knowledge existed, but the scale of production was different (Veropoulidou, Andreou, and Kotsakis 2008).

The oldest evidence of purple-dye production in prehistoric Greece comes from the Middle Bronze Age islet of Lefki/Koufonisi in southeastern Crete, where a considerable amount of crashed murex shells were found along with Middle Minoan (MM2) ceramic (Stieglitz 1994). In Akrotiri, some of the buildings (Santorini) have floors made with crushed murex shells and frescoes using the red pigment derived from murex shells (see Fig. 3 below). These are considered to be the remains of purple-dye industrial activities from a workshop somewhere close to the settlement. In Crete, the evidence of purple dye comes from many important sites (such as Palaikastro, Knossos, Zacros, Myrtos, Pyrgos Myrtou, Makris Gyalos, Petras, Mallia, Tylissos, Yiouchtas, Chania, and Kommos). Additional information of the importance and symbolism of the precious dye comes from two tablets in Linear B discovered at the Palace of Knossos, where among the precious belongings of the king, some purple garments are mentioned (Karali 1988; 1997; 2005; Reese 1986; 1987; 2000).

After the Minoans, the Mycenaeans adopted and continued this industry and created an extended commercial network. Workshops can be found in many important Mycenaean sites such as Thebes and Athens (Constantinidis 2008)

The Classical period is much better documented by the purple workshops, relevant archaeological findings, and literary sources. Pliny the Elder (*Historia naturalis* IX, 124–142) is the first to provide information of the recipe and some of the most important production and trade centers, such as Crete, Rhodes, Kos, Amorgos, Nisyros (called also Porphyris), Chios, the west coast of Asia Minor, Phocaea, Lydia and Phrygia, Laconia, Cythera, Corinth (a murex is depicted on Corinthian coins), and Hermione.

The importance of purple dye in the last city is proved by the following historical fact: when Alexander the Great occupied Susa (330 BC), some five thousand talanta of purple dye (or purple cloth) bought from Hermione and stored in Persia for about two centuries were among the royal treasures. This must have been a very precious good because of its quality and value. The mighty kings of Persia preferred to buy such goods from a Greek city than from the Middle Eastern purple production centers.

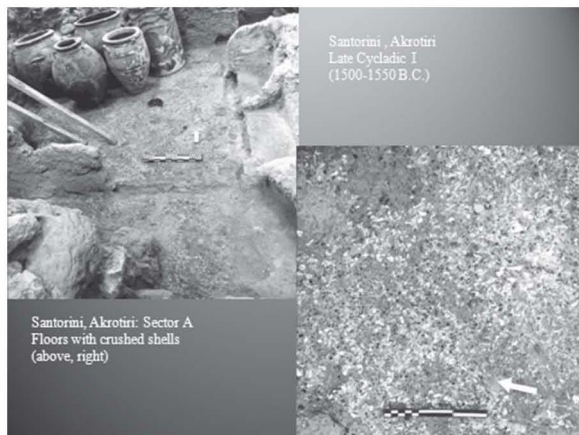


Fig. 3. Floors made from fragmented Murex shells from the Aegean site of Akrotiri

Actually, estimations are made about the approximate number of shells fished and processed for the local Hermione Purple industrial activities (Protopapas and Gatsos 2003). Based on the amount of fragments of crushed shells used as mortar for the construction of the city walls, it seems that about ten million shells have been processed for the extraction of the shell gland in the periods preceding the construction of the walls. Thus, diachronically, a least some thousand shells were processed daily, producing around ten to twenty kilograms of purple dye. Accordingly, the city's importance and fame, the temples, the rich estates, and the extensive walls were built thanks to a vast class of rich producers and merchants. If we make the assumption that the purple industry lasted for about one thousand years, from the sixth century BC to the sixth century AD, one could estimate the approximate total number of murex fished and processed as follows:

10,000 sea mollusks per day

1,000 years x 360 days = 360,000 days

10,000 shells x 360,000 days = 3,600,000 shells

If size of the shell and the degree of fragmentation are taken into account, there should have been fished +/- 2-3,000,000,000 murex shells

In the ensuing periods, great importance was again attributed to this precious dye. During the Roman period, purple was the symbol of priesthood, and political and military authority. Purple-dyed products were imported to Rome both from Phoenicia and Greece. Similar use and symbolism inherited from both eastern and western traditions also prevailed in Byzantium and the Christian tradition. During the Byzantine period, the most important purple-dye industrial centers were located in Southern Greece and Asia Minor. The production of murex purple for the Byzantine elite came to an end firstly with the sack of Constantinople in AD 1204, and afterwards the fall of Constantinople in 1453. Some of the reasons for the decay and disappearance of the production centers and the use of purple garments were the lack of the financial resources required for the purchase of murex purple, the expansion of piracy, continuous war activities, and the Muslim beliefs about the negative meaning of the color red.

Establishing a Murex Database

In order to better understand the centers and the trade networks of dye, the analysis and display of all the existing information are imperative. The database we are constructing includes the name of the relevant archaeological site, the geographic location, the relative and absolute date of the shell material, the murex species, the NISP (Number of Individual Specimens) fragments and whole shells, the MNI (the estimated Minimum Number of Murex Individuals represented), and the existing information about the landscape and the sources in which the data are stored (see Fig. 4 below). Articles related to shells are stored in the name of author, title, and geographic area, providing the possibility to easily find and read the selected article in pdf format (Karali, in print).

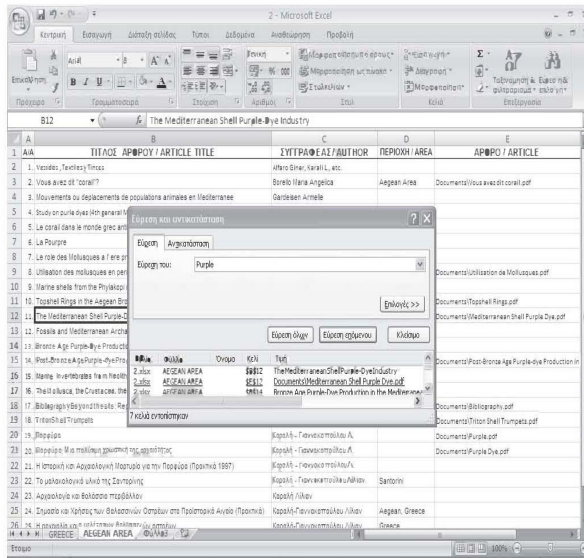


Fig. 4. Descriptive database

A GIS database (see Fig. 5 below) accompanies it, with layers referring to murex shells, correlating the sites and determining the distribution of murex shells around the Mediterranean. Thus, it could be possible to define the geographical boundaries of the areas of influence of the related cultural groups by period (Constantinidis and Karali 2014). A digital map of the Mediterranean is under construction, showing diachronically the sites, the amount of murex middens, and the types of shells found at each geographic unit. This analysis is correlated with other significant trade routes in the area and will certainly give a better understanding of possible factors influencing communication networks in the past. Since different murex species produce different shades of purple dye, this database aims at determining the different ecosystems they come from, and will make possible the identification of specific sites that produced different shades of red and violet. Combining all these different layers of data, a well-documented analysis will be possible and will help new conclusions to be arrived at.

