**BOOK PROPOSAL**

**Proposed Title: Artificial lighting in ancient Greece**

Author: Dorina Moullou, Archaeologist PhD

thmoullou@hotmail.com/tmoullou@culture.gr

**Short Summary of the proposed book**

**Abstract**

This book constitutes a thorough analysis of artificial light and lighting devices in Ancient Greece from Geometric to Hellenistic periods. Shapes, forms and functions of lighting devices are explored: ancient texts, iconography and excavation data are investigated. This offers interesting insights into ancient Greek night- and everyday life, household organization and perception of space, funerary, cultic and profane activities, as well as the ancient Greeks’ views on light and vision. The book is completed by an extensive study on physical the properties of light, experiments and laboratory measurements of the performance of ancient lighting devices, simulations of the lighting conditions of ancient Greek environments, as well as an ethno-archaeological research on the use of *flomis*, an ancient plant wick, still used as a lamp wick in Greece today. The result is a complete overview of the use of artificial light in Greek antiquity, enhancing archaeological perspective and allowing for a fresh archaeological viewpoint of the ancient Greek way of life.

**More info about the book**

This book is the result of more than twenty years of research on artificial lighting in ancient Greece. My intention when I started this topic was to identify, record and explore the function of the means of illumination other than natural light, that were used in ancient Greece, from Geometric to Hellenistic times, that is lamps, torches, hearths and candles.

Spouted terracotta lamps are the devices that are studied the most in literature. They are found in almost every excavation and can be used to date the context. Publications and excavation reports on lamp finds from archaeological sites across the Mediterranean, as well as museum catalogues and articles, provide extensive information on lamp typology, chronology, iconography, and production. Despite the plethora of publications and detailed catalogues on lamps, the main elements of their function as lighting devices, i.e., the dimensions of the wick hole and the capacity of the vessel are only occasionally mentioned, since lamps are usually studied as works of art and not as a tool to provide illumination.

Torches and candles are made of perishable materials and are not easily visible in an archaeological context, so their form and practical use in everyday life are only investigated on rare occasions. Scholarly research has primarily focused on the role of the torch in cult practices or on a specific type of torch associated with a specific cult, ceremony, or event, such as torch-racing.

Hearths, on the other hand, leave traces that are difficult to ignore during an excavation. Domestic hearths are mentioned in a number of excavation reports. However, not every house in Greece had a fixed hearth, especially after the classical period. Due to the lack of fixed hearths in most houses, scholars believe that portable hearths (braziers) were used instead.

While gathering information and data on the functional aspects of lighting devices, I realized that such an undertaking would be incomplete if I did not include in my work the result of the use of these devices: the intended goal of the people who used them. Their goal was simple; they wanted light in order to prolong their activities, even when the sun went down and darkness prevailed. My own goal was becoming increasingly more complicated. Questions such as what these activities were and whether the available means of lighting posed any limitations to those activities, led to others such as how much light was ultimately provided and how it affected people’s perception of space and colours.

Since no information about the physical properties of the light omitted by ancient lighting devices was available in literature, I had to produce them myself in order to respond to the questions of my research that kept multiplying. I had to explore and synthesize the elements that would allow the possible reconstruction of ancient lighting devices and the creation of their copies. With the help of modern technology, I was able to proceed with experiments that would provide measurements, quantitative and qualitative data, that would allow me to assess and evaluate them.

I had to draw information from other scientific fields, understanding the risks involved and the limitations that are set when entering into scientific fields that do not belong to one's immediate background. Therefore, in addition to my own experiments, I acquired the assistance of the Lighting Laboratory of the School of Electrical and Computer Engineering of the National Technical University of Athens, which indeed gave new impetus to my research.

During this process, I had to reorganize my thinking and my work. The new data changed not only the individual conclusions, but also the logical diagram of the study: the structure, the chapters and subchapters. Emphasis had to be placed also on other elements, which affect the lighting result.

Thus, another task was added to the research: the measurement of lighting and the assessment of its effect in relation to selected activities. My aim was now to investigate not only the lighting devices, but also the effects of artificial lighting in ancient Greek dwellings. To achieve this, without forgetting my original goal, I divided the book into three different parts, where each part is also a separate thematic unit.

The first part serves as an introduction and deals with issues related to the only artificial source of light that existed in antiquity: fire. It refers to fire’s nature and origin, both at the level of myth and (ancient) theory, as well as in practice, as it emerges from archaeological evidence. It investigates the beginnings of lighting as practice and tries to answer basic questions that arise for anyone who deals with artificial lighting in antiquity, such as the ways of lighting a fire and the ways of maintaining it.

