Execution by *Styrax* in Ancient Thasos

Anagnostis P. Agelarakis

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Introduction

In Thasos Island, the most northern of the Aegean Sea, extensive archaeological excavations under the auspices of the Hellenic Antiquities Authority have brought to light a considerable number of archaeological sites, settlements, and activity areas reflective of the human presence in the region since early prehistoric times.[1]

During the 7th century BC the Parians[2] endeavoring from their native island in the Cyclades established themselves in Thasos[3] drawn by the beauty and richness of its natural resources,[4] the diversity of its catchment areas, and the important strategic location for nautical dominance and trade between the Thracian mainland and the regional sea routes (Figure 1). While keeping close ties with its Parian metropolis, Thasos undertook the founding of strongholds and settlements on the mainland[5] as also narrated by poet Archilochus[6] who fought in arms in the region for the establishment of Thasos and its colonies.[7] The city state of Thasos became rich and powerful, widely known in the trade routes of the

[1] Koukouli-Chrysanthaki, Ch., and Papadopoulos, S., (2016), 'The Island of Thasos from the Neolithic to the Early Bronze Age. Excavation Data and Absolute Dates', in (Ed.) Z. Tsirtsoni, *The human face of radiocarbon*, Travaux Maison de l'Orient et de la Méditerranée, Lyon, 69, p. 339-358; Nerantzis N., and Papadopoulos S., (2013), 'Reassessment and new data on the diachronic relationship of Thassos Island with its indigenous metal resources: a review', *Journal of Archaeological and Anthropological Sciences*, 5:3, p. 183-196; Papadopoulos, S., (2008), 'Silver and Copper Production Practices in the Prehistoric Settlement at Limenaria, Thasos', in (Ed.) I. Tzachili, *Aegean Metallurgy in the Bronze Age, Proceedings of International Symposium*, Rethymnon, 63-71; Lespez, L., and Papadopoulos, S., (2002), 'Palaeoenvironmental Study of Prehistoric Sites on Thassos: Preliminary Results of Geomorphological Research', *Archaiologiko Ergo sti Makedonia kai Thraki*, 16, p. 47-56.

[2] The possibility may be considered for the endeavoring of the Parians in Thasos between the later years of the 8th and the early years of the 7th c. BC, given the findings on their military organizational abilities and capacities during the last decades of the 8th c. BC, see Agelarakis, A. P., (2017), *Parian Polyandreia: The Late Geometric Funerary Legacy of Cremated Soldiers' Bones on Socio-Political Affairs and Military Organizational Preparedness in Ancient Greece*, Archaeopress, Oxford; *id.* (2017), 'Parian Polyandreia and the Military Legacy of Archilochus' Forebears', in (Ed.) D. Mulliez, *Métropole et colonies, Proceedings of International Symposium- in memoriam Marina Sgourou*, Recherches Franco-Hellénique, École française d'Athènes, Paris, p: 47-64; Lane Fox, R., (2008), *Travelling Heroes, Greeks and their Myths in the Epic Age of Homer*, p. 388; Strabo, *Geography* 14.1.40: his reference of the Magnetan destruction by the Cimmerian Treres, between 726-660 BC; Athenaeus, *Deipnosophistae* 12.625c. Cf. Kohl, M., Muller, A., Sanidas, G., and Sgourou, M., (2002), 'Ο Αποικισμός της Θάσου: η επανεξέταση των αρχαιολογικών δεδομένων›, AEMTh 16, p. 57-69; Muller, A., (2000), 'L'archéologie de la foundation de Thasos. Lecture critique de la stratigraphie du sondage 'Héraklis Kokkinis'', *Topoi* 10, p. 15-17; *Greek Iambic Poetry*: *Archilochus, Testimonia*, n[os] 5-11, p. 34-39; Pouilloux, J., (1990), 'Pariens et Thasiens dans le Nord de la Grèce à l'époque archaïque, Μνήμη Δ. Λαζαρίδη›. Πόλις και χώρα στην αρχαία Μακεδονὶα και Θράκη, *Recherches franco-helléniques* 1, p. 485-489.

[3] Herodotus, (2004), (Ed.) J. Henderson, (Transl.) A.D. Godley, Loeb Classical Library, Harvard University Press, Cambridge, MA., II. 44, p. 331, VI. 46-47, p. 193; Thucydides, (2005), (Ed.) J. Henderson, (Transl.) C. F. Smith, Loeb Classical Library, Harvard University Press, Cambridge, MA., I: C, p. 169, IV: CIV, p. 391.

[4] Pericoastal biotic resources, lumber, marble, gold, silver, copper, and iron resources.

[5] Herodotus, (2004), (Ed.) J. Henderson, (Transl.) A.D. Godley, Loeb Classical Library, Harvard University Press, Cambridge, MA., VI. 46, p. 193, VII. 108, p. 413.

[6] Archilochus, in Plutarch, *Moralia*, Αποφθέγματα Λακωνικά, 239b; Agelarakis, A. P., (2017), 'Parian Polyandreia and the Military Legacy of Archilochus' Forebears', in (Ed.) D. Mulliez, *Métropole et colonies, Proceedings of International Symposium- in memoriam Marina Sgourou*, Recherches Franco-Hellénique, École française d'Athènes, Paris, p: 47-64; Tsantsanoglou K., (2003), 'Archilochus Fighting in Thasos', Ελληνικά 53, p. 235-255;

[7] Zafeiropoulou, F., (2008), 'Ζωγραφική και ποίηση στην εποχή του Αρχίλοχου›, in (Eds.) D. Katsonopoulou, I. Petropoulos, and S. Katsarou, *Archilochos and his Age, Proceedings of the 2nd International Conference on Paros and the Archaeology of the Cyclades*, Paros, p. 343-363; Zafeiropoulou, F., and Agelarakis, A. P., (2005), 'Paros Warriors', *Archaeology Magazine*, 58:1, p. 30-35; Tsantsanoglou