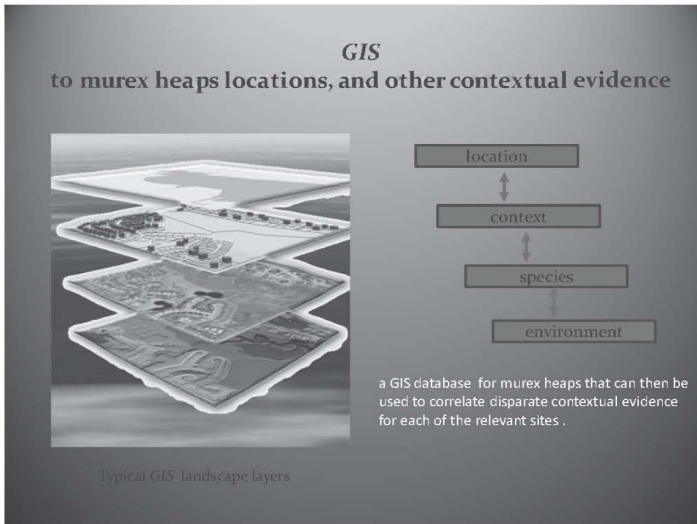


Fig. 5. GIS; excavations and shells of the muricidae family (Constantinidis and Karali 2011)

<i>GIS</i> to murex heap locations, and other contextual evidence
<ul style="list-style-type: none"> • Location • Context • Species • Environment
<i>GIS</i> Purple-dye production layers—typical <i>GIS</i> landscape layers (Constantinidis and Karali 2011)

5. Conclusions

The invention, production, and trade, as well as the archaeological and ethnographic debate with an emphasis on the Greek mainland and the Aegean islands, have been discussed. Archaeology and Archaeomalacology have established the origins of purple dye. Murex-shell deposits found in Minoan sites indicate that purple dye was produced in the Middle Bronze Age Aegean and Late Bronze Age Middle East in Lebanon, Israel, Syria, and other Middle Eastern areas. The Phoenician marines traded purple and established production centers around the Mediterranean Sea. This is the reason why purple dye is mostly known as Tyrian purple and has been associated with the Levant and Phoenicia of the Iron Age. Greek purple dye has been a valuable good and provided the production centers as well

as the relevant ports with wealth and fame from the Bronze Age to the end of the Byzantine Empire. The specialized production and trade as well as the archaeological and ethnographic debate with an emphasis on the Greek mainland and Aegean islands have still to be studied and analyzed.

Selected Bibliography

- Alberti, M. E. "Murex Shells as Raw Materials: Purple Industry and its By-products: Interpreting the Archaeological Record." *Kaskal* 5 (2008): 73–90.
- Carannante, A. "Archaeomalacological Data from the Bronze Age Industrial Complex of Pyrgos-Mavroraki (Cyprus): a Non-dietary Mollusc Exploitation Case." In *Not Only Food: Marine, Terrestrial and Freshwater Molluscs in Archaeological Sites (Proceedings of the Second ICAZ Archaeomalacology Working Group, Santander, 2008)*. MUNIBE, Donostia-San Sebastian, 2010, 34–45.
- Cardon, D. *Natural Dyes*. London: Archetype, 2007.
- Carannante A. "Archaeomalacology and Purple-Dye. State of the Art and New Prospects of Research." In *Moluscos y púrpura en contextos arqueológicos atlántico-mediterráneos*, edited by Juan Jesús, Cantillo Darío, and Bemal José Ramos, 273–82. Actas de la III Reunión Científica de Arqueomalacología de la Península Ibérica, Universidad de Cádiz Constantinidis.
- Constantinidis, D. "Mapping Mediterranean Murex Middens with a Geographical Information Systems (GIS)." In *Purpurae Vestes II. Vestidos, textiles y tintes. Estudios sobre la producción de bienes de consumo en l' Antigüedad*, edited by C. Alfaro and L. Karali, 233–8. Valencia: PUV, 2008.
- Constantinidis, D., and L. Karali. "A Proposed Survey of East Mediterranean Murex Heaps from the Bronze Age to Roman Times: a GIS Analysis of Possible Trade Networks." In *Purpurae Vestes III. Textiles y tintes en la ciudad Antigua*, edited by C. Alfaro, J.-P. Brun, Ph. Borgard, and B. Pierobon, 151–5. Valencia: PUV CJB, 2011.
- Constantinidis, D., and L. Karali "Designing a Database to Trace Purple Dye Trade Routes During the Historical Period in Greece." In *Purpurae Vestes IV. Productions and Trade of Textiles and Dyes in the Roman Empire and Neighbouring Regions*, edited by C. Alfaro, M. Tellenbach, and J. Ortiz J., 143–8. Valencia: PV IV UV, 2014.
- Edmonds, J. *Tyrian or Imperial Purple: the Mystery of Imperial Purple Dyes*. Historic Dye Series, no. 7. Little Chalfont, Buckinghamshire: John Edwards, 2000.

- Goldstream, J. N., and G. L. Huxley. *Kythera: Excavations and studies conducted by the University of Pennsylvania Museum and the British School at Athens*. London: Faber and Faber Limited, 1972.
- Haubrichs, R. “L’étude de la pourpre: histoire d’une couleur, chimie et expérimentations.” *Prehistoria Alpina* 40 (1) (2005): 133–60.
- Karali, L. “Porfyra: Mia polytimi chrostiki tis Archaïotitas.” *Anthropologica Analekta* 49 (1988): 41–3.
- “I istoriki kai archaeologiki martyria gia tin porfyra.” In *Ancient Greek Technology*, Proceedings First International Conference, Thessaloniki, 1997, 325–30.
- *Shells in Aegean Prehistory*. Oxford: BAR International Series 761, 1999.
- “Exploitation du genre Murex en mer Égée.” In *Mouvements ou déplacements de populations animales en Méditerranée au cours de l’Holocène*, edited by A. Gardeisen (UMR 154 – CNRS) Lattes—Montpellier (France), BAR International Series 1017, Oxford, 2002, 105–8.
- “La porpora prima dei Fenici.” In *Dentro la conchiglia. I molluschi alla conquista del mondo*, edited by M. Negra and G. Zobebe Lipparini, 410–13. Trento, Italy: Museo Tridentino di Scienze Naturali, 2003.
- “Testimonianze della produzione della porpora nell’ Egeo nell’ antichità.” *Preistoria Alpina* 40 (2005): 3–9.
- Karali, L., and F. Megaloudi. “Purple Dyes in the Environment and History of the Aegean: A Short Review.” In *Purpurae Vestes II. Vestidos, textiles y tintes. Estudios sobre la producción de bienes de consumo en l’ Antigüedad*, edited by C. Alfaro and L. Karali, 181–4. Valencia: PUV, 2008.
- Karali, L. “Recent Research on Purple Dye Production in the Mediterranean: ‘How Many Purple Dye Cosmic Worlds? The Caves of Greece.’” In *Moluscos y púrpura en contextos arqueológicos atlántico-mediterráneos*, edited by Juan Jesús, Cantillo Darío, and Bernal José Ramos, 283–5. Actas de la III Reunión Científica de Arqueomalacología de la Península Ibérica, Universidad de Cádiz, 2014.
- “Aegean and the Middle East in prehistory. Purple-dye invention, production and diffusion.” UNESCO forum V, “The Alphabet Road: Mediterranean Heritage and Challenges,” October 11–12, Piraeus, Athens, 2014 (in print).
- Kardara, Chr. “Vafi, vafeia kai vafai kata tin archaiotita.” *Hesperia* XLIII (1974): 447–53.