The second part deals with the primary goal: what were the means of artificial lighting in antiquity (hearths, torches, lamps and candles), how did they evolve, what was their ergonomic design, how much did they cost, where and how were they used for lighting. The individual chapters are structured in such a way as to, on one hand, answer the above questions and, on the other hand, provide the necessary information for the reconstruction of the lighting devices, according to those elements that influence the lighting effect.

The third part is dedicated to lighting, the result of the use of the lighting devices. It gives the necessary information about light, how people perceive it, and how it affects matter and space. Based on this data, the lighting devices are assessed and evaluated. Finally, lighting simulations of dwellings based on archaeological data are conducted in order to "light" selected activities and assess the adequacy or inadequacy of the resulting lighting and its impact on the way the users of those dwellings perceived space and colour. This allows the examination of whether the activities that, according to the archaeological record took place in a specific room, could have been easily performed after dark, and what limitations the light produced from the lighting devices found in this same room, posed to people’s ability to execute them.

Regarding the methodology followed: due to the type of information available, it is different both in each part of this work and in its individual main chapters (sections). For this reason, before each part and before each section, the methodology to be followed and the way in which each individual issue is to be addressed is described.

Finally, a few words about the topics that are not included in the proposed book. The book does not include the role of light during cult practices, since it was the subject of E. Parisinou's study (Parisinou E. 2000. *The* Light of the *Gods: The Role of* Light *in Archaic and Classical Greek Cult.* London: Duckworth). Certainly, the various means of lighting remained the same, whether they were intended for ritual or domestic use. Therefore, all means of illumination are part of the discussion in the present research, including the ones with special characteristics, even if they were used exclusively in cult practices.

Artificial light used as a signal is also outside the scope of the proposed discussion, i.e. its use in telecommunications (e.g. beacon towers), in navigation (e.g. lighthouses) and in war strategies (e.g. to mislead the enemy). This topic is adequately covered by the work of Y. Seidel (Seidel*,* Y. 2009. Künstliches Licht *im individuellen, familiären und öffentlichen Lebensbereich*. Wien: Phoibos-Vlg).

In order to draw conclusions about many of the individual topics addressed in the book, extensive research was required. Wanting to include the resulting material, because in my opinion it contributes to the research, and at the same time wanting to maintain the flow of the text, I preferred to list it in accompanying appendices, incorporating only the final conclusions in the main text. Thus, catalogues of representations of the ancient means of lighting in iconography, the experiments carried out in the Lighting Laboratory of the NTUA, as well as ethnoarchaeological research on the use of an ancient plant wick still used in modern day Greece, are presented in appendices.

 This proposed book, drawing material from ancient literature and epigraphical sources, archaeological contexts, architectural remains, artifacts, iconography, ethno- archaeological investigation, experimental approaches, laboratory tests, physical measurements and digital simulations presents a thorough analysis of lighting devices and of artificial lighting in antiquity, providing new insights into everyday life in ancient Greece, as well as a new approach in archaeological perspective and the study of past societies.

**Table of Contents**

Including a brief description of each chapter

Introduction

An introduction to the book, its main arguments and background details

Part 1. Fire: The only artificial light source in antiquity

Until the discovery of electricity, the only source of illumination, apart from natural light, was fire. That is why we begin our journey through the history of artificial lighting in antiquity from this primary good, assuming that the origins of this practice begin with man's use of fire, since fire is, intentionally or unintentionally, a light source. This part is written not in the light of an historical timeline, but to answer certain questions about fire, regarding its nature, its use and the ways of producing and preserving it, which today, in the age when nothing -almost- is done without electricity, either they don't seem to concern us, or we take them for granted. After all, the entirety of this work deals precisely with the effort to handle and maintain the fire.

1.1 The conquest of fire by man

Exploration of the first evidence of the use of fire and its conquest by man in the Paleolithic.

From the moment humans learned to light a fire, they tried to keep it for cooking, for heating, for lighting, for processing, but also to drive away everything that approached them, from vermin other people, and even wild beasts. Fire is the first element that man knew and turned it into one of the greatest forces. It is what differentiated him from animals and formed the basis of civilization. The presence of the demarcated fire also indicates the presence of man, since only he can control it. The first traces of fire date back to the lower Paleolithic period, although they are extremely rare.

