The Influence of Hellenic Philosophy on the Contemporary World

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Edited by

John G. Dellis and Stephanos A. Paipetis

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«ἐτεῇ 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 Vorskokratiker*, Wedmann² 1972, Vol. II, Δημόκριτος, 68 B117.

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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 χωρεί και ουδέν μένει" ["everything flows and nothing remains still"] and Protagoras's "πάντων χρημάτων μέτρον άνθρωπος" ["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 (επιλάθευσις), 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" ["Περί ψυχής"], 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" ["Μετά τα 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 "begun" 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. On the one hand, Ancient Greek intellect shaped this civilization by setting the foundations of science, and ultimately philosophy, by liberating intellect from myth. One 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 Odysseas 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 Θεόν και Θεός 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 πράξουμε: Δύο διαλέξεις-δοκίμια*] (Athens: Nefeli, 1993), states that the Word is the: "Open 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 *Oedipus Rex* a fatal and emblematic leader who defends the city [Πόλις], and in *Oedipus at Colonus* one who defends himself against Fate [Είμαρμένη] 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

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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" (DK68^{A}58), notices that, according to Democritus, atoms move with mutual collisions and impacts (αλληλοτυπούμενας και κρουόμενας προς αλλήλας 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 μεν εν πάσιν όντων, εκάστου δε κατά το επικρατούν εν αυτώ 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 ην ομού είτε νους ελθών αυτά διεκόσμησεν" (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 Νους." 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 Νους 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 Leibnitz's text, who writes that God is the creator and the one who puts the "units" in order.

The Νους of Anaxagoras enforces a definite order in the universe, "decoration." Leibnitz calls this "Pre-established harmony." The qualities of the Anaxagorean Νους are not material "έστι γαρ (ο Νους) λεπτότατον τε πάντων χρημάτων και καθαρώτατον και γνώμην (γνώση) γε περί παντός ίσχει και ισχύει μέγιστον και τα συμμισγόμενα τε και αποκρινόμενα και διακρινόμενα πάντα έγνω νους και οποία έμελλεν έσεσθαι και οποία ην άσσα νυν μη έστι και οποία έστι πάντα διεκόσμησε" ["Νους is the purest thing of the finest texture and possesses all knowledge and power and intermixes and separates all these. Νους 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 Νους 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 Leibnitz's ideas which seem to be between those of Democritus and Anaxagoras. Diderot characterized Gottfried Wilhelm Leibnitz (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 Leibnitz 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 omnipotent and omniscient, 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),