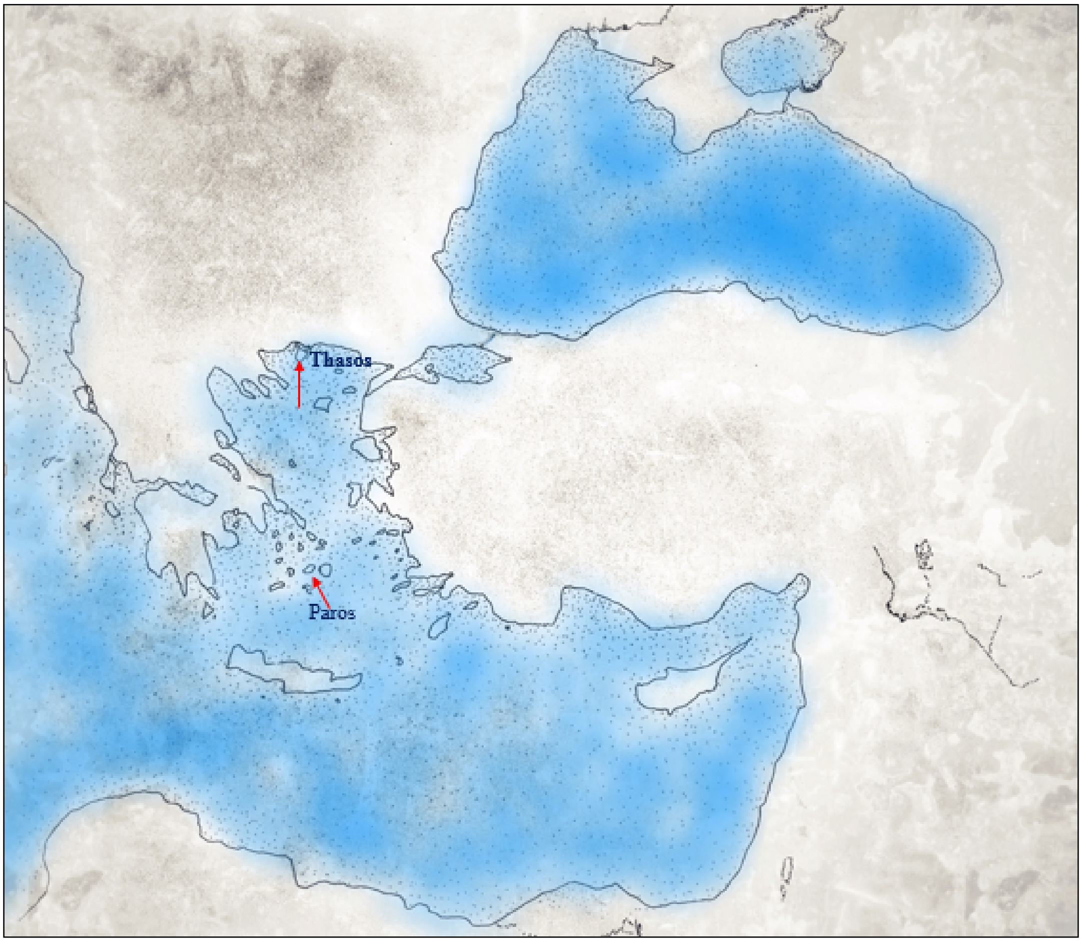


Figure 1. Map of the geographic region, Paros and Thasos Islands in the Aegean Sea, within the Eastern Mediterranean basin and the adjoining context of the Black Sea.

Figure 2. Silver tetradrachm of Thasos. Obverse: Ivy crowned Head of Dionysus, facing left; Obverse: ΘΑΣΙΟΝ (*Thasion*) [plural genitive form of *Thasios*], right kneeling Herakles, facing right, right-handed shooting arrow through recurve bow, with rose in front. Weight: 15.21 gr., Diameter 24.0 mm, Die Axis 330° (courtesy of Alpha Bank, Numismatic Collection, Athens).

Aegean Archipelago and the Eastern Mediterranean, its coinage (Figure 2) found in Syria and Egypt, and its amphorae (Figure 3) for the trade of its acclaimed wine[8] throughout the Aegean to the Black Sea. The dominance and nautical prowess of Thasos were recorded by Herodotus describing the Greco-Persian Wars and later by Thucydides recounting the operations during the Peloponnesian War.[9]

Searching for interpretive answers in engendering an enriched nexus to the attainments and at times wavering dynamics of the ancients at Thasos, the significant assemblages and splendor of archaeological findings in conjunction with a substantial record of anthropological remains excavated provided for a well-endowed framework of cross-disciplinary research endeavors (Figure 4) aiming to investigate, decipher, and where pertinent fine-tune our understandings on aspects of the human condition in the island during antiquity.[10]

Figure 3. Illustration of amphora handle stamped ΘΑΣΙΩΝ (*Thasion*) [plural genitive form of *Thasios*], right kneeling Herakles, facing right, right-handed shooting arrow through recurve bow (artifact courtesy of late Dr. Marina Sgourou, Hellenic Archaeological Service, Chief Archaeologist for the Ancient City of Thasos).

K., (2003), 'Archilochus Fighting in Thasos', Ελληνικά, 53, p. 235-255; Tsantsanoglou K., (2000), 'Ο Αρχίλοχος και ο λαός του›, in (Eds.) Ph. I. Kakridis, G. M. Siphakis, and I. Touloumakos, Κτερίσματα. Φιλολογικά Μελετήματα αφιερωμένα στον Ιω. Σ. Καμπίση, p. 369-393; Salviat, F., (1963), La colonisation grecque dans le Nord de l'Égée, *VIIIe Congrès international d'archéologie classique*, p. 299-303.