- Pliny the Elder. *Natural History*, edited by John Bostock and Henry Thomas Riley. London: Taylor and Francis, 1855, Book IX. The Natural History of Fishes. chapters 60–5.
- Protopapas, St. and V. Gatsos. “I perifimi archaia porfura tis Ermionis kai i technologia tis.” *Archaiologia kai technes* 89 (2003): 87–92.
- Reinhold, M. *History of Purple as a Status Symbol in Antiquity*. Collection Latomus no. 116. Bruxelles: Latomus, 1970.
- Reese, D.S. “Industrial Exploitation of Murex Shells: Purple-dye and Lime Production at Sidi Khrebish, Benghazi (Berenice).” *Libyan Studies* 11 (1979–80): 79–93.
- . “The Mediterranean Shell Purple-dye Industry.” *American Journal of Archaeology* 90 (2) (1986): 183.
- . “Palaiakastro Shells and Bronze Age Production in the Mediterranean Basin.” *Annual of the British Schools at Athens* 82 (1987): 201–6.
- . “Iron Age Shell Purple-dye Production in the Aegean.” In *Kommos IV: The Greek Sanctuary*, edited by J. W. Shaw and M. C. Shaw, 643–5. Princeton: Princeton University Press, 2000.
- . “Shells from Sarepta (Lebanon) and East Mediterranean Purple-dye Production.” *Mediterranean Archaeology and Archaeometry* 10 (1) (2010): 113–41.
- Ruscillo, D. “Reconstructing Murex Royal Purple and Biblical Blue in the Aegean.” In *Archaeomalacology: Molluscs in Former Environments of Human Behaviour*, edited by D. E. Bar-Yosef Mayer. Proceedings of the Ninth Conference of the International Council of Archaeozoology, Durham, August 2002, 99–106. Oxford: Oxford Books, 2005.
- . “Faunal Remains and Murex Dye Production.” In *Kommos V: The Monumental Minoan Buildings at Kommos*, edited by J. W. Shaw and M. C. Shaw, 776–840. Princeton University Press, 2005.
- Stieglitz, R. R. “The Minoan Origin of Tyrian Purple.” *Biblical Archaeologist*. 57 (1) (1994): 46–54.
- Theodoropoulou, T. “Neolithic and Minoan Marine Exploitation at Petras: Diachronic Trends and Cultural Shifts.” In *Petras, Siteia—25 years of Excavations and Studies*, edited by M. Tsipopoulou. Acts of a two-day conference held at the Danish Institute at Athens, October 9–10, 2010. Monographs of the Danish Institute at Athens, vol. 16. Aarhus, 2012, 89–103.
- Veropoulidou, R., S. Andreou, and K. Kotsakis. “Small Scale Purple-Dye Production in the Bronze Age Northern Greece: the Evidence from the Thessaloniki Tsoumba.” In *Purpurae Vestes II. Vestidos, textiles y tintes. Estudios sobre la produccion de bienes de consumo en la*

Antigüedad, edited by C. Alfaro and L. Karali, 171–9. Valencia: PUV, 2008.

Veropoulidou, R. “The Tyrian Purple, a Royal Dye.” In *Greeks and Phoenicians at the Mediterranean Crossroads*, edited by P. Adam-Veleni and E. Stefani. Thessaloniki: Archaeological Museum of Thessaloniki, 2012.

5.3

EXAMPLES OF ENVIRONMENTAL ENGINEERING INFRASTRUCTURE WORKS FROM GREEK ANTIQUITY

EFSTATHIA ODYSSEOS VALIANTZA

VISITING PROFESSOR, UNIVERSITY OF THESSALY, GREECE

Abstract

The paper refers to the three especially clear examples of environmental-engineering infrastructure works in Greek Antiquity, mainly in the area of the recycling and treatment of rainwater:

- (1) Rainwater collection, treatment, and storage in the island of Delos
- (2) Rainwater collection and treatment for secondary uses of Knossos Palace in Crete
- (3) The treatment system of Kladeos river water covering the needs of Leonidaion, a big hotel establishment at the Olympia archaeological site

The present study is based not only on bibliographic references, but mainly on data from in situ visits by the author and relevant innovative assessments over the course of several years. Adequate photographic material was used.

The comments on the works presented are based on the present knowledge of environmental-engineering technology and the professional specialization of the author.

Finally, a comparison is made between Greek Antiquity and the modern world, as far as technology for water protection and management is concerned, as well as the implementation of important infrastructure works.

1. Introduction

An important sector of the environmental-engineering technologies is that of water collection and treatment, so that it becomes suitable for the desired uses. The water is collected mainly from natural surface sources (e.g. lakes and rivers), underground sources, or recycling the urban rainwater runoff. Nowadays, several water-treatment methods have been developed, depending on the initial water quality and that required for the desired uses. Nevertheless, in the majority of water intake cases from natural surface sources, there are basic stages of treatment which are always included, like the removal of the coarse solids through sand collectors, and the removal of the fine suspended solids through properly designed precipitation tanks.

In the present study, a few examples of water collection and treatment infrastructure works of the Greek Antiquity have been investigated to determine the methods of water management applied at the time, as well as the existing level of environmental-engineering knowledge.

2. Water Intake Treatment and Storage at the Ancient Delos Settlement

The myth has it that the Aegean island of Delos was the birthplace of Apollo, god of light, and Artemis, his twin sister, goddess of hunting, the children of Leto and Zeus, father of the Olympian gods. However, the jealousy of Hera, Zeus's wife, prevented any land from accepting Leto delivering her babies until a small lost rock "wandering" in the Aegean decided to stop and accept her, becoming in this way Delos, which in Greek means "obvious."

On this dry, sterile rock, with an area of 5 km², a pebble in the Aegean Sea between the Mykonos and Rineia islands, but famous worldwide, human settlements have existed since the middle of the third millennium BC, which were highly developed around the middle of the second millennium BC [1, p. 6]. Accordingly, reserving water was of vital importance, since water shortage has always been a problem for most of the Aegean islands, and many extraordinary public and private infrastructure works for the collection and recycling of rainwater from the various surfaces of the Delos settlements were implemented:

2.1 Water intake barrage at the Inopos river

The only river in Delos is the Inopos, collecting the surface runoff from Mount Kynthos (112 m.) [1, p. 5]. Close to Inopos house there is a barrage structure, retaining the river water, and has an overflow of 8 to 10 m long. According to the French archaeological school, who performed many excavations in the area, the water, after overflow, was conducted to two consecutive basins, one overflowing into the other. The second basin includes twenty-two staircases giving access to the water levels [2, p. 224–5].

In our opinion, these two basins constitute a two-stage sedimentation treatment system for the removal of fine suspended solids, while the staircases in the second basin are also used to remove the sludge that eventually collects at the bottom of the basin.

It is worth noticing that the Delos water-basin walls are covered with waterproof mortar, preventing water leakage.

2.2 The theater water basin

The most remarkable hydraulic work of the ancient Delos settlement is the water basin of the theater. The theater had a capacity of 5,500 seats, and is made of granite and marble [2, p. 247].

Rainwater collection was obtained by gravity through aqueducts all along the scene of the theater (see Fig. 1 below), while an underground structure of 6 x 22.5 m with eight big stone arches supporting its roof serves as a water-storage tank.

This arrangement was necessary to protect water from evaporation and pollution (see Fig. 2 below). However, judging from the progressive decrease of the height of the arches along the basin, we conclude that, besides supporting the roof, these walls might also serve as overflow areas from one part of the basin to the next, so that a multistage sedimentation of suspended solids was obtained, as well as a retention of the latter behind the base walls of the arches. The retention time of the water, due to the total volume of the basin, could ensure good water treatment by sedimentation.



Fig. 1. The theater and open duct for the collection of rain runoff water



Fig. 2. The theater water basin

2.3 House rainwater collection basins and wells

It is interesting that in Delos both public and private infrastructure works existed for the collection of rainwater from the roofs, and an arrangements of sand collectors assisted by primary sedimentation tanks (see Diadoumenos House, where the famous statue of Diadoumenos was found, depicting a young man trying to put on headgear). Many water wells were found in the internal yards of private houses (see the House of Hermes). Some of these wells are still in use by the guards of the archaeological site.

3. Works for the Collection and Treatment of Rainwater at Knossos Palace in Crete

Knossos, one of the most ancient cities of the Aegean, has a history of eight thousand years of continuous human presence [4, p. 23]. The Minoan civilization that developed in Crete appears to be the first example of what is known as European culture [5, p. 46]. The existing archaeological site of Knossos originates from 1600–1500 BC and has a surface area of 17,400 m² [5, p. 48].

Here, an impressive surface network of ducts for the collection of rainwater runoff exists along the various yards and staircases. The rainwater was then conducted to basins for secondary uses. Before storage, it passed through many small enlargements of the duct cross sections, resulting in its sequential short-term sedimentation due to decreased flow speed. These enlarged cross sections may have served as sand collectors.

The rainwater collection network was separate from another network collecting wastewater from the palace. The Queen's toilet, located at the east side of the palace, along with her bath, had a continuous run of water for the removal of waste [5, p. 48], and could be considered as the first "modern" toilet in history.

