

Ancient Sparta – Research Program of Keadas Cavern

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Summary

The historical question of ancient Keadas is associated with ancient Sparta's myth and its heritage to the history of Greece. Ancient Keadas constitutes a complex puzzle inevitably linked with important historical facts of Greek antiquity as well as life principles and philosophical reflections underlying the essence of human existence and the fundamental relation of man to life and death. Human life span constitutes a quantitative biological trait and as such it is genetically defined while at the same time it is strongly influenced by environmental parameters relative to nutrition, disease and the unexpected intricacies of human behaviour. It is well-known that biological traits developing over extended time-periods (i.e., maximum stature may be reached up to the 25th year of life) have increased probability for environmental factors to be associated in their determination. At the individual level, human life span as a biological feature can be definitely determined only after death – and any prediction about when the fatal event will happen could be proved wrong.

Keywords: Ancient Sparta, Greece, human execution

Zusammenfassung

Die Höhle von Kaiadas befindet sich 10 km nordwestlich von Sparta an der Grenze zur malerischen Siedlung Trypi, auf 750 m Höhe und in der Nähe der Strasse von Sparta nach Kalamata, welche das Taygetos-Gebirge durchquert. Von der offenbar ausgewählten Lage des alten Höhleneingangs auf der Hügelkuppe hat man einen weiten Ausblick auf das lakonische Flachland und das Tal von Evrotas. Alle geologischen und anthropologischen Daten sowie antike und historische Aussagen belegen, dass der Abgrund von Trypi dem Kaiadas der Antike entspricht, der möglicherweise von den Spartiaten auch während der messinischen Kriege (8.–5. Jahrhundert v. Chr.) benutzt wurde. Nach den Ergebnissen der anthropologischen Forschung gehört die grosse Mehrheit der menschlichen Skelettfunde, die im Bereich der Höhle gefunden wurden, zu Männern im biologischen Alter zwischen 18 und 35 Jahren. Im gesamten oberflächlichen menschlichen Skelettmaterial, das bis heute im Bereich der Höhle von Kaiadas eingesammelt wurde, wurde die Existenz einer kleinen Zahl von 46 Individuen bestätigt. Überreste von Neugeborenen, Säuglingen oder allgemein Kinderknochen, die das umstrittenste und fragwürdigste Element der Geschichtsschreibung im Hinblick auf die Höhle von Kaiadas und das antike Sparta ausmachen, wurden nicht festgestellt.

Schlüsselwörter: Sparta, Griechenland, Exekution

Keadas cavern

The picturesque village of Tripi – where the cavern of Keadas is located – lies 10 km northwest of Sparta at an altitude of 750 m near the main road leading from Sparta to Kalamata through the deep valley of Lagada, which crosses over the mountain chain of Taygetos. The ancient entrance of the cavern at the top of a verdant conical hill looks down upon the Laconian plains and the Evrotas river valley from a height making it a continual wonder and pleasure for one to stand and behold them.

The cavern is situated inside the hill, extending approximately 50 m in length, 1,5 m to 3,5 m in width

and 18 m to 25 m in height. Primarily formed due to a vertical tectonic chasm in the bedrock with NE-SW direction, the cavern was secondarily shaped by carstic water flowing towards lower limestone layers. The greater vertical development of the cave – obviously constituting its oldest compartment – at the top of which lies the ancient entrance, demonstrates the heaviest deposition of calcite in its walls and the greater concentration of human skeletal remains at its bottom.

Human bones in assemblies representing entire skeletons found in natural crevices or cavities of the cavern's vertical walls – several meters above the bottom surface – indicate the existence of an old entrance on the rooftop from which the cavern was



Fig. 1. The hill of Keadas.

supplied. That is, skeletal remains in these cavities may belong to those held during their fall through the cavern or to those who climbed upwards trying to reach the ancient exit.

At 35 m below the present entrance of the cavern in a 2,5 m × 1,5 m cavity there is a natural cross section of sediments revealing human bones and stone blocks covered by calcite 1 cm in thickness. Here is the only compartment of the cave presenting an active dripping, revealing bones compressed by the superincumbent stone blocks covered by a 1 cm thick layer of calcite.