[8] Athenaeus, *The Deipnosophists* VIII. 364d, 431a, 432c; *id.* XI. 478d; *id.* XIII. 579e, 641f.

[9] Herodotus, VI. 46-47; Thucydides, (2003), (Ed.) J. Henderson, (Transl.) C. F. Smith, Loeb Classical Library, Harvard University Press, Cambridge, MA., I. C-CI. p. 166-170, VIII. LXIV, p. 298-300; cf. Plutarch, *Lives*, *Cimon*, (2001), (Ed.) J. Henderson, (Transl.) B. Perrin, Loeb Classical Library, Harvard University Press, Cambridge, MA., XIV. 1-2, p. 446-448.

[10] Vakirtzi, S., Koukouli-Chrysanthaki C., and Papadopoulos S., (2014), 'Spindle whorls from two prehistoric sites on Thassos', in (Eds.) M. Harlow, Michel, C., and L. M. Nosch, *Prehistoric, Ancient Near Eastern and Aegean Textiles and Dress. An interdisciplinary anthology*, Oxbow Books, pp. 43-57; Papadopoulos, S., (2005), 'The Island of Thasos before Written Sources. Recent Investigations in the Paleolithic, Neolithic and Bronze Age', in (Eds.) J. Bourek, and L. Domaradzka, *The Culture of Thracians and their Neighbours*, *BAR International Series*, 1350, p. 245-252; Agelarakis, A. P., (1999), 'Reflections of the Human Condition in Prehistoric Thasos: Aspects of the Anthropological and Palaeopathological Record from the Settlement of Kastri', *Actes du Colloque International Matières prèmieres et Technologie de la Préhistoire à nos jours, Limenaria,* Thasos, French Archaeological Institute in Greece, Athens, p. 447-468; Koukouli-Chrisanthaki, Ch., Sgourou M., and Agelarakis, A. P., (1997), 'Archaeological Investigations in the Necropolis of Ancient Thasos 1979-1996', *AEMTh*, 10, p. 770-794; Koukouli-Chrysanthaki, Ch., (1992), *Proto-Historic Thasos. The Cemeteries of the Settlement of Kastri* (in Greek), *Archaiologiko Deltion*, 45:I-III; Agelarakis, A. P., (1992), 'Linen Thread Fragment', in Ch. Koukouli-Chrysanthaki, *Proto-Historic Thasos. The Cemeteries of the Settlement of Kastri* , *Archaeologiko Deltion*, 45:II, 1992, p: 803.

Figure 4. In Thasos Agora region with collaborator, late Dr. Marina Sgourou, Hellenic Archaeological Service, Chief Archaeologist for the Ancient City of Thasos; offering a guided tour to the Adelphi student field team through the archaeological landmarks, in year 1996.

Archaeo-anthropological research in Thasos island

While carrying out funerary archaeological research at the extensive necropolis of ancient Thasos,[11] clusters of Hellenistic to Roman periods family graves were investigated at the proximity of the ancient shoreline (*Myroni* site) at the western outskirts of the ancient city (Figure 5). The anthropological remains recovered comprised a population sample of 57 individuals, buried either as single or multiple interments. Bioarchaeological analyses of the anthropological remains[12] identified the involvement of

[11] Papadopoulos, E., Agelarakis, A. P., and Tsoutsoubei, S., (2012), 'Burial Customs at Thasos: From the Neolithic to the Hellenistic periods', *Kavala and the Balkans, Kavala and Thrace: History, Arts-Culture from Antiquity to Modernity*, Historic and Ethnographic Archive of Kavala, p: 1023-1042; Agelarakis, A. P., (2002), 'Investigations of Physical Anthropology & Palaeopathology at the Ancient Necropolis of Thasos', in M. Sgourou, 'Excavating houses and graves: exploring aspects of everyday life and afterlife in ancient Thasos', in (Eds.) M. Stamatopoulou, M. Yeroulanou, *Excavating Classical Culture, BAR International Series* 1031, p. 12-19; *id.* (2001), 'Report on the Anthropological Forensic and Palaeopathological Study of a Select Number of Human Skeletal Individuals from the Ancient Necropolis of Thasos', in M. Sgourou, 'Jewelry from Thasian Graves', *ABSA* 96, p. 355-364; *id.* (2000), *BioArchaeological Study of the Roman to Palaeo-Christian Period Human Skeletal Remains Excavated from the Ancient Theater Site of Thasos*, Archival Report, Prehistoric and Classical Museum of Thasos, IH' Ephoreia of the Greek Archaeological Service; Koukouli-Chrisanthaki, Ch., Sgourou M., and Agelarakis, A. P., (1997), 'Archaeological Investigations in the Necropolis of Ancient Thasos 1979-1996', *AEMTh*, 10, p. 770-794.