4. Treatment of Kladeos River Water for Use of Leonidaion

Leonidaion, a big two-level residence located at the southwestern end of the archaeological site (see Fig. 3), was erected in the fourth century BC and funded by Leonidas, a man from Naxos. Plan view dimensions are 80 x 73.51 m, while a 138-column gallery surrounded the building [9, 10]. In the inner yard, an artificial water pool with a small "island" at the center [7, p. 32] served aesthetic purposes.

However, from a local survey and references based on excavations, the present author proved that this artificial water pool was a very cleverly designed water treatment system aiming at the recycling, treatment, and storage of rain roof water, as well as water from the Kladeos river and surface runoff from the area (6).

This water was used for the needs of Leonidaion and was sufficient for eight hundred persons at least for the five-day Olympic Games. The little island at the center provided access to a water well, the top of which is still visible,

and could enrich its water volume due to infiltration across the earth mass between the inner water channel and the well, as described below.

These conclusions are based on the following remarks concerning environmental engineering [6]:

- (a) Leonidaion lies in the vicinity of Kladeos, a tributary of the Alfeios river, with slopes enabling the flow of rainwater surface runoff toward its area
- (b) Archaeological findings of aqueducts conducting the water toward Leonidaion are confirmed—see ducts collecting rainwater from the roof of Feidias laboratory, ducts from the Thermes (bathing) area, located in the north, using water from the Kladeos river, and the main rainwater collector as well, directing water toward the artificial pool
- (c) Archaeologists confirmed that the drainage of the Leonidaion roof existed through “impluvia” (drainage ducts) toward the artificial pool
- (d) The artificial pool consisted of two concentric open channels, the outer one having an almost rectangular but varying cross section, while the inner was circular, with a constant cross section along its length. This arrangement, in our opinion, does not serve aesthetic purposes, but in the outer channel the changing water speed, due to the changing cross section, served as a four-stage sedimentation tank after the entrance of the rainwater through the main collector. The flow velocity changed, giving the rainwater consecutive levels of sedimentation and solid removal. It is noticed that the ratio of the biggest channel cross section to the smallest one is 2:1. The water was overflowing in the inner circular channel, which had a single cross section and could rest for sufficient time so that fine suspended solids could be removed. The fact that the inner channel was operating as a sedimentation tank is also proved by the presence of a duct connecting this channel to the outer one at a higher level from the bottom one, apparently serving to remove sludge
- (e) The base of the bridge connecting the outer channel to the artificial island providing access to the existing well is still visible

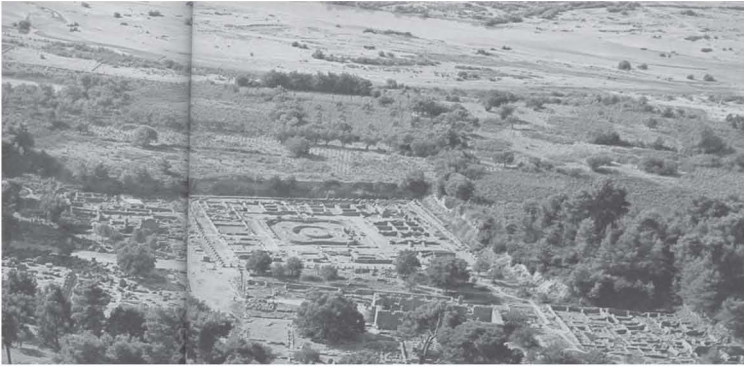


Fig. 3. Aerial plan view of Leonidaion, at the southwestern part of the Olympia archaeological site and Kladeos river [8]

5. Conclusion

Examples of infrastructure works for the collection, treatment, and management of water in Greek Antiquity prove that, since at least 3,500 years ago, the Greeks possessed water-treatment technologies such as sand collectors and sedimentation tanks to improve water quality and use for specific purposes. They were recycling rainwater surface runoff from areas within settlements, like roofs or theater surfaces, and protecting water-storage basins against evaporation and pollution through appropriate coverage. This proves that the Ancient Greeks developed advanced methodologies concerning water treatment and management not unrelated to their great respect for the environment.

Bibliography

- [1] F. Zafeiropoulou, *Delos* (Athens: Editions Krini, 1993).
- [2] Ecole Française d' Athènes, *Guide de Delos* (Athens: Editions E. de Boccard, 1983).
- [3] M. Giagou, *Mykonos-Delos, a Trip at the Center of Cyclades* (Editions Libris Tech S. A., 2002).
- [4] A. Vassilakis, *Knossos* (Athens: Editions Adam-Archaeological Resources Fund, Greek Ministry of Culture, 1994).
- [5] P. M. Warren, "Minoan Palaces," *Ancient Cities* (1985).
- [6] E. O. Valiantza, "Leonidaion of Olympia: a Model of Environmentally Friendly Management of a Hotel," *Elliniki Agogi* (November 2003).
- [7] S. Th. Foteinos, *Olympia-Archaeology Guide* (Olympic Editions, 1992).

- [8] M. Andronikos, *Olympia: the Archeological Site and the Museum* (Athens: Editions Ekdotiki Athinon S. A., 2000).
- [9] A. Mallwitz, *Olympia und seine Bauten* (Munich: Prestel-Verlag, 1992).
- [10] A. R. Ragavi, *Lexicon of Greek Archaeology* (Kostantinidis, 1888).

5.4

THE KNOSSOS PALACE AND THE RESTORATION OF THE COLUMNS

WAKO NISHIYAMA

YUZEN, THE JAPANESE TRADITIONAL FABRIC-DYEING ARTIST

Abstract

The color of the columns of Knossos Palace and the possibility of their being porphyra is investigated in the present study. The author was unaware of the material of the columns, and whether it was stone or wood. But, as for the color, in 1979 he heard an interesting story that they were painted with porphyra. Ever since, he has been studying and investigating porphyra. Based on this information and by means of experimental work, he managed to paint a column with porphyra, eventually getting very important results. In fact, it was proved that porphyra could be reused as a very precious material, while at the same time the columns were utilized for porphyra storage.

Preface

Was the color of the Knossos Palace columns porphyra? This, along with the material used in the construction, were for a long time unknown. One day, in 1979, the author encountered the view that they were painted with porphyra, and was deeply interested in it, and this how is the research on Ancient Greek fabric-dyeing started.

The following is an account of the research on the use of porphyra on the columns of Knossos Palace along with the processes of the actual experiments based on the author's career as a traditional Japanese fabric-dyeing artist.

1. Restoring the Columns of Knossos Palace

The following tests were intended to determine whether painting with porphyra was possible. In the first place, it was assumed that Knossos columns were indeed painted with porphyra, although it was not known if they were made of stone or wood. First, a fresco painting technique was applied, painting porphyra dyestuff on a piece of wood, 20 x 13 cm, after covering it with plaster. The result was that the color became uneven with an unsatisfactory texture. However, several tests of painting with porphyra mixed with lime at various compositions that followed were successful.

2. The Material of the Columns: The Perfect form of a Wooden Column

The wood used was Japanese hinoki cypress, dried for more than one hundred years. A cylindrical specimen 30 cm high, 9 cm diameter at the top, 7 cm at the bottom, was utilized. By the first trial, paint plaster was applied to the surface. Two longitudinal cracks appeared in the front and back through the center of the circle, and gaps between the wood and plaster were observed.

To prevent cracking and peeling, several tests were performed by changing the form of the cylinder. The final test was to curve sixteen flutings. The width and depth of the flutings were important parameters. To prevent cracking, it was noticed that the inner perimeter of the plaster on the column should be the same as the outer perimeter. This was successfully applied to the real scale.

The plaster constituents for preparing the primer coating were: (a) 200 g slaked lime, (b) 300 g sand of 1 mm grain to shave the porphyra dyestuff and make the surface thinner, while sand of 1–2 mm grain was used for the middle and the base paintings. To make the plaster last longer, 10 g of boiled-down hemp fibers were prepared. To improve durability and better color of the plaster, 10 g of boiled-down bark fibers were prepared, and 25 g of olive oil were mixed with water to get 500 g of plaster. The constituents were stirred in carefully, one after the other.