The big question that remains is how people acquired fire. From natural sources, such as fires caused by lightning, trees rubbing against each other, volcanic eruptions, spontaneous combustion of grasses, dried wood, oil or natural gas? Or was it artificially produced? Most scholars assume that man first used the fire that nature provided, first discovering ways to preserve it and then developing ways to produce it. Others, based on the fact that natural fires would have been very rare in those years, as they are today, wonder if man's acquaintance with fire was achieved by the accidental impact of two stones or when trying to pierce one piece of wood with another. It appears, however, that for some time fire "producing" groups and fire "collecting" groups coexisted, as findings show that some Palaeolithic groups produced fire earlier than others.

1.2 The origin of fire according to Greek mythology

Brief reference to the myths about the origin of fire in ancient Greece.

Fire, according to Greek mythology, was given to humans by the gods, and through it the gods receive the offerings of humans. However, it was not given without a price. It cost a god's punishment and man's entry into an endless adventure of toil and trials; an adventure of technological development.

1.3 The nature of fire in the ancient world.

Brief reference to the views on the nature of fire in the ancient Greek world.

In ancient Greece, unlike other cultures, fire was never worshiped as a deity, nor was it ever the focus of worship. It did, however, have a very important role in religion and ritual: being the means of communication and contact between humans and the divine world. Without it, no religious act of the Greeks was performed. Sacrifices without fire were rare, conscious exceptions. But also in everyday life its contribution was so great, that people used it in almost all of their work.

Because of the extraordinary importance of fire in the natural world, since the beginnings of philosophical thought, there have been various attempts to interpret its nature and its contribution, both to the creation of the human race and to the creation of the universe.

1.4 Ways of lighting a fire.

In whatever way man first came into contact with fire, the fact is that already from the Paleolithic period he could produce it artificially. It is also a fact that until the discovery of chemical methods, such as matches in the 19th century, he used a variety of means and ways of lighting it. In antiquity, the main methods of lighting a fire were three:

A. By percussion

B. By friction

C. With concave glass lenses or mirrors.

In ancient Greece the most common way of lighting a fire was by friction and more specifically by the fire-drilling method. In the Roman period, percussion was preferred.

1.5 Lighting a new or maintaining an existing fire?

Despite the ways that were developed for the easy and quick production of fire, what was particularly important in the ancient world was its preservation. In fact, they preferred to keep the fire constantly burning, rather than light a new one each time.

Part 2. Ways and means of artificial lighting in antiquity

Introduction to the means of lighting used worldwide, before the discovery of electricity (hearths, torches, lamps and candles).

Essentially, all the ways of artificial lighting that man used, until the 19th century, were nothing more than means of maintaining the fire. These means were not used only in one area, nor only in a certain period of time. They are timeless and hyperlocal. What differs from region to region is the fuel and the container, if and when one is used, in which the fire is kept. The choice depends on factors such as the climate, mainly the flora and fauna, and the surrounding area, if there is an abundance of materials (wood, stone, clay, metals for the construction of the vessel). Also, the more general technical, social, ideological and cultural levels of a society decisively affect the technical choice.

2.1 Hearths

Introductory chapter. Hearth is a delimited space, in which a controlled fire is lit. Hearths are either fixed or portable. In this chapter I examine whether hearths; fixed or portable, can be effectively used as lighting means and under what conditions this can be done.

2.1.1 Fixed Hearths

Brief overview of the presence or absence of fixed hearths in domestic environments in Greece. (From Geometric to Hellenistic period)

2.1.2 Portable hearths

Overview of the objects that would have served as portable hearths (From Geometric to Hellenistic period)

2.1.2.1 The names of portable hearths

Textual sources mention various terms related to the objects that we generally call portable hearths or braziers. The vocabulary is so rich and overlapping that it is difficult to distinguish a specific function in each of them, and even more so to identify a name, with a specific type of object.

In this chapter the Greek names of portable hearths for which there are references that associate them with a lighting function (*lampter*, *hypnos*) are examined but also the terms that are considered to be the most prevalent to be identified with specific types of portable hearths are investigated (*eschara*, *anthrakion*, *pyraunon*).

2.1.3. The combustible material.

The combustible materials that could be used to maintain the fire in either fixed or portable hearths are examined. The properties of wood and charcoal are briefly presented. Financial data are given for the cost of both fuels. Finally, a brief mention is made of other fuel materials, which, however, were not so common and apparently had no domestic use, such as mineral coal and petroleum.

2.1.4. Hearths as means of lighting.

This chapter attempts an evaluation of the hearth as a lighting device. Through experiments, it is shown that portable hearths with charcoal as a fuel cannot be considered as indoor lighting devices due to extremely poor illumination. Wood on the other hand cannot be used indoors without smoke evacuation provisions. Fixed hearths, which are not only used for lighting (their main use is for cooking and heating), have the main disadvantage of being used indoors, only during the winter months, and not being moved from room to room.