[12] Christensen, M. A., Passalacqua, V. N., and Bartelink, J. E., (2014), *Forensic Anthropology: Current Methods and Practice*, Elsevier, New York; Buikstra, J.E., and Beck, L. A., (2006), *Bioarchaeology: The contextual analysis of human remains*, Elsevier, New York; Bass, M.W., (2005), *Human Osteology: A Laboratory and Field Manual*, Missouri Archaeological Society, Special Publication 2, Columbia; Grauer, L. A., and Stuart-Macadam, P., (Eds.), (1998), *Sex and Gender in Paleopatholgical Perspective*, Cambridge University Press, Cambridge; Buikstra, J.E., and Ubelaker, H. D., (1994), (Eds.) 'Standards for Data Collection from Human Skeletal Remains', *Arkansas archaeological Survey Research Series*, 44; White, D. T., and Folkens, A.P., (1991), *Human Osteology*, New York, Academic

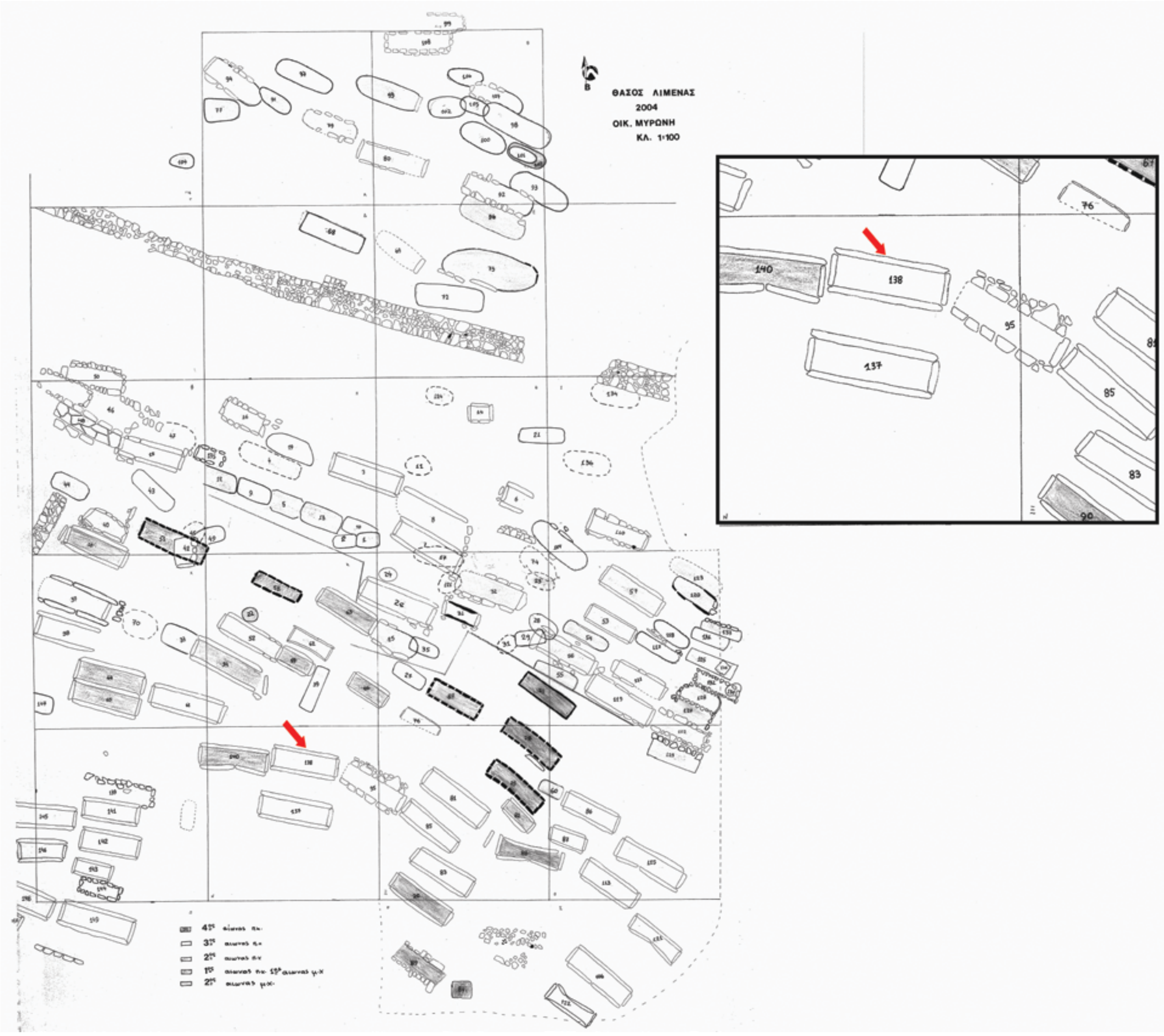
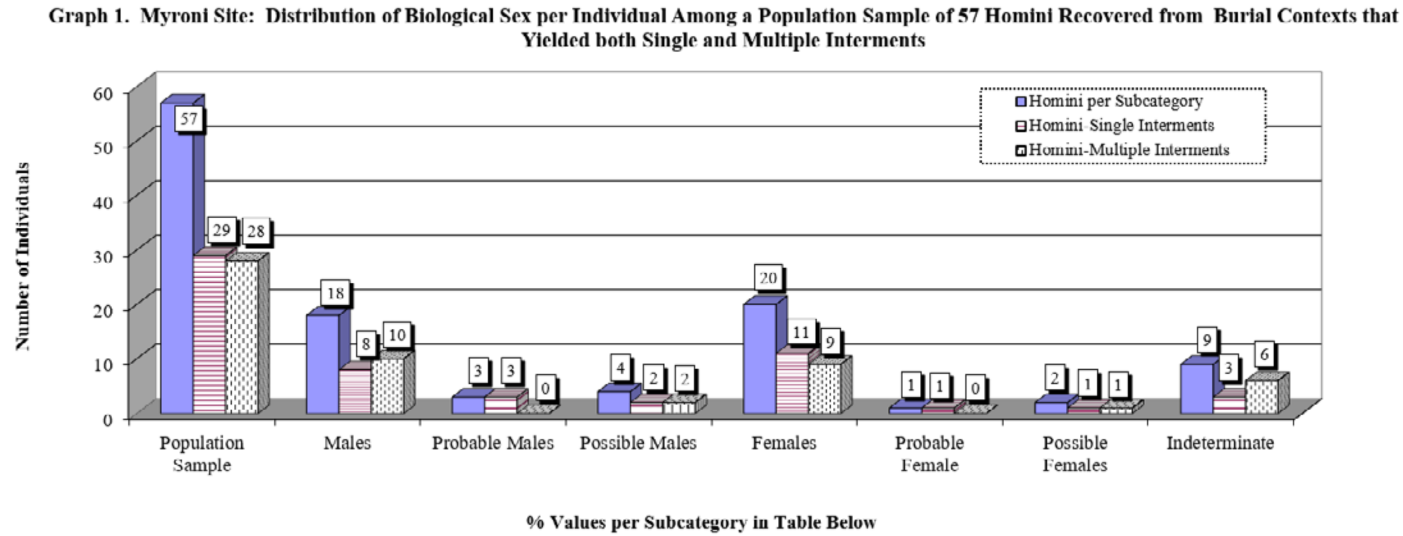