As far as the first coating of plaster is concerned, coating the plaster got easier for a sixteen-fluting cylindrically shaped wood specimen 30 cm high, diameter 9 cm at the top and 7 cm at the bottom. The coating of the plaster

was carried out by a trowel by pressing and proceeding obliquely upward to make a circle. As a result of a drying test for seven days, peeling and gaps between the wood and plaster appeared, but there was no cracking on the surface. No problems appeared after the middle coating. It was then left unattended to do the surface coating for a week.

3. Coating with Plaster Mixed with Porphyra Dyestuff

Kneading 200 g hydrated lime pouring 1 l aqueous with 1 g porphyra dyestuff. The nearly perfect plaster coating was completed with a roughly 2 mm thick layer following the way already shown. It was found that summer is the best season for plaster coating.

Especially for coating with plaster, the best season is midsummer, and from early summer to early autumn. Considering the winter in Crete with strong winds and cold weather, some tests under various conditions were conducted. With drying under a temperature of 2–3°C it became fragile, and easily peeled off under 0°C to about -2–3°C. The results were the same with various compositions.

After ten years, the color tone of the columns was still beautiful, but the intensity decreased by half, probably due to the effect of sunlight. However, the following account shows the surprising power of porphyra.

Seven years after the test, the color faded a little. In order to strengthen the fastness of the color, the plaster was coated three times with the same ratio of dyestuff. To know the inner condition, the surface was shaved as thinly as possible. A stronger color was found. By processing, stronger colors appeared. After the three layers of plaster, pure white plaster was found. That was unexpected and called for further investigation.

These six years since 2006 should be sufficient time to study the changes of cracking, peeling, and the durability of the color tone. There were no changes except for the color tone.

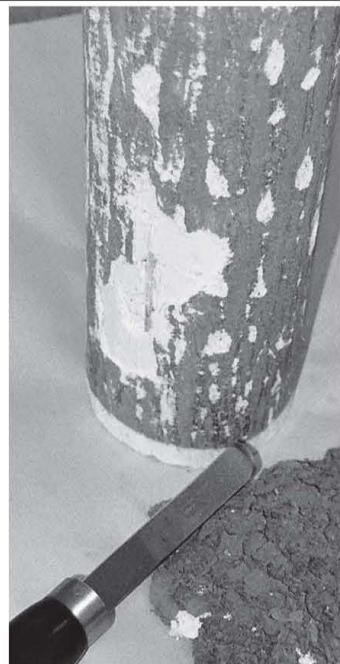
Finally, in order to test the strength of the plaster, the object was impacted twenty times with a hammer. No peeling appeared.

The possibility of reusing porphyra after peeling was confirmed, which is proof that the columns of Knossos Palace were painted with porphyra. Also,

this shows a strong possibility that the columns were made of wood, since wood was abundant in Crete, and no remains of the columns were found.



Picture of the completed columns



Impact test with a hammer, the white part of the porphyra dyestuff shaved with a chisel

5. Review and Conclusions

In May 1993, the author's dream to visit the remains of the Crete civilization came true. In 1979 he came across porphyra in its birthplace, as described in ancient myths. Porphyra was said to be the dyestuff used to paint the columns of Knossos Palace in Crete, but even experts ignored this fact. So, the author decided to research the issue in depth and find out how to dye with porphyra dyestuff himself, hoping to contribute to the field of study.

5.5

NATURAL ENVIRONMENT AND CULTURAL HERITAGE

PETROS THEMELIS

PROFESSOR EMERITUS, UNIVERSITY OF ATHENS

Abstract

Environmental problems have assumed critical importance. The protection of the beauty of nature, natural and historic monuments, and wildlife is of primary importance for the survival of both the human race and civilization. Moreover, a *sine qua non* is the education and culture of people in relation to both environmental protection and cultural heritage.

1. Introduction

The time between the present and the past consists of an unbreakable chain of archaeological and historical layers. It is not a chasm that has to be bridged because it cuts swiftly through cultural continuity, but it is the solid ground of the process in which the present is rooted [1]. As a consequence, the past does not die unconditionally, but continues to exist and act down through the generations, constituting a cultural and humanistic force of the highest significance. History appears as a genetic evolutionary function; as “change within time,” according to Aristotle, referring principally to humankind in its activity and fate. Natural elements also exist in it, for instance the geographical location as residence, battlefield, and workplace, along with land roads and sea lanes, rivers, floods, earthquakes, volcanic activity, and plagues—the natural environment in general. The human as a natural being finds itself in the bosom of natural reality and at the same time lives in a particular historical period with a specific cultural and intellectual horizon [2]. Geographical conditions, the natural environment, and the climate affect and to a great

extent determine ways of life and of thinking, beliefs, and the aesthetic values of local communities. The human-geographical fixations of the late Semni Karouzou, director of the National Archaeological Museum of Athens, come to my mind. As soon as a person was introduced to her, she would ask “where are you from?” and draw her conclusions according to the place of origin of the person, whether from mountain-dwelling, islander, farming, or nomadic herder parents from Peloponnesus, Thessaly, Macedonia, or Asia Minor.

Historical geography aims at the reconstruction of the lost historical location (natural and man-made) which framed it and set its limitations on human action, affecting the course of events [2]. Geography constitutes the core prerequisite for understanding historical events and is justly recognized today as a factor in the renewal and rebirth of historical research and its enrichment with new material, mainly from the area of archaeology. Through its vital contributions to current work in the applied sciences and archaeometry (dating of archaeological findings using scientific methods), archaeological research has the power to bring new material remnants to light and illuminate aspects of the past, with its main goal being to approximate the natural and man-made environment more closely. The archaeologists’ pickaxes reveal monuments that throw light on unfamiliar aspects of historical events in antiquity, confirming or changing established views.

2. Degradation of Natural Environment in the Mediterranean

Except for the gradual rise of the sea level that has changed the details of the coastlines, it has been believed that the contours of the Mediterranean are the same as those seen by people living around twenty-five hundred years ago. Geologically, it is new and therefore unstable. A fair number of volcanoes are active and earthquakes are relatively frequent. The forests of pine, oak, beech, and chestnut trees were more numerous and denser according to certain studies. Since the Archaic period, they have been losing ground to cultivated land and expanses of maquis. According to the paleontologist Günter Nobis, who studied the numerous animal bones from the excavations at Ancient Messene, the mountains around the city in antiquity were home of many animals, including brown bears, red deer, jackals, foxes, and wild pigs. Even today, there are many wild pigs as a result of human intervention, but because of the lack of woodlands they invade cultivated areas and cause damage.

The Greek philosophy of nature as developed in Miletus, Asia Minor, and later in other Greek cities was a pioneering intellectual creation. All the concepts that make up the system of philosophy and physics were born at the time—those of matter, force, number, motion, becoming, being, space and time, and the idea of the atom as well as the methods of empirical physics that would triumph later on. The ancient Greeks saw the element of life everywhere in nature. The theory of Anaximander, a student of Thales, concerning the origin of species—that they initially evolved from the seas, then on dry land, and adapted to the natural environment—is startling, and contains ideas which would be introduced into biology by Charles Darwin more than two millennia later.