2.2 Torches

Introductory chapter. It presents an overview of the literature related to torches. It is noted that the involvement of scholars with torches is limited to their use in religious practices.

2.2.1 Names and shapes of torches in Ancient Greece

Through written sources and iconography (mainly of Attic classical vases) it is attempted to distinguish the typological characteristics of torches in Ancient Greece (quality and quantity of wood, coating or filling with combustible materials, mainly resin and tar) in order to better understand its construction and to discern the different names attested in textual sources. The chapter closes with a brief reference to the torches of the Roman period. It should be noted that this chapter is supported by an appendix including representations of torches.

2.2.2 Combustible material

In this chapter the two main flammable materials used in torches i.e. resin and tar (wood is discussed in chapter 2.1.3) are examined. Reference is made to the torches’ manufacture and sale. At the same time, an attempt is made to estimate their cost.

2.2.3 Torches as means of lighting

Whether the torch is an outdoor or indoor lighting device is examined. It appears that, even if rarely, torches were also used indoors.

2.3 Lamps

Introductory chapter. Lamps fall into two categories: spouted lamps (our familiar lamps with a nozzle to hold the wick) and floating wick lamps (such as today's Christian orthodox votive lamps). In the following chapters the lamps will be examined in terms of the elements that essentially make up a lamp: the container, the wick and the combustible material. These are also the elements that affect the lighting result.

2.3.1 The wick

The materials from which lamp wicks were made are examined. Special mention is made of the loumini (ancient Greek *flomis*): the plant which is found free in nature and without any processing is used as a wick in floating wick lamps. The chapter is complemented with an appendix including research on the modern use of loumini wick in Greece.

2.3.2 The fuel

In ancient Greece, the primary fuel for lamps was olive oil. There are references, however, to other types of combustible material for their use in lamps, e.g. aromatic oils, castor oil, petroleum. There are no indications of the use of fat as fuel in lamps. Financial data is given for the cost of olive oil, so that conclusions can be drawn about the cost of using the lamps.

2.3.3 The container

This chapter is divided into two sub-chapters: the spouted lamp container and the floating lamp container

2.3.3.1 Spouted lamps

An examination is made exploring the evolution of the spouted lamp container based on functional criteria. For this reason, strictly typological and decorative criteria are avoided. The emphasis is laid on the period from the Archaic to the Hellenistic times. Evidence from earlier periods (Minoan and Mycenaean) as well as from Roman period are mentioned. Geometric spouted lamps have not yet been discovered in excavations.

2.3.3.1.1 A digression: The automated spouted lamps of the Hellenistic period

This chapter includes references to the original devices created by engineers Philo of Byzantium and Heron of Alexandria, utilizing the principles of hydraulics. These devices had mechanisms, by which the lamp either was automatically filled with combustible material or supplied, also automatically, with a wick.

2.3.3.2 Floating wick lamps

The operation of this type of lamp is examined and an attempt is made to investigate its container. The container of the floating wick lamp is not easily recognizable archaeologically, as it does not bear, necessarily, any particular characteristic (nozzle or traces of burning). The vessels for which such a use has already been proposed are examined: the geometric pyxis and kothon (another name in literature plemochoe or exaleiptron).

2.3.4 Lamps’ supporting equipment.

The necessary "tools" for the operation of the lamp are investigated such as tweezers and oil fillers as well as the supporting equipment for its use: lampstands and lanterns.

2.3.5. Lamps as means of lighting

This chapter examines the domestic use of lamps. It includes excavation data, textual and iconographical sources of lamp use. This chapter is supplemented by an appendix containing depictions of lamps in vase paintings.

2.4 Candles

The examination of candles is brief, as they were not widely used in ancient Greece. Their more extensive use as means of lighting in Greece begins in the Roman period. However, there are indications of the use of wax in Minoan Crete.

Part 3. Lighting in practice

Introduction to light and its physical properties.

3.1 Light and Vision

This chapter provides information on the nature of light and how it is perceived by the human eye. There is a brief reference to the concepts of vision in antiquity.

3.2 Light and Space

This chapter refers to the modern perception of lighting and the factors that affect the lighting of a space. The basic elements of the photometric theory and colour perception are given, which will serve to “enlighten” the lighting experiments of the following chapters.