Figure 5. *Myroni* site field map with plotted burial features; arrows point to the topographic locus of burial feature No. 138, the cyst grave of the Thasian male, and the cluster of its adjoining graves (courtesy of excavator, Dr. Eustratios Papadopoulos, Ephor of Hellenic Antiquities).

both biological sexes (Graph 1) and age subgroups which ranged from Infancy I to *Senilis*/Older (Graph 2). Following the taxing years of early life, laden with morbidity challenges, a smoothly ascending curve past SubAdulthood registered the greatest mortality score among the Late Adults. Then tapering off toward the *Maturus* it further ascended among the cohort of the Older; indicative of adequate prospects that must have pertained for extending longevity into old age within this Thasian population sample. Such aspects of demographic dynamics were congruent to the survivorship probabilities, per age cohort, among the larger coeval population at Thasos studied so far. Further, bioarchaeological analyses conducted on matters of dento-skeletal anatomy,[13] the record of acquired skeletal markers

Press; İşcan Y.M., and Kennedy, R. A. K., (1989), 'Reconstruction of Life from the Skeleton', Alan R. Liss, Inc., New York; Katz, D., and Suchey, J. M., (1986), 'Age Determination of the Male *Os pubis*', *American Journal of Physivcal Anthropology,* 69, p. 427-435.

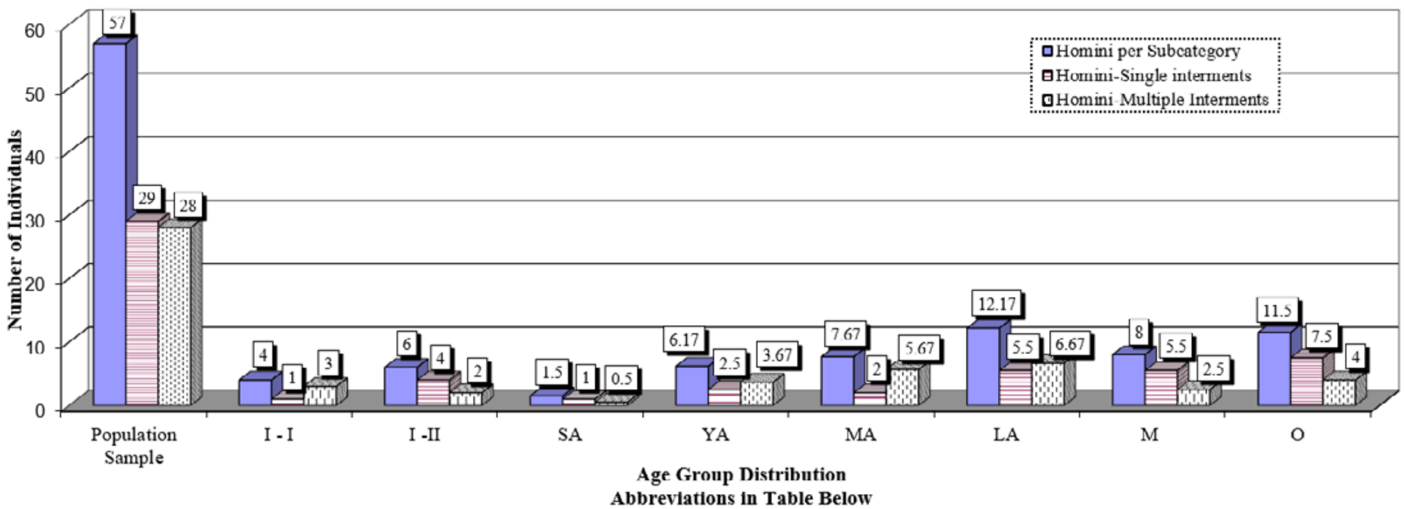
[13] Hillson S., (2000), *Dental Anthropology*, Cambridge University Press, New York; Cate Ten, A.R., (1998), *Oral Histology: Development, Structure, and Function*, Mosby, Philadelphia; Lukacs, J.R., (1989), 'Dental Paleopathology: Methods for Reconstructing Dietary Patterns', in (Eds.) M.Y. İşcan and K.A. R. Kennedy, *Reconstruction of Life from the Skeleton,* Alan R. Liss, New York, p. 261-286; Rogers, L.S., (1988), *The Testimony of Teeth: Forensic Aspects of Human Dentition*, Charles, C. Thomas, Springfield; Clarke, N.G., S.E. Carey, W. Srikandi, R.S. Hirsch, and P.I. Leppard, I.P., (1986), 'Periodontal Disease in Ancient Populations', *American Journal of*