Interest in the alteration and destruction of the natural environment, especially in beleaguered Attica, has its roots in classical antiquity. Plato took a lively interest in the natural environment. With great sensitivity, he describes the landscape around the banks of the Ilissus river, which Socrates especially loved. The most reverend Archbishop of Pergamon Ioannis mistakenly attributed Western human arrogance and responsibility for today's ecological crisis to Platonism [4], understanding nature as a basic goal of Western thought, but that it should not be identified with controlling nature. Sophist Critias, in Plato's homonymous dialogue, describes deforestation and stripping away the land of Attica:

what there is now compared with the way it was then, is like a sick man, with all the fat, soft earth washed away and only the land's bare bones remaining. But at that time the land was intact, and for mountains it had high earth-covered hills, and instead of the "rocklands," as they are now called, it held plains full of rich soil, and had much woodland on its mountains, of which there are visible proofs even today, for some mountains which now have food only for bees, they had trees not very long ago, and the beams from the trees fell there for roofing the largest buildings, are still sound ... Moreover, it was each year enriched with the water from Zeus, which was not lost, as it is now, by running off the thin soil into the sea. Rather, it had much soil that received the water and stored it up; by drawing off the water from the heights down into the hollows, it provided all the various districts with abundant running water from springs and streams ... (Plat. Criti. 111b d)

According to mythology, Orethya, daughter of King Erechtheus, was once playing by the Ilissus with her friends when Boreas, the North Wind, seized her by force and made her his wife. Plato (*Phaedr.* 229b–c) mentions an altar of Boreas near the ford going toward the sanctuary of Artemis Agrotera. After a long conversation with Lysias at his house near the

sanctuary of Olympian Zeus, Phaedrus came outside the walls of Athens to study a manuscript in a quiet, cool, and shady place, since midday was approaching and the heat was unbearable. The area of the Ilissus was an ideal spot for study and contemplation in the summer. On the way, Phaedrus met Socrates. They walked barefoot through the riverbed, which in summertime had little water, but was cool and clear. They sat down on the opposite bank, beneath the shade of a “tall and spreading” plane tree beside the river’s “delightful and transparent” waters (*Phaedr.* 230b), on the grass of the verdant slope of a little hill, with the cicadas singing ceaselessly around them while the leaves of the trees rustled as the wind’s cool breath touched them. Complementing this paradisiacal landscape, beside the banks of the Ilissus was a most agreeable little spring with cold water and a big shady willow tree that perfumed the air with its blossoms. There was also nearby a sanctuary of the Nymphs and Acheloos, with terracotta dedications, as well as one of Pan.

How can I describe the complete disappearance of the Ilissus today, and its transformation into a sewer running under the pavement of the streets of Vasileus Konstantinos, Kallirhoe, and Ilissus? How can I render the current plight of the landscape along the Ilissus that Plato once described so gracefully? What can I say about the shabby remnants of the Temple of Agrotera and the modern buildings that surround it? The odors that dominate the area nowadays have certainly nothing to do with sweet-smelling willows. The constant roar of automobiles does not recall the unbroken song of the cicadas and the rustling leaves. The paradise of the landscape along Ilissus has been turned into hell.

For Ancient Messene it should be stressed that the city kept its size and Hippodamian urban plan to the end of the fourth century AD. The 9.5 kilometer walls, surrounding an area of 290 hectares, enclose open space larger than the built-up area that included the mountainous bulk of Ithome for woodcutting, quarrying, and grazing, as well as flat expanses to the south, west, and east of the city center for cultivation, in fields with fruit trees, olives, vineyards, and domesticated animals. The image that the urban landscape presented, the wider area of the walled city in antiquity, did not essentially differ from the present view of the archaeological park, with its magnificent ancient buildings of political and cultic character among the modern olive groves, vineyards, and fields of fruit and vegetables.

Zeno, the founder of Stoicism, saw the population of the inhabited world (the *oikoumene*) as one people, citizens of a single city and living under a

single set of laws. Human beings could be happy only when they learned to live according to the law of order inherent in nature. Many of Zeno's ideas, along with those of his successors Cleanthes and Chrysippus, derive from Pythagoras and Plato, but the notion of the unity of humankind may well have been inspired by the achievements of Alexander the Great. The location of Zeno's school, the *stoa* (colonnaded portico), was a typical secular urban building.

Epicurus's choice of setting and location of his school was equally significant—he bought a garden far away from the center of the city, and there practiced a philosophy based on an understanding of nature first developed by the fifth-century atomists Leucippus and Democritus. The random motion, collision, and conjunction of tiny particles brought the material world into being, and it is constantly changing as atoms separate and come together in different patterns. Each human being is merely a collection of particles that break apart at death, an individual with no responsibilities. Since humans have no future existence after death, they should trust their own desires, seeking peace and happiness and satisfying them without giving in to excess. This is best done in a garden, away from the pressures of the city where society constantly imposes its demands.

We live today in a global village, a “global ethnoscape” (the *oikoumene* of Zeno) to use Arjun Appadurai's neologism, and the distribution of “common images” for the world, chiefly by means of the mass media, speaks in favor of a “common view” about culture and the natural environment [5]. The challenge to humanity today is to understand that the planet constitutes a totality and devise strategies that will avert the rapid destruction of the environment and its economic collapse, developing a plan for the sustainability of our culture and a course toward a more hopeful future. In other words, we should build a world “where the basic needs of all the Earth's people are satisfied, and a world that will allow us to think of ourselves as civilized,” as Lester R. Brown stresses in his 2011 book *World on the Edge: How to Prevent Environmental and Economic Collapse*.¹

In 1972, Costas Carras founded the Hellenic Society for the Protection of Environment and Cultural Heritage (*Elliniki Etairia*), an interdisciplinary non-governmental organization (NGO), roughly thirty years before Lester Brown founded his own Earth Policy Institute. The foundation of the *Elliniki Etairia* was sparked by Athens' environmental pollution and the destruction of a great part of its architectural heritage with an eye on easy profit, using the real-estate swap (*antiparochi*) as a tool and the flawed

legal protection of certain traditional settlements as an excuse. Costas Carras's book, containing published texts written between 2000 and 2008 [6], is extremely topical today—even prophetic, I would say—expressing the agonies and struggles of a time when Greek society began—admittedly, after a considerable delay—to turn its interest toward the environment and the need to protect it. Three streams, to use Carras's apt expression, united to create the broad river of the ecological movement: love for nature, respect for architectural heritage, and concern for public health. The book's four main sections end up with a powerful epilogue that analyzes the current dramatic collapse of the Greek (and, by extension, Western) social, economic, and management model, as well as the catastrophic consequences of this collapse for the environment and the survival of Earth's inhabitants.

The disruption of the environment's fragile equilibrium, with the monstrous growth of the man-made environment at the expense of the natural world, is not just a Greek or European problem. It is global and threatens Earth's very survival. If you insist on proclaiming the value of cultural heritage, if it matters to you and you fight passionately to protect the environment, and censure those who break the law and cause destruction, then it is certain that these same wrongdoers will pursue you by illegal means to ruin your image and vilify you as a corrupt and immoral person. When you spend years fighting about issues that affect certain interests, you frequently cause trouble and become a target. Nonetheless, we all carry an existential burden of moral values and truths about humankind which we can approach within nature, tradition, and life.

The past does not die, as I argued above, but continues to exist and to act down through the generations, constituting a cultural and humanistic force of the highest significance. Archaeologists, as sensitized citizens and researchers, practice their discipline on behalf of the community, cultivating the relationship the past has with the present.

The material remains of the past and the natural environment become perceptible to our senses, send out messages, and constitute a part of reality not only of the past but also of the present; they are connected with individual and social situations. The relationship we have with the material remains of our civilization and the natural world is experiential, not only for specialized researchers but also for every inhabitant. The ancient stones that come to the surface during excavation are not mute. They speak, revealing their secrets to everyone who approaches them with interest, sensitivity, and love. Sigmund Freud is known to have admired

archaeologists; he admitted that he followed the methods used by excavators in his own practice of psychoanalysis in order to bring the deepest layers of the subconscious to the surface.

Archaeological excavation and working outdoors have the benefit of providing the joy and excitement of immediate physical contact with human beings of the past through the material remains of their culture as well as their bones, which have been preserved in burials. Whether surrounded by their books or outdoors under the hot sun, archaeologists dig, looking for relevant truths in the depths of the human past. Their task is to study the process by which human societies perceived the material world, nature, and their environment, and evolved from small groups of hunter-gatherers to cultivators of the soil and the city-dwellers of the contemporary consumer world. They collect all the evidence from their direct contact with the material remains that they bring to light, and using it as their basis proceed to a reconstruction of the past and the ancient environment, and to an understanding of human beings as creators. This contact is not passive, but an interactive joint activity of the mind and the senses which has changed with the passage of time, developing rapidly from the time of the Renaissance down to the present postmodern perspective and the virtual world of computers and the internet.