In 1983 archaeologist P. Themelis, head of the Speleology and Palaeoanthropology Ephorate under the auspices of the Ministry of Culture embarked on a research expedition to the cavern. The operation and scientific exploration of the cavern was completed with the cope of the geologist E. Kampouroglou, speleologist I. Ioannou and the physical anthropologist Th. Pitsios. On-site observations revealed dense skeletal material scattered over the floor surface in the last – and deepest – compartment of the cavern. Human skeletal remains were observed in cavities of the cave as well as in the natural section of an underground 2 m × 3 m chamber

forming the sink for karstic waters which drain through underground limestone (Themelis 1984, 1985, Pitsios 1984, 1985).

Site recognition

Regarding the agreement of the known cavern of Tripi with ancient Keadas in Laconia, archaeologist P. Themelis states: “On-site reports lead us to the conclusion that this pothole rich in human skeletal material, in the country of ancient Sparta, is in absolute accordance both with ancient testimonies and the popular tradition, regarding the form and purpose of Keadas. All evidence, both geological and anthropological in origin, convince us that the Tripi pothole is the Keadas of antiquity used by the Spartans mostly during the Messenian wars i.e. 8th–5th century B.C. (Themelis 1984, 1985).

The concordance of ancient Keadas with the Tripi cavern is also noted in an English edition of Pausanias’ works (Pausanias, 115–180 AD). An explanatory passage to the text points out the view that ancient

Keadas was associated with the execution of those convicted for serious crimes and had adequate depth to allow for the slow and complete decomposition of a body.

In a German travel brochure (Baedeker 1908) an older description is found; according to this earlier account, near the verdant village of Tripi there is a big cavern which identifies with ancient Keadas – the site where Spartans used to thrust criminals convicted to death.

However, the first description of the Tripi cavern and its identification with Keadas belongs to the Frenchman O. Rayet who visited Tripi in 1879 and published his observations both in A. Couat's "*La poesie alexandrine sous les trois premiers Ptolemées*" Paris 1882 and in Daniel Ogden's "*Aristomenes of Messene: Legends of Sparta's Nemesis*".

Rayet's description, observations and conclusions do not differ from those of geologist Vaggelis Kampouroglou and physical anthropologist Theodoros Pitsios, both of whom conducted research at the site in 1983.

Hitzig H. and Bluemner H. accepted Rayet's identification ("*Pausaniae Craeciae Descriptio*", 1901) as did known American historian Kendrick Pritchett in 1985 without referring to the research conducted at the site during year 1983. Following investigations in year 1983, all previous attempts to place Keadas in the area of Mystra or Parori were abandoned.

According to historical records, Keadas was the site of execution where Spartans would thrust the enemies of Sparta, traitors and those convicted of serious crimes. In addition, an unlikely, unconfirmed fiction – widespread nevertheless in contemporary times as well – holds that disabled or cachectic infants were thrown by Lacaedemonians at Keadas. Anthropological research in the Tripi cavern has failed to establish the presence of infant or child bones. The interior of the cavern yielded ample numbers of skeletal findings belonging mainly to men aged 18–35 years. Therefore, according to P. Themelis, the Tripi cave must have been used by the Spartans during the Messenian wars. Radiocarbon dating conducted in the Institute of Nuclear Physics Demokritos (Athens, Greece) for two separate skeletal samples suggests the period between 8th–5th century BC as the most probable chronology of the bone samples (Maniatis *et al.* 2007).

The traveler of 2nd century AD, Pausanias, describes the mythical escape of Messenian hero and rebel Aristomenes from Keadas where he, along with fifty Messenian captives were thrown –alive – by the Lacaedemonians. Pausanias speaks of "a bold and deep cavern" which correlates to the Tripi cavern. Aristomenes' activities are placed by Pausanias in the second Messenian war which he dates between 685–668

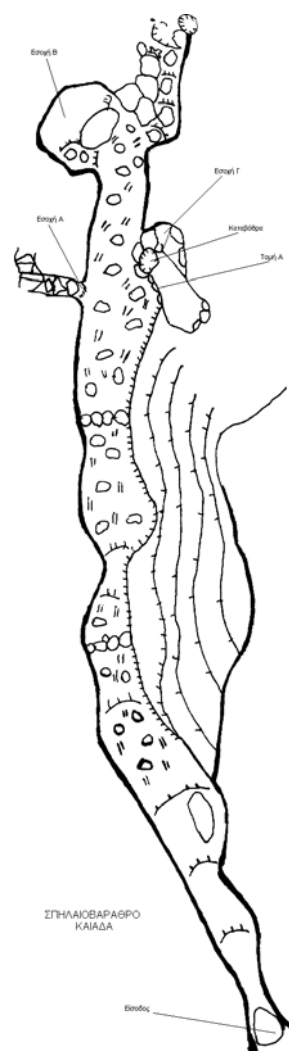


Fig. 2. Ground Keadas (draft I. Ioannou).