3.3 Qualitative evaluation of the ancient means of lighting

The optical properties of exact copies of ancient light sources are investigated. The evaluation is based on the results obtained from laboratory measurements. The data are used to assess the sufficiency of light produced by the lighting devices.

3.4 Lighting simulations

3D lighting simulations in domestic environments are performed in order to examine the resulting lighting conditions in relation to domestic nocturnal activities. The findings indicate that people were able to move about and function reasonably well at night. Even a single lamp could be used to illuminate the majority of domestic nighttime tasks as long as it was placed nearby. The most challenging, but not impossible, activities were those that required color discernment, like weaving.

APPENDIX 1 Catalogue of representations of torches

APPENDIX 2 Catalogue of representations of lamps

APPENDIX 3 Ethnological research on the modern use of loumini wick in Greece

APPENDIX 4 Laboratory measurements of the performance of ancient Greek lighting devices.

ILLUSTRATIONS AND TABLES: 80

Word Count: 100.000 words

Non latin scripts: Ancient Greek

Intended submission: December 2023

**About** **the author**

Short CV of Dorina Moullou

Dorina Moullou is a senior archaeologist at the Hellenic Ministry of Culture and Sports (tenured Gov. Gazette 1187/B/14.12.2010) and an adjunct professor at the School of Applied Arts and Sustainable Design of the Hellenic Open University, where she serves also as a member of the supervising Academic Committee of two post Graduate programmes. She studied History-Archaeology at the University of Crete. At the same University, she completed her postgraduate studies with a scholarship from the Vardinogiannis Foundation and her doctoral thesis in Classical Archeology with distinction. Her research interests and publications, apart from the study of lighting devices and of illumination in antiquity, include the investigation of everyday life, the crafts and the technology of the ancient world, the geotechnical and geoseismic analysis of monumental structures, as well as the application of modern tools and ICT in archaeological fieldwork, research and interpretation, along with the protection of cultural heritage. She has taught in several Greek Universities (Ionian University, University of Peloponnese and University of Crete) and has been a visiting scholar at the Institute of Hellenistic Studies in the Uinveristy of Waterloo, Canada. She participated in several national and international research projects (Aristeia/Thalis, lighting.ece.ntua, Dress ID, ARKWORK, iNEAL etc.) and since 2018 has been is a member of the Steering Committee of the Greek branch of the international organization CAA (Computer Applications & Quantitative Methods in Archaeology). From 2013 to 2018, she was the National Coordinator and National Contact Point of Greece for the European Heritage Label (EU Initiative-Decision No 1194/2011/EU of the European Parliament and of the Council).

PUBLICATIONS

1 Book (in Greek)

13 Refereed Papers in Journals

8 Refereed Chapters in books

25 refereed Papers in Books of Proceedings

24 invited talks

2 edited volumes

&

3 3D animated archaeological documentaries produced by the Acropolis Restoration Service, (co-supervisor).

1 CD-ROM with guidelines for the special requirements of 3D modeling of Ancient Monuments, produced by Acropolis Friends Association (scientific and production supervision)

1 mini documentary film “Lighting in Antiquity” (production of the Lighting Laboratory, NTUA, Athens)

PUBLICATIONS ON LIGHT AND LIGHTING

2021

Moullou D. “Shedding Light on the Kothon. Vases with Inward Downturned Rims Revisited”, *American Journal of Archaeology (AJA),* 125,2, 183-206

Moullou D., F.V.Topalis “Reconstructing Artificial Light in Ancient Greece” in C. Papadopoulos and H. Moyes (ed)The Oxford Handbook of Light in Archaeology: Oxford University Press

2020

Aggelis L., D. Moullou, Ch. Sigala “Emerging from Oblivion. Accent Lighting for the Castle of Levadia” στο Zerefos S, Doulos L, Moullou D, Balafoutis A. (eds) LIGHTS 2020, *1st International Conference on Lighting, Interactivity, heritaGe, Health, Technology and Sustainability. Athens, Greece 10.10.2020*. Ed. Hellenic Open University pp. 55-64

2019

Moullou D., K.S. Garnett. "Floating Wicks without Metal», *Polish Archaeology in the Mediterranean* *(PAM)*, 28 (1), 167-178 DOI: 10.31338/uw.2083-537X.pam28.1.11

Moullou D., K. Garnett “Capacity and Capabilities for Terracotta Lamps from Corinth. A measurement procedure” in L. Chrzanowski (ed), *Greek, Roman and Byzantine Lamps from the Mediterranean to the Black Sea, Monographies Instrumentum* 63, Drémil Lafage: Editions Mergoil, pp.185-198