To understand the environment, material culture, and works of art is to practice a sort of translation. The meaning depends on the context and position of the translator (the interpreter, so to speak) in relation to the context. No translation, to be sure, can be so perfect or exhaustive as to claim an absolute degree of identity with the original. The reason why the past is shaped within the social present is rooted in contemporary ideologies. Interpretations and reproductions of the past are affected by the social beliefs and ideological positions of those who propose them. Historians, archaeologists, sociologists, and researchers in the applied sciences, as responsive scholars, are obliged to assimilate the subjective element as much as possible, and underline the social and political connectedness of the past, both natural and man-made, with the present.

There are invisible dimensions of an internal emotional character which are not expressed directly in the scholarly writing of researchers who are engaged in the study of the remains of the past. These material remains have a natural status and send out multiple messages with historical, social, political, and existential dimensions.

Unfortunately, it is impossible to incorporate the testimony of the senses which participate in the daily toil of revealing the material remains of the past directly in scholarly presentation. The whole complex of experiences of the present excavation remains inescapably beyond the text that describes contact with the past as a natural and man-made environment—the excitement of the first encounter with a finding, the special feeling of first recognizing an inscription, or touching the skulls in a burial site that has just been opened. Only sketches and photographs capture the moments, express the process, and depict things in their original locations before they are removed for storage, conservation, recording, and publication. Experiences are not photographed, to be sure, but they are indelibly impressed upon the individual, making an essential contribution to the reconstruction of the past and the search for its human creators.

In the wasteland of barbarism in which we currently live, human creativity, innovation, and imagination are the things that count. “We are fortunate that the course of the universe led to the creation not only of life, but also of civilization and the arts” [7].

Research and creation are an oasis.

The protection of natural beauty, of natural and historic features, and of wildlife and monuments is a matter of the survival of the human race. A *sine qua non* is moreover the cultivation of human beings in ways and by means which prompt them to preserve intact all the goods already mentioned so that the generations to come can enjoy them too [8]. The elitist version of ecological and cultural imperialism, in contrast, has this strategy: “save the flora and the fauna, the animals and the plants, keep the people away.”

Let us proceed to the foundation of more national parks at the very least. What David Quammen has written about national parks is just as valid for archaeological parks.² The national park enjoys the special advantage of being a precious expanse of the natural world.

What, indeed, is responsible for the recent vigorous activity of publishing organizations vis-à-vis the depiction of wild flora and fauna, of nature’s treasures, of the traditional elements of our culture? I think it owes to the fact that we are anxious and feel remorse and responsibility for the destruction of the environment that is occurring around us every day, and for the gradual destruction of the very planet Earth that created and continues to nurture us. We are eager to record the last moment, to

immortalize (although photographically) what has survived intact not only in our own country, but all over the world, to make it more widely known.

3. Conclusion

Knowledge by itself is nevertheless not enough—even if it leads to self-knowledge and love for the monuments of nature and humankind—if it does not serve to spur the immediate taking of measures for protecting and preserving these treasures. The danger of their extinction is unfortunately at the gates, and it is ourselves who are responsible for it because most of us are unaware of the value and indifferent to the natural environment. Of course, the state is to blame as well, because it has invested very little in education and the promotion of those elements that define the character of our civilization—in antiquity, the early modern period, and at present—as well as our natural environment. Nature and the monuments cannot take it any longer. We must take immediate measures because, in a little while, we will not have anything beyond photo albums by socially conscious publishers to remind us of the lost paradise.

In the case of Greece, the now-downgraded Ministry of Culture, which is usually given over to mere words only, should finally commit itself to deeds in order to show itself as the first in its class. Let it be staffed, let it be equipped, let it obtain a specific, accountable annual budget, and let it take up the protection of the environment together with the promotion and protection of monuments. The Archaeological Service could be integrated into a Ministry of Cultural Heritage, Research, Technology, and the Environment. This new ministry for research and technology would, as a unified body, respond most fully to the problems involved in protecting the potential of monuments and the natural environment.

References

1. H. G. Gadamer, *Truth and Method* (New York: Crossroad, 1989).
2. K. D. Georgoulis, *Philosophy of History* (Athens, 1993).
3. G. Steinhauser, *Historical Geography of the Ancient World, Greece-Rome* (Athens, 2009).
4. *The Kathimerinh* (Athens, July 30, 2006), 24
5. A. Appadurai, “Global Ethnoscape: Notes and Queries for a Transnational Anthropology,” in *Recapturing Anthropology: Working in the Present*, edited by R. G. Fox, 191–210 (St. Paul, NM: School of American Research Press, 1996), 44–65.

6. *Unfinished Landscape: Will and Opposition in the Struggle for Sustainability* (Athens, 2011).
7. Ilya Prigogine, *The End of Certainty: Time, Chaos, and the New Laws of Nature* (New York: Free Press, 1997).
8. John G. Mitchell, "Threatened Sanctuaries: the State of US Parks," *National Geographic* (2006): 56–61.

Notes

- ¹ Translation into Greek by Christos Foundoulis, *Ο πλανήτης μας στα όριά του ή πώς θα αποτρέψουμε την περιβαλλοντική και την οικονομική κατάρρευση* (Athens 2011). In 2001, Brown founded the *Earth Policy Institute*, a non-governmental interdisciplinary research organization based in Washington DC whose aim is to offer a plan for the viability of our civilization and a roadmap for us to get out of the crisis.
- ² "A national park is, in more cases than not, a wildly ambivalent act of collective purpose: dreamy yet provident, selfish yet sacrificial, local yet global in significance. Unlike a national anthem or a national flag, a national park exists in the concrete dimensions of geography, biology, and economics and in the dimension of symbolism as well. It has living denizens and physical boundaries. It has benefits and costs. It has friends, and sometimes it has enemies. It has an aura of sacred permanence as a place that society has chosen to set aside and protect forevermore." David Quammen, "An Endangered Idea," *National Geographic* 17 (4) (2006): 26–31.

5.6

ECOLOGICAL CONSCIENCE AND BIOETHICS IN THE GREEK ANTIQUITY: SYBARIS

CHARALAMPOS CH. SPYRIDIS
PROFESSOR EMERITUS, UNIVERSITY OF ATHENS

Abstract

Sybaris of Calabria was the most important colony of the cities Helike, Boura, and Aegae of Achaea during the eight century BC. Its fertile soil and thriving trade quickly turned it into the mightiest and richest city of Magna Graecia.

The sudden prosperity and immense riches of its residents led to moral corruption, and the word Sybarite became synonymous with a hedonistic, effeminate, concupiscent, and soft person. The bioethics of the Sybarites has remained in history as “sybaritism.”

As mentioned by Athenaeus of Naucratis in his work *Deipnosophistae* and the Bishop Eustathius of Thessalonica, who wrote a commentary on Dionysius Periegetes, about twenty-eight centuries ago the self-indulgent Sybarites had realized the effects of environmental pollution in respect to flying particles and noise pollution and took completely original protection measures, which constitute the oldest environmental set of laws in the history of the civilized world.

1. Introduction

Air pollution may cause health problems for humans and also have adverse effects on flora and fauna, soil, buildings and other man-made structures, as well as ancient monuments.

On the other hand, noise creates significant pollution, which may cause disturbance and hearing loss, along with physical and psychological effects. A high noise level, especially occupational noise, is the most common cause of temporary or permanently impaired hearing. Hearing loss caused by excessive noise in a working environment (chronic acoustic trauma) is getting worse. The effects of noise on the cardiovascular system, the autonomous nervous system, and human cell biochemistry are also significant.

As a rule, in modern societies, protection measures against pollution are taken. However, one can hardly imagine such measures in a Greek city in the eight century BC, namely ancient Sybaris of Magna Graecia.