BC. Also, king of Sparta Pausanias (467 BC) convicted to death as a traitor of Sparta, was eventually buried outside the cave, while later his bones were buried in Sparta (Themelis 1985).

The collapse of rocks observed inside the cavern may be associated with the great historically confirmed earthquake of 464 BC. The earthquake which destroyed Sparta and allowed for the revolutionary revolt of the helots known as the third Messenian war (464–460 BC), produced fresh Messenian refugees who settled in Nafpaktos assisted by Athenians. According to Plutarch, the 464 BC earthquake was of tremendous strength: "deep clefts in the ground were opened and rocks were cut from the top of Taygetos".

Anthropological research

Interdisciplinary research regarding populations of Greek antiquity lies upon the exhaustive historical, social and biological analyses and focuses on their continuous evolutionary processes. Ancient cemeteries constitute the standard source of ancient skeletal material. The historical, cultural and social context of these sites constitutes the essential framework for anthropological investigation and has a determinative effect upon anthropological conclusions.

In 2003 the Ministry of Culture approved a three-year instruction and research program conducted by the Anthropology Museum of Athens University aiming at

the more extensive study of the Keadas cavern. The Ephorate of Speleology and Palaeoanthropology under the Ministry of Culture and the Ephorate of Classical and Prehistoric Antiquities of Sparta participated.

The particular objectives set by the Anthropological Museum and the students enrolled in physical anthropology courses included the following:

- a) Examination of the deposition conditions regarding the human skeletal material in the interior of the cavern
- b) Collection and recognition of the skeletal findings
- c) Anthropological analysis and characterization of the skeletal material.

KEADAS – MINIMUM NUMBER OF INDIVIDUALS

		Human bones excavated during (1983 – 2005)	Min. number of individuals
CLAVICLE		10	5
SCAPULA	CORACOID	13	7
	ACROMION	18	9
	BODY	26	13
INNOMINATE	INNOMINATE	1	1
	PUBIC	–	–
	ISCHIUM	–	–
HUMERUS	UPPER EPIPHYSIS	16	8
	DIAPHYSIS	51	26
	LOWER EPIPHYSIS	49	25
ULNA	UPPER EPIPHYSIS	42	21
	DIAPHYSIS	22	11
	LOWER EPIPHYSIS	9	5
RADIUS	UPPER EPIPHYSIS	17	9
	DIAPHYSIS	24	12
	LOWER EPIPHYSIS	12	6
FEMUR	UPPER EPIPHYSIS	39	20
	DIAPHYSIS	92	46
	LOWER EPIPHYSIS	18	9
TIBIA	UPPER EPIPHYSIS	13	7
	DIAPHYSIS	46	23
	LOWER EPIPHYSIS	22	11
FIBULA	UPPER EPIPHYSIS	6	3
	DIAPHYSIS	16	8
	LOWER EPIPHYSIS	15	8

Tab. 1: Minimum no of individuals found in Keadas is estimated to 46 individuals.

Research at the site gave the first record regarding:

- 1) conditions in the cavern
- 2) dispersal and preservation states of palaeo-anthropological findings in the cavern
- 3) problems to be faced by further research at the site. Particular emphasis was given to the identification of the initial conditions in which human skeletal material was deposited; that is, prior to topographical changes that occurred in the area during the past 20 years – including the more recent interventions in its interior.