Graph Abbreviations & % Values per Subcategory		
Population Sample	=	57 (100%) Homini recovered as single (29 or 50.87%), and multiple Interments (28 or 49.12%) out of 39 burial contexts
Males	=	18 (31.58% out of 57) Homini assessed as Males: 8 (44.44% out of 18) among single, and 10 (55.56% out of 18) among burial contexts that yielded multiple interments
Probable Males	=	3 (5.26% out of 57) Homini assesed as Probable Males recovered among the burial contexts that yielded single interments
Possible Males	=	4 (7.01% out of 57) Homini assessed as Possible Males recovered in subgroups of two (2) among both burial contexts that yielded single, and multiple interments
Females	=	20 (35.08% out of 57) Homini assessed as Females: 11 (55.0% out of 20) among single and 9 (45.0% out of 20) among multiple interments
Probable Female	=	1 (1.75% out of 57) Homo assesed as Probable Female recovered among the burial contexts that yielded single interments
Possible Females	=	2 (3.5% out of 57) Homini assessed as Possible Females recovered in subgroups of two (2) among both burial contexts that yielded single, and multiple interments
Indeterminate	=	9 (15.78% out of 57) Homini of Indeterminate biological sex: 3 (33.33% out of 9) recovered among single, and 6 (66.67% out of 9) among burial contexts that yielede multiple interments

GRAPH 1. DISTRIBUTION OF BIOLOGICAL SEX PER INDIVIDUAL AMONG A POPULATION SAMPLE OF 57 HOMINI RECOVERED FROM BURIAL CONTEXTS THAT YIELDED BOTH SINGLE AND MULTIPLE INTERMENTS

Graph 2. Myroni Site: Abridged Age Subgroup Distribution Among 57 Homini Comprising the Population Sample



Graph Abbreviations and % Values per Subcategory		
Population Sample	=	57 Homini recovered from 39 burial contexts that yielded both single (29) and multiple interments (28)
I - I: Infancy I (Birth-6years)	=	4 Homini (7.01% out of 57) within the Infancy I age subrgroup: 1 as single (25.00%) and 3 as multiple (75.00%) interments
I - II: Infancy II (6.01-12y.)	=	6 Homini (10.52% out of 57) within the Infancy II age subgroup: 4 as single (66.67%), and 2 as multiple (33.33%) interments
SA: SubAdults (12.01- <18y.)	=	A value of 1.5 Homini (2.63% out of 57) within the Subadult age subgroup: 1 as single (66.67%), and an allocated value of 0.5 as multiple (33.33%) nterment
YA: Young Adults (18-25y.)	=	A value of 6.17 Homini (10.82% out of 57) allocated within the Young Adulthood age subgroup: a value of 2.5 as single (40.52%), and 3.67 (59.48%) as multiple
MA: Middle Adults (25.01-35y.)	=	A value of 7.67 Homini (13.46% out of 57) allocated within the Middle Adulthood age subgroup: 2 as single (26%), and a value of 5.67 (74%) as multiple interments
LA: Late Adults (35-45y.)	=	A value of 12.17 Homini (21.35% out of 57) allocated within the Late Adulthood age subgroup: 5.5 as single (45.2%), and a value of 6.67 (54.8%) as multiple interments
M: Maturus (45/01-55y.)	=	8 Homini (14.03% out of 57) within the Maturus age subgroup: a value of 5.5 as single (68.75%), and a 2.5 as mutiple (31.25%) interments
O: Older (55.01-65+ y.)	=	A value of 11.5 Homini (20.17% out of 57) allocated within the Older age subgroup: a value of 7.5 as single (65.22%), and 4 as multiple (34.78%) interments

GRAPH 2. ABRIDGED AGE SUBGROUP DISTRIBUTION AMONG 57 HOMINI COMPRISING THE POPULATION SAMPLE

and skeletomuscular changes due to *ante mortem* corporeal load bearing issues and kinetics[14] (Graph 3), along with the prevalence of pathological manifestations[15] (Graph 4) and nature of trauma impact[16] (Graph 5) put in motion a set of competing explanatory hypotheses, still under investigation, on the hypothesized concept that the spatial distribution of interments allocated within the necropolis close to the sea shore[17] could in some ways link those individuals posthumously to their *ante mortem* seabound activities and engagements[18] (Figures 6, and 7).