Moullou D., L. Doulos, F.V. Topalis “Lux in Vitro. Artificial Lighting Conditions in Houses of Antiquity” in L. Chrzanowski, A. Nestorović, V. Vidrih Perko (eds) *Ancient Lamps from Balkans and beyond, Monographies Instrumentum 59*, Drémil Lafage: Editions Mergoil, pp.319-328

2017

Moullou D. “Lights, lighting, lamps” *The Encyclopedia of Ancient History*, Wiley- Blackwell DOI: 10.1002/9781444338386.wbeah30107

Moullou D., L.T. Doulos, F.V. Topalis "Living in the Gloom" in G. Vavouranakis, M. Katsianis. Y. Papadatos, M. Mouliou, P. Petridis (eds) *Digital Pasts for the Present. Proceedings of the 2nd Conference on Computer Applications and Quantitative Methods in Archaeology, Greek Chapter, 20-21 December 2016*, Athens: Department of History and Archaeology, National & Kapodistrian University of Athens. pp. 76-80

2015

D. Moullou, “Lighting night-time activities in antiquity” in Μ-Ε Micheli & A. Santucci (ed), *LUMINA,* Pisa: Edizioni ETS 2015, pp. 199-212

Moullou D., L. Doulos, F.V. Topalis “Artificial Light Sources in Roman, Byzantine and Post- Byzantine Eras. An evaluation of their performance” *Chronos* (n. 32). pp.119-132

Douskos D., D. Moullou “Ethno-archaeological inquiry on the use of plant wick and other pre-electrification lighting resources on the island of Therassia” in *Proceedings of the 6th Balkan Light Conference*, Athens, 16-19 September 2015 pp. 153-161

2013

Moullou D. «Illuminating the art of the loom» *Arachne* (n.4), pp. 16-37

2012

Moullou D., N. Bisketzis, Ch. Tselonis, D. Egglezos, O Filippopoulou, F.V. Topalis «Methods and Tools for the study of artificial illumination in antiquity» in N. Zacharias (ed) *2nd ARCH\_RNT Archaeological Research and New Technologies*, University of Peloponnese Editions, pp 107-114

Moullou D., E.-N.D. Madias, L.T. Doulos, C.A.Bouroussis, F.V. Topalis “Lighting in Antiquity”, in Μ. Kostic (ed) *5th Balkan Light Conference*, *Belgrade 3-6 October 2012*. Berlgrade: Serbian Lighting Committee, pp 236-244

2011

Moullou D. “Lighting the fire and illumination in antiquity” in Ι. Motsianos, E. Bintsi (ed) *Light on Light: An illuminating story*. Folklife and Ethnological Museum of Macedonia-Thrace editions, Thessaloniki, pp. 45-57

Moullou D., F.V. Topalis “Illuminating the past: measuring the efficiency of means of lighting” in Ι. Motsianos, E. Bintsi (ed) *Light on Light: An illuminating story*. Folklife and Ethnological Museum of Macedonia-Thrace editions, Thessaloniki, pp. 58-63

Moullou D., F.V. Topalis “An example of room lighting from Classical Greece” in Ι. Motsianos, E. Bintsi (ed) *Light on Light: An illuminating story*. Folklife and Ethnological Museum of Macedonia-Thrace editions, Thessaloniki, pp.63-66

2002

Moullou D., *Technitos fotismos stin archaia Ellada apo ton 12o eos ton 8o aiona p.X. (translation: Indoor Artificial Lighting in Greece from the 12th to the 8th c. B.C.) Rithymna 13*. Department of History and Archaeology University of Crete, Rethimnon.

SELECTED PUBLICATIONS ON OTHER SUBJECTS

Ioannidou Μ., D. Moullou, D. Egglezos. 2022. “The Restoration of the Acropolis of Athens: A holistic approach”, in D'Amico, S., Venuti, V. (eds) *Springer Handbook of Cultural Heritage Analysis:* Springer

Sbonias K., I. Tzachili, M. Efstathiou, C. Palyvou, C. Athanasiou, E. Farinetti, and D. Moullou. 2020. “The Early and Middle Bronze Age settlement at Koimisis, Therasia: Periods of habitation and architecture.” *The Annual of the British School at Athens (BSA)*, 2020, 1–28.