Preliminary research yielded the following results and conclusions:

- Human bones were scattered virtually over the entire cavern; secondary concentrations of skeletal remains were observed on the cavern surface and in a few cases paleoanthropological finds were uncovered *in situ*; these results indicate different phases and periods during which skeletal remains were deposited; alternatively a change in the initial conditions of deposition of human skeletal finds in the cavern may be suggested.
- A total of at least 46 individuals is inferred by the collection of human skeletal from the cavern floor up to now (Tab. 1); this result is in accordance with the historical account of the capture and execution of Aristomenes and his companions at the Keadas cavern. The material collected is principally comprised of male skeletons with biological age between 18–35 years; a restricted number of individuals with estimated age at death above 40 years is recorded and 2 or 3 subadult skeletons aged 12–17 years old.
- On-site research as well as laboratory analysis of the sample collected, failed to reveal infant or child bones among the skeletal findings.
- The presence of adult skeletons at a height up to 20 m from the cavern's present floor surface was confirmed; this result is suggestive of survivors in the cavern who tried to escape from the deep cavern.

The human skeleton constitutes a valuable means for studying human populations of previous historical periods; a single biological element which maintains genetic information, bearing as well acquired testimonies relevant to origin, daily life, demographic composition, health and major events experienced by such populations in their historical course.

In a preliminary phase, anthropological analysis of a skeleton or of a skeletal population focuses on determining the basic parameters of sex and biological age at death for the respective material. Results approach with a greater or a lesser validity the facts

regarding the individual age of death or the average life span of a population. Thus, a series of biological features are used in anthropological analysis as indicators of social or environmental stress with an immediate effect on population health. Among these, indicators of population fatality and population morbidity are considered most significant; in addition, aberrations in the development of the long bones and stature and the statistical depiction of dental pathology and the incidence of dental enamel hypoplasia.

Biological age

The determination of biological age in subadult skeletons (small children and adolescents) lies in the process of skeletal ossification, bone development and the degree of sutures synostosis (Krogman 1962; Bass 1987; McKern and Stewart 1957), as well as the stage of formation and time of eruption for deciduous and permanent human dentition (Stevensen 1924; Garn *et al.* 1959; Miles 1963; Brothwell 1972; Ubelaker 1978).

In adult skeletons, the major indicators of age at death are the morphological changes in the pubic symphysis (McKern and Stewart 1957), dental abrasion (Miles 1963), the progressive synostosis of the cranial sutures (Olivier 1960), the progressive osteoporosis of long bone epiphyses (Acsadi and Nemeskeri 1970) and the morphological changes of thoracic ribs (Krogman and Işcan 1986) and the clavicle.

Dental histological methods such as TCA and lamentin help to define biological age with accuracy, principally in adult individuals. That is especially the case where serious erosion of the skeletal remains limits further analysis while preservation of dental tissues due to their natural resistance allows for the above-mentioned methods to be applied.

The biological age of a skeleton is defined by the processes of growth, maturation and ageing of its bones. In Keadas, however, most of the skeletal findings were found scattered and disarticulated from their initial skeletons. That is a consequence of the verticality of the cavern, the slope of its floor and the activities of a vast number of uncontrolled visitors to the cave during the last twenty years. Consequently, age related morphometric observations were obtained from independent bones which were evaluated as a total sample with regard to the frequencies of different age-related observations. In any case, the presence of skeletal findings of newborns or infants was not established in the cave. These constitute the most ambiguous and questionable element of the relevant historiography associated with Keadas and ancient Sparta.

KEADAS – SEX TRAITS

	Female (-2)	Female (-1)	Undefined (0)	Male (+1)	Male (+2)
Skull volume	1	1	1	5	3
Muscular relief of skull	0	0	0	3	2
Size of long bones	4	5	9	28	11
Muscular relief of long bones	0	0	1	18	11
Observations	5	6	11	54	27
Total sum		11 (10,7%)	11 (10,7%)		81 (78,6%)

Tab. 2: Sex observations on the skeletal remains of Keadas.

On the contrary, the majority of human findings in the cave belong to male skeletons of biological age between 18 and 35 years. Only two adult skulls exhibit indications of biological age above 50 years, whereas few skeletal findings from two subadult skeletons indicate biological age between 14 and 17 years.

Finally, parts of the frontal bone which must belong to another young person aged approximately 12 years was found. But this case could not be considered proof for the killing of infants in Keadas, since the involvement of older children and adolescents in violent confrontations and warfare is a fact accounted for in modern historical periods as well.

Therefore, the improbable scenario of infant killing in Keadas as an application of eugenics seems to be

unsubstantiated. Since the genetic ground underlying most of the diseases or physical dysplasias of man are largely unknown up until today, the application of eugenics should be rejected as an ineffective and unreasonable brutality against humanity. Even more so since such a practice directly opposes human sense as well as the innate self-sacrifice instinct that parents exhibit through caring and protecting their offspring.