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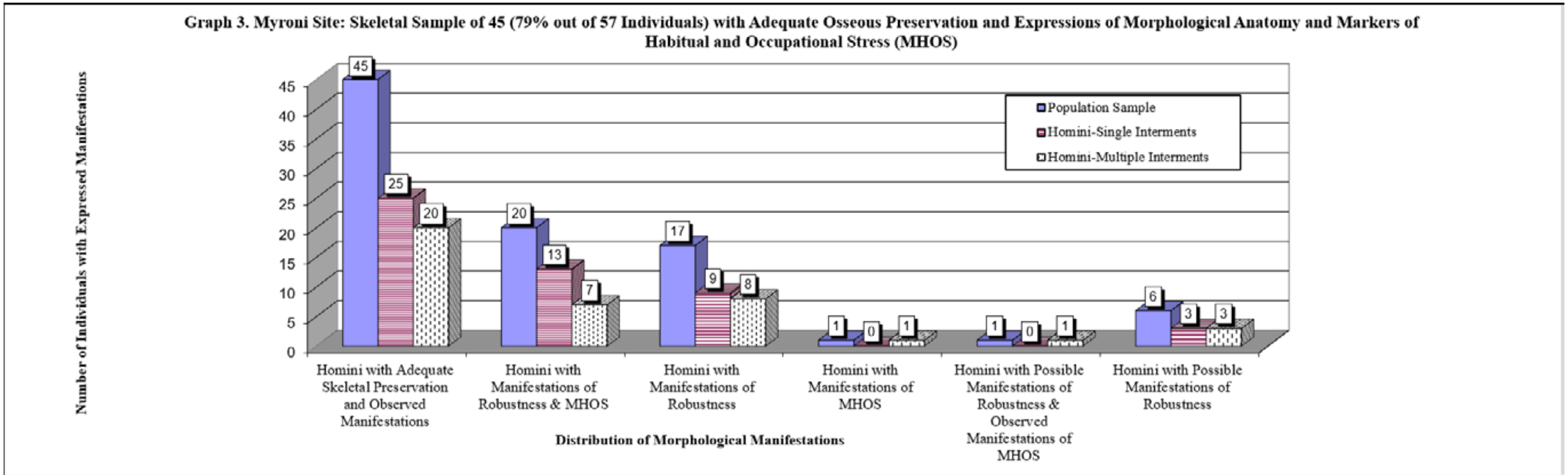
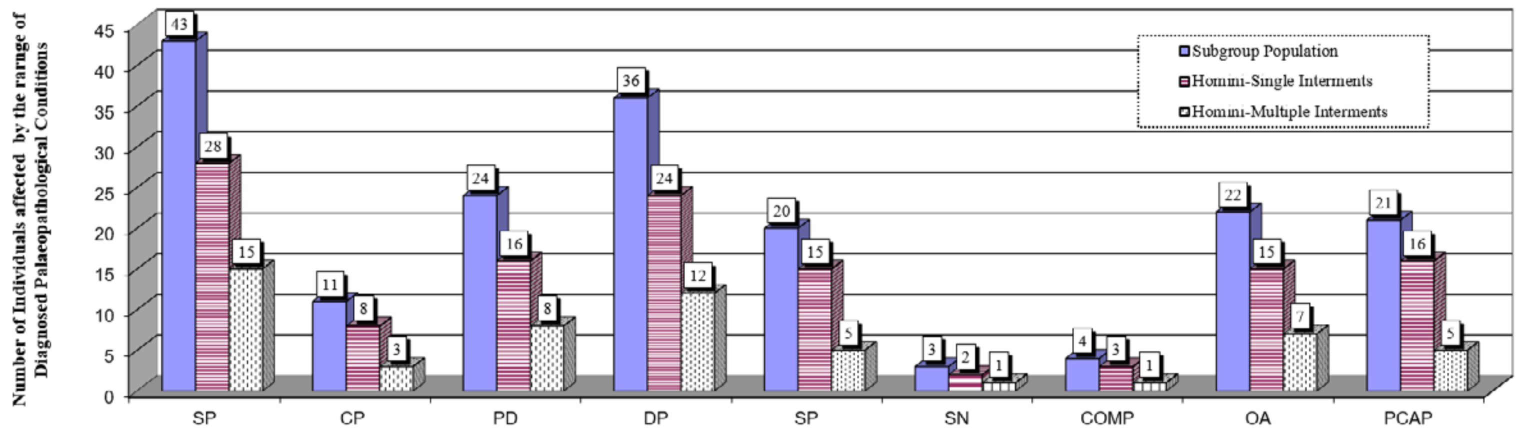


Graph Descriptions & % Values per Subcategory		
Homini with Adequate Skeletal Preservation and Observed Manifestations	=	45 Homini with adequate skeletal preservation and observed manifestations: 25 (55.6%) as single, and 20 (44.4%) as multiple interments
Homini with Manifestations of Robustness & MHOS	=	20 Homini with manifestations of robustness and MHOS: 13 (65.00%) as single, and 7 (35.00%) as multiple interments
Homini with Manifestations of Robustness	=	17 Homini with manifestations of robustness: 9 (52.94%) as single, and 8 as multiple (47.06%) interments
Homini with Manifestations of MHOS	=	1 Homo with manifestations of MHOS recovered from a burial context with multiple interments
Homini with Possible Manifestations of Robustness, and Observed Manifestations of MHOS	=	1 Homo with possible manifestations of robustness, and observed manifestations of MHOS: recovered among multiple interments
Possible Manifestations of Robustness	=	6 Homini with possible manifestations of robustness: 3 (50.00%) as single, and 3 (50.00%) as multiple interments

GRAPH 3. SKELETAL SAMPLE OF 45 (79% OUT OF 57 INDIVIDUALS) WITH ADEQUATE OSSEOUS PRESERVATION AND EXPRESSIONS OF MORPHOLOGICAL ANATOMY AND MARKERS OF HABITUAL AND OCCUPATIONAL STRESS (MHOS)

Graph 4. Myroni Site: Distribution of Observed Palaeopathological Manifestations Among 43 (75.44% out of 57) Homini Recovered as Single and Multiple Interments [from within 38 (97.44%) out of 39 Burial Contexts]