Egglezos D., D. Moullou 2014 “Performance Displacement Based Design Analysis: A Contribution to the diagnosis of monuments’ mechanical history” in C. Papadopoulos, E. Paliou A. Chrysanthi, E. Kotoula and A. Sarris (eds) *Proceedings of the 1st Conference on Computer Applications and Quantitative Methods in Archaeology Greek Chapter (CAA-GR),* Rethymno: Institute for Mediterranean Studies – Foundation of Research and Technology (IMS-Forth). pp. 145-152

Moullou D. 2010, “The project Development of Geographical Information Systems on the Acropolis of Athens. Managing scientific questions of documentation”, *Acropolis Restoration News*, 10, pp.12-15

Egglezos D, D. Moullou 2008 “Preservation of the Circuit Wall of the Acropolis: past and future» *Acropolis Restoration News* 8, pp. 22-25

D. Moullou, D. Mavromati, V. Tsingas, C. Liapakis, L. Grammatikopoulos, S. Raikos, A. Sarris, E. Baltsavias, F. Remondino, J.-A. Beraldin, S. El-Hakim, L. Courvoyer, M. Picard, 2008. “Recording, Modelling, Visualisation and GIS applications development for the Acropolis of Athens” *International Archives of Photogrammetry Remote Sensing and Spatial Information Sciences,* 2008, Vol 37; Part B5; Numb 2, pp. 1073-1076.

Egglezos D., D. Moullou, D. Mavromati. 2008. “Geostructural Analysis of the Athenian Acropolis Wall Based on Terrestrial Laser Scanning Data” *International Archives of Photogrammetry Remote Sensing and Spatial Information Sciences* 2008, Vol 37; Part B5; Numb 2, pp. 1093-1100.

D. Moullou, D. Mavromati 2007 “Topographic and Photogrammetric Recording of the Acropolis of Athens” *International Archives of Photogrammetry Remote Sensing and Spatial Information Sciences*, 2007, Vol 36-5, C53, pp. 515-520.

**Competing** **publications**

Despite playing a significant role in human activity, as the mediating factor between mater and space, light is frequently ignored in archaeological research. This can be attributed to the difficulties of expressing the experience of light since it is easy to describe a lamp but exceedingly hard to convey any concept of the light obtained from it. This is why lighting has only been examined in certain contexts and case studies, mostly related to religion and ritual, and why lighting devices have been treated as works of art, without investigating their functional aspect, nor the experience of light they produce, the perception of space they affect or their light’s impact on people and their activities.

Recently, however, there has been an increase in the number of publications on light, particularly in collective volumes, showing that many more scholars are currently working on the subject from different perspectives and methodological approaches.

J.M. Miller (1885; 1886), was the first to give attention to artificial lighting by collecting the relative literary sources in ancient Greece and Rome; R.J. Forbes, included lighting in his six-volume study of Ancient Technology (Forbes 1966); E. Parisinou explored the role and symbolism of light, lamps and torches in cult practices in archaic and classical Greece (Parisinou 2000); I. Potamianos examined natural light in the Byzantine Church (Potamianos 2000, in Greek); D. Moullou focused on artificial lighting in Ancient Greece from the 12th to the 8th c. BCE (Moullou 2002, in Greek); Y. Seidel investigated artificial lighting in various aspects of private, family and public life, with an emphasis on late antiquity (Seidel 2009) and L. Bouras and M. Parani the lighting devices in early Byzantium including the lighting system of Hagia Sophia church in Constantinople (Bouras and Parani 2008).

Several edited collections explored the role of light through various viewpoints. M. Christopoulos et al. examined light and darkness in Greek myth and religious practices (Christopoulos et al. 2010). P. Schneider and U. Wulf-Rheidt discuss the concepts and use of light, mainly natural, in premodern architecture (Schneider and Wulf-Rheidt 2011). I. Motsianos and E. Bintsi on the occasion of an exhibition in the Folklife and Ethnological Museum of Macedonia and Thrace, Greece, delved into the history of light from antiquity to modern times (Motsianos and Bintsi 2011). A. Chaniotis and P. Derron investigated the experience of the night in Greek and Roman art and society (Chaniotis and Deron 2018). I. Motsianos and K. Garnett explored lighting technologies from late antiquity, Byzantium and medieval period (Motsianos and Garnett 2019). The concept of night and darkness in archaeological contexts as a sensory experience, through a range of cultures and practices was recently the subject of three collective volumes (Dowd and Hensey 2016; Gonlin and Nowell 2018; Dunn and Edensor 2021).

In 2022, the Oxford Handbook of Light in Archaeology was published as a volume that takes a case study approach to show how diverse spatial and temporal contexts can advance the archaeological study and practice (Papadopoulos and Moyes 2022).