Estimation of sex

In diagnosis of skeletal sex, the morphometrical features of the pelvis bones are considered of particular importance (Martin and Saller 1956; Stewart 1954, 1968; Bass 1987), the morphology of cranial bones (Krogman 1962; Keen 1950; Bass 1987), the bulk of the long bones and the size of their articular surfaces (Krogman 1962) are also evaluated.

As in the case of biological age, determination of sex is based on the development and morphometric characteristics of the bones of a skeleton. However, this classical method of analysis could not be applied to the sample of scattered bones collected from Keadas cavern. Consequently, the method had to be modified accordingly so as to ensure the most probable and valid methodological approach and relevant conclusions.

Intragroup overlapping in the frequency distributions of sex-related biological traits is known for all human populations; an equal percentage of the relevant diagnostic criteria would be expected to appear (e.g. 50% of male and 50% of female indicators) in a skeletal sample with normal demographic composition. According to our research hypothesis and the historical data concerning ancient Keadas, the proportions of male/female indicators are expected to indicate explicit numerical predominance of males in the present sample. This is shown in Table 2 which summarizes the most frequent observations made while determining sex in the skeletal remains collected from the Keadas cavern.

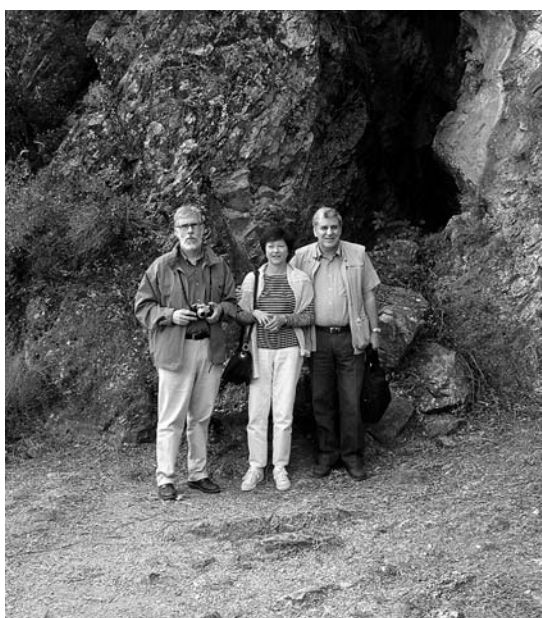


Fig. 3. Recent entrance of Keadas.



Fig 4. Human bones at the lower level of the cavern.

After counter-checking for all probable female sex indicators in skeletal remains found in the cavern, the single strong indication of a female in the skeletal sample of Keadas remained an intact sacral bone, collected in 1983 during the first exploration of the cave.

Where a random mixture of skeletal findings is under anthropological analysis – as is the case with the Keadas material – an important parameter to be estimated is that of the minimum number of individuals represented in the sample. Where conditions of preservation are favorable, the calculation of the minimum number of people can in theory significantly approach the actual number of people in the population. On the other hand, in cases where the skeletal material has suffered extensive losses due to natural factors or human intervention, the estimated parameter for the skeletal sample and the actual parameter for the respective population sample can diverge.

In our sample – that is the total of human skeletal findings collected from the Keadas until today –

a minimum number of 46 individuals have been estimated. This result bears an indirect relation to the historical account on the execution of Aristomenes and his companions in the Keadas cavern (Pitsios *et al.* 2008a, 2008b, 2009a, 2009b, 2009c).

This collection of skeletal material offered very few examples of skeletal elements being recognizable as belonging to the same individual. Skeletal elements identified in this way were: a) discerned in their initial position e.g. a couple of ankles found attached in the west wall of the cave; b) distinguished on the basis of age indicators e.g. a few ossicles from an adolescent skeleton lied among the findings of the cavern sink; c) matched by their unique metric dimensions. Such was the case of “the giant” – a male adult skeleton named by the excavation crew – found in cavity \hat{A} in an assembly of large bones bearing strong muscular relief, pressed by stone blocks.