2. Ecological Conscience and Bioethics of the Ancient Sybarites

Sybaris of Calabria (see Fig. 1 below) was founded in 720 BC by Isos and was the most important colony of the Achaean cities Helike, Boura, and Aegae. Sybaris was located on the bay of Tarentum in the fertile plain of Lucania in southern Italy, between the Krathis river, named after the homonymous river of Aegae of Achaea, and the Sybaris river, named after the homonymous spring of Boura.



Fig. 1. Magna Graecia

Its fertile soil and thriving trade quickly turned it into the mightiest and richest city of Magna Graecia, as it was the only city where the import and export trade of southern Italy was conducted, mainly with Miletus of Ionia. According to Eustathius, the commentator of Dionysius Periegetes and Strabo (*Geographica*, Book 6, chapter one, paragraph 13, lines 1–3), the city expanded its borders to the Tyrrhenian Sea, and the citizens of twenty-five other cities were under its jurisdiction.

Diodorus Siculus (*Bibliotheca historica*, 12, 9, 2, 10 et seq.) states that the oligarchic government of the city was overthrown in 510–9 BC through a rebellion, the leader of which was a demagogue named Tisias, who convinced the Sybarites to exile the five hundred richest citizens and confiscate their wealth. The exiled citizens found refuge at the altars of the city of Croton. Sybaris threatened to wage war against Croton should the city not return the exiled citizens. The Crotonians, to avoid war, were willing to give back the exiled citizens, but Pythagoras of Samos, the philosopher, living in Croton at the time, convinced them not to, since these people had requested refuge there.

Eustathius confirms both Strabo and Diodorus Siculus. According to him, the Sybarites marched against the Crotonians with a force of three hundred thousand men and were confronted by an army of one hundred thousand Crotonians. However, being self-indulgent as they were, they were defeated within seventy days. When the Crotonians conquered the city (510 BC), they destroyed it completely, excavated it, and, according to Herodotus (*Histories*, 5, 44), after diverting the flow of the river, they flooded and buried it under the silt. Later, in 444 BC, the Athenians and other Greeks reclaimed the city, moved it from its original location, and named it Thurii after a fountain.

The sudden prosperity and immense riches of its residents led to moral corruption and the word Sybarite became synonymous with a hedonistic, effeminate, concupiscent, and soft person (Maximus, *Lectures*, Lecture 30, chapter five, paragraph g, lines 1–3). The bioethics of Sybarites, namely their extravagant luxury, their indolence due to the endless fun they were having, and their softness, has remained in history as “sybaritism.”

The Sybarites had indeed determined rewards for anyone who invented new pleasures and delights. They mainly focused on carnality, revelries, symposia, spectacles, pleasures, and having a good time. They remunerated very generously the cooks who invented new tasty foods and desserts, and those cooks held a patent privilege for a whole year. The Sybarites invited

their banqueters to lunch a year before, in order to have enough time to prepare for that extravagant lunch or dinner.

All manual labor was carried out by slaves with the citizens resting in their luxurious mansions. A self-indulgent Sybarite became covered in sweat, for example, upon seeing a lumberjack cutting logs in the forest. When they told another Sybarite what had happened, their fellow citizen replied that hearing about it was enough for them to start feeling pain in their ribs, as if they had worked as hard as the lumberjack.

According to Claudius Aelianus (*Varia Historia*, Book 9, paragraph 24, lines 1–6), in his work *Varia Historia*, a Sybarite called Smindyrides could not sleep all night long and his body became covered with blisters because one of the rose petals of his mattress was creased.

Both Claudius Aelianus (*Varia Historia*, Book 12, paragraph 24, lines 1–5) and Timaeus (*Fragments*, bk. Jacoby-F 3b, 566 F fragment 9, lines 1–6) mention the exaggerations and whims of this Sybarite called Smindyrides ahead of his betrothal to Agariste, daughter of Cleisthenes, the tyrant of Sicyon, stating that when Smindyrides came to Sicyon, he was escorted by a thousand cooks, a thousand bird hunters, and a thousand fishermen.

At the baths, which were called valaneia, especially trained bath slaves used to pour water on the bathers slowly and carefully so that they would not get startled by the temperature of the cold water. Additionally, the bath slaves were not allowed to make sudden movements, especially when the water was too hot, to avoid burning the bathers (Athenaeus of Naucratis, *Deipnosophistae*, 15, 518 c).

So, about three thousand years ago, the self-indulgent residents of Sybaris were aware of the danger of environmental pollution in respect to flying particles and noise pollution, and took original protection measures. These measures constitute possibly the oldest legislation concerning noise in the history of the civilized world and are mentioned by Athenaeus of Naucratis, the sophist or grammarian of the second century BC, in *Deipnosophistae*, and the commentator of Homer's work, Bishop Eustathius of Thessalonica.

The Sybarites were the first to ban noisy activities in the city, such as those produced by coppersmiths, builders, and carpenters,¹ so that no noise² whatsoever would disturb their sleep. Not even rooster breeding was allowed in the city, to prevent roosters waking the Sybarites with their crowing at the break of dawn. The Sybarites implemented the alternate³ operation of coppersmith workshops and smelters. Thus, they prevented

flying smoke particles since the furnaces of coppersmiths did not operate simultaneously. Noise pollution was also avoided, since not all forges were working on the same day.

The city of Sybaris was surrounded by a ten-kilometer fortified wall, and had very imposing buildings and wide stone-paved roads. Tents were placed along the roads of rich districts to protect the residents from the sun and rain (Athenaeus of Naucratis, *Deipnosophistae*, Vol. 1, page 295, lines 6–16). Chariots and carriages were not allowed to pass through the stone-paved roads of the city at certain hours of day and night⁴ to avoid excess noise and disturbance of the peace during resting hours.⁵

Nowadays, twenty-seven centuries later, despite the plethora of existing legislation, the problem of noise pollution remains, and in fact has become worse. Animal and bird voices are not considered disturbing any more, but rather pleasant sounds in noisy cities.

In 510 BC, the Crotonian army, having won the war against Sybaris, levelled the city, excavated it completely, and flooded it with the water from the nearby river, the flow of which they had diverted. In fact, when in 445 BC the Athenians founded a new colony in the area called Thurii, they could not find a single trace of the once-flourishing city of Sybaris.

The Sybarites were defeated by the Crotonians practically without resistance due to their self-indulgence, as mentioned by Athenaeus of Naucratis in his *Deipnosophistae* (Vol. 12, page 19, lines 1–9):

In their feasts they had reached such a high level of self-indulgence, that had trained their horses to dance to the sound of flutes. Knowing this, the Crotonians, as Aristotle states in his account of the city, while fighting against them, played the melody to which the horses of Sybarites were trained to dance, as there were also pipers in military attire among them. When the horses heard the pipers, not only did they come dancing out of their battle lines, but they also defected to the Crotonians with their riders still on their backs.

Regarding the “dance performance” of the horses of the Sybarites, Sextus Julius Africanus, a Roman writer (*Fragmenta*, Book 1, chapter eleven, lines 1–15), mentions that a Sybarite piper, wanting to take revenge for an insult, revealed to the Crotonians the melody by which the horses of the Sybarites danced. Consequently, during the battle, the Crotonian pipers played that melody, causing the horses to stand on their back legs, throwing their riders down, and in this way the Sybarites were defeated.

Notes

- ¹ Athenaeus of Naucratis, *Deipnosophistae*, Vol. 1, page 295, lines 6-16.
Athenaeus of Naucratis, *Deipnosophistae* (Epitome), Vol. 2.2, page 78, lines 3-6. Eustathius, commentator of Homer's Iliad, Vol. 4, page 202, lines 15-17.
- ² Reduced background and environment noise.
- ³ We could use the term "in turn" here.
- ⁴ Resting hours.
- ⁵ Grig. P. Markantonatos, *Elements of Environmental Hygiene and Sanitary Engineering* (Athens, 1984).