The proposed book aspires to contribute to the emerging and expanding field of light in archaeology by incorporating methods and tools of interdisciplinary scientific fields including photometry and lighting studies. It argues that the study of the physical properties of light and lighting provides a new perspective and new insights in the study of the past societies. In archaeology, light is directly linked to activities and can assist in deciphering the usage and meaning of artefacts and buildings. Determining how light is perceived and how environments are experienced under the resulting light can help establish a theoretical framework that takes into consideration illumination's impact on various contexts, be theysocial, economic or cultural, as well as its functional usage.

Monographs on lighting in antiquity

Bouras L. and Parani M. 2008. *Lighting in Early Byzantium*, Dumbarton Oaks Byzantine Collection Publications 11, Washington D.C.

Forbes R.J. 1966. *Studies in Ancient Technology*, v.VI, Brill, Leiden.

Miller J.M. 1885. *Die Beleuchtung im Altertum. Die Beleuchtung bei den Griechen*, Programm der Königlichen Studien-Anstalt Aschaffenburg, StudienJahr 1884/1885, Stuttgart.

Miller J.M. 1886. *Die Beleuchtung im Altertum. Die Beleuchtung bei den Römern,* Programm der Königlichen Studien-Anstalt Aschaffenburg, StudienJahr 1885/1886, Stuttgart.

Moullou D. *Technitos fotismos stin Ellada apo ton 12o eos ton 8o aiona p.X.* *Rithymna Series*, 13. Rethymnon: Department of History and Archaeology University of Crete.

Parisinou E. 2000. *The* Light of the *Gods: The Role of* Light *in Archaic and Classical Greek Cult.* London: Duckworth.

Potamianos I. 2000. *To fos sti Byzantini Ekklisia (translation Light in Byzantine Church)*, Thessaloniki: University Studio Press

Seidel*,* Y. 2009. Künstliches Licht *im individuellen, familiären und öffentlichen Lebensbereich*. Wien: Phoibos-Vlg.

Collective volumes

Chaniotis A., and P. Derron. 2018. *La Nuit: imaginaire et réalités nocturnes dans le monde gréco-romain*. *Entretiens sur l’antiquité classique, 64*. Geneva: Fondation Hardt

Christopoulos, M., E. D. Karakantza, and O. Levaniouk. (eds). 2010. *Light and Darkness in Ancient Greek Myth and Religion*. Lanham, MD: Lexington Books

Dowd, M., and R. Hensey. 2016. *The Archaeology of Darkness*. Oxford: Oxbow Books.

Dunn, N., and T. Edensor. 2021. *Rethinking Darkness: Cultures, Histories, Practices*. Abingdon: Routledge.

Gonlin, N., and A. Nowell. 2017. *Archaeology of the Night: Life after Dark in the Ancient World*. Boulder: University Press of Colorado.

Motsianos, I., and E. Bintsi. 2011. *Light on Light: An Illuminating Story*. Thessaloniki: Folklife and Ethnological Museum of Macedonia-Thrace.

Motsianos, I. and K.S. Garnett. 2019. *Glass, Wax and Metal: Lighting Technologies in Late Antique, Byzantine and Medieval Times*. Oxford: Archaeopress.

Papadopoulos K and H. Moyes. 2022. *The Oxford Handbook of Light in Archaeology*. Oxford: Oxford University Press.

Schneider P.I. and Wulf-Rheidt U (eds). 2010. *Licht – Konzepte in der vormodernen Architektur*. Diskussionen zur Archäologischen Bauforschung 10, Internationales Kolloquium in Berlin vom 26.02.-01.03.2009 veranstaltet vom Architekturreferat des DAI. Regensburg: Verlag Schnell und Steiner

MARKET

This book is written for scholars, educators, graduate students, undergraduates and educated people interested in Ancient Greece. Since it is innovative within a number of disciplines (eg classics, archaeology, material studies, lighting studies, computer sciences) it is expected to attract a broad readership from multiple angles. In particular, the experimentally derived luminaire datasets are of vital importance to all archaeological practitioners of computer/ VR graphics, since the existing software solutions for physically accurate simulations of lighting in archaeological environments (3D Studio Max, Maya, Radiance) are currently insufficient.

While the book draws information from many disciplines, it is written to be clear and understandable to all audiences. I have written it in a didactic and engaging way, so that any well educated person should be able to read it without needing prior engagement in these fields.

I expect the book to be useful in graduate courses involving art history, ancient technology, household archaeology, iconography and everyday life in ancient Greece. Moreover, it can be useful to graduate courses on lighting design, especially the ones focusing on the history of light, architectural lighting design and heritage lighting design.