The anthropological composition regarding the population in the wider Greek region is considered to

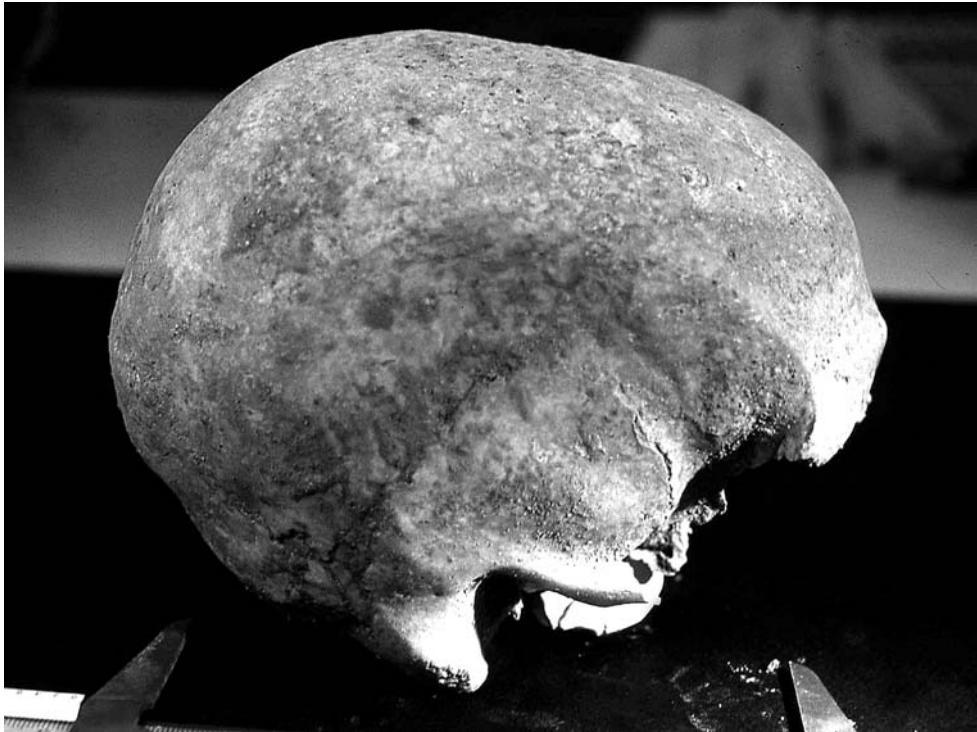


Fig. 5. Keadas, adult male skull.

have been complete within the Neolithic period, constituted by specific anthropological types i.e. the mediterranean, the alpine and the dinaric type. Angel (1971) established the anthropological continuum and genetic relevance between the population of classical Greece and its Neolithic demographic basis.

Epilogue

According to available data, death in Keadas was a ritual execution imposed by a cruel, inevitable sentence following the laws and principles of Sparta. The Homeric epos introduces capital punishment in the heroic era; throughout the heroic epos human life is highly esteemed, emphatically in verse displaying overwhelming wonder and dread over the early loss of it. From the top of the hill of Keadas those condemned for treason were looking down over the beloved fatherland while those jealous of Sparta's glory were looking upon the avenger country, glorious and alluring; in these final moments laid before them in all its glory what was to be lost while they were nearing Keadas; light and life were left behind, ahead were darkness and probable death.

Tripi cavern is a natural sink collecting waters from the surrounding land and yielding the underground waters of Taygetos which flow towards the neighboring ravine of Lagada and the Evrotas valley. Death and the descent to Hades were associated with surface water disappearing underground – as in the traditions of the Aherousia lake and the Hades cave in Taenaron.

Avengeance such as that encountered in Keadas – where convicts were not killed but abandoned in the hands of god – is associated to a widespread perception of antiquity as it happened with the rescue of the Messenian hero Aristomenes and his fictional escape from Keadas.

However, it is the geographical position of the site that is most distinctive among the elements in Keadas' historical character. It stands at the unaltered – from antiquity to contemporary times – boundary of the Laconian land, a quasi sleepless guard and defensive warning for those who conspired against or threatened Sparta's integrity.

Given the great significance the perception of death carried in Sparta and the unequalled self-sacrifice of Spartan citizens, Keadas seems to be an imposing symbol over Sparta, a supreme ideological element,



Fig. 6. Professor W. Henke, *Doctor honoris causa* – University of Athens (2006).

directional in Spartans' lives. Without the aforementioned, Greek and world history would not have received the notion of Thermopylae.

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