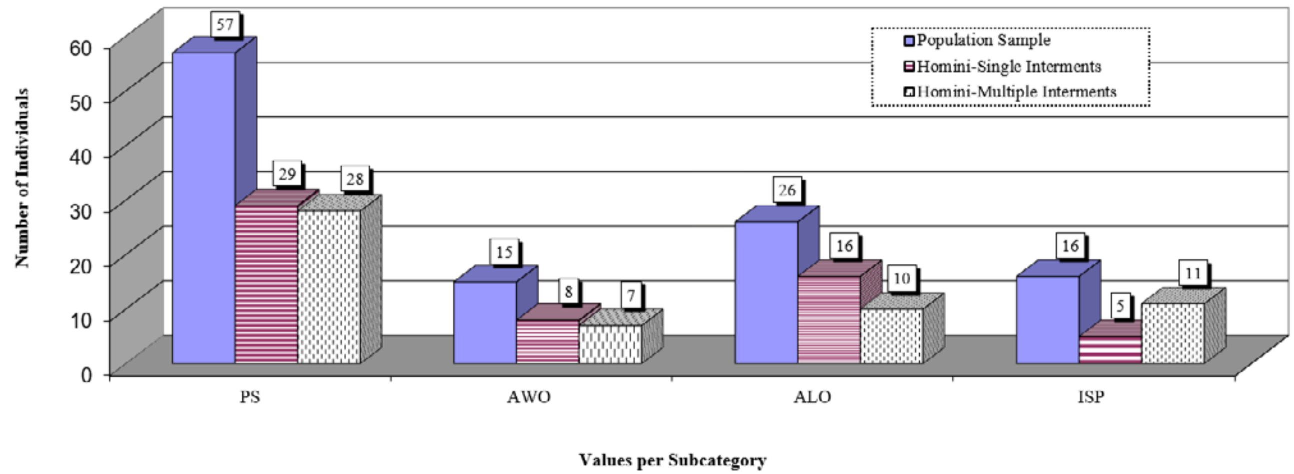


Distribution per Subcategory of 141 Cases of Palaeopathological Manifestations: A Number of Individuals involved had been affected by Multiple Pathologies

Graph Abbreviations & % values per Subcategory		
SP: Subgroup Population	=	43 individuals with adequate skeletal preservation and observed pathologies: 28 individuals among single and 15 individuals among multiple interments
CP: Cranial Pathologies	=	11 individuals exhibiting manifestations of cranial pathology: 8 (72.72%) individuals as single 3 (27.27%) indivuals as multiple interments
PD: Periodontal Disease	=	24 individuals exhibiting manifestations of periodontal disease: 16 (66.67%) as single and 8 (33.33%) as multiple interments
DP: Dental Pathologies	=	36 individuals exhibiting manifestations of dental pathology: 24 (66.67%) as single and 12 (33.33%) as multiple interments
SP: Spondyloarthropathies	=	20 individuals exhibting manifestations of spondyloarthropathy: 15 (75.00%) as single and 5 (25.00%) as multiple interments
SN: Schmörl's Nodes	=	3 individuals exhibiting Schmörl's nodes: 2 (66.67%) as single and 1 (33.33%) as a multiple interment
COMP: Vertebral Compression	=	4 individuals exhibiting manifestations of vertebral compression: 3 (75.00%) as single, and 1 (25.00%) as a single interment
OA: Osteoarthropathies	=	22 individuals exhibiting manifestations of osteoarthopathy: 15 (68.18%) as single and 7 (31.82%) as multiple interments
PCP: Postcranial Appendicular Pathologies	=	21 individuals exhibiting manifestations of postcranial appendicular pathologies: 16 (76.19%) as single and 5 (23.81%) as multiple interments

GRAPH 4. DISTRIBUTION OF OBSERVED PALAEOPATHOLOGICAL MANIFESTATIONS AMONG 43 (75.44% OUT OF 57) HOMINI RECOVERED AS SINGLE AND MULTIPLE INTERMENTS [FROM WITHIN 38 (97.44%) OUT OF 39 BURIAL CONTEXTS]

Graph 5. Myroni Site: Conditions of Skeletal Sample Preservation and Distribution of Fracture Impact and Trauma Manifestations



Graph Abbreviations & % Values per Subcategory		
PS: Population Sample & Burial Context Subdivisions	=	Burial contexts (39) which yielded the remains of Homini (57) in various states of skeletal preservation, as single (29) and multiple interments (28)
AWO: Homini with Adequate Preservation & Observed Manifestations	=	Contexts which yielded the remains of Homini (15) with adequate skeletal preservation and observed manifestations, 8 single (53.33%) and 7 multiple (46.67%) interments
ALO. Homini with Adequate Preservation Lacking Manifestations	=	Contexts which yielded the remains of Homini (26) with adequate skeletal preservation yet lacking fracture/trauma manifestations, 16 single (61.54%) and 10 multiple (38.46%) interments
ISP: Homini with Inadequate Preservation for Fracture/Trauma Assessments	=	Contexts which yielded the remains of Homini (16) with inadequate skeletal preservation, 5 single (31 25%) and 11 multiple (68 75%) interments

GRAPH 5. CONDITIONS OF SKELETAL SAMPLE PRESERVATION AND DISTRIBUTION OF FRACTURE IMPACT AND TRAUMA MANIFESTATIONS

Figure 6. View of the ancient commercial harbor of Thasos, still in use by fishermen and seafarers in Limenas the modern capital city of Thasos Island.

Figure 7. Wooden boat repair activities taking place in the Limenas harbor of Thasos.

Aspects of the human condition decoded through analysis of the osteological record

Sharing in the objectives of the larger archaeo-anthropological endeavor, aiming to better decipher and elucidate facets of the human condition in ancient Thasos,[19] this essay addresses a case of particular forensic/ bioarchaeological interest involving a member of one of the clusters of burials, who had been placed as a single interment in a limestone cyst grave (see arrows in Figure 5) of the Hellenistic period, based on relative dating, along with an iron strigil; a non-perishable burial offering (Figure 8). Morphoanatomic inspectional and mensurational analyses of the skeletal remains indicated the individual as of male biological sex, while age assessments based on dental anthropology[20] and jaw pathologies (Figure 9) provided for an age at death over 50 to 55 years whereas infracranial pathologies along with osteological changes traced on the surfaces of the pubic symphysis reflected on manifestations that may be expected, commensurate to aging processes, around the 60th year of life (Figure 10).

FIGURE 8. IMAGE OF BURIAL FEATURE NO. 138, THE CYST GRAVE WITH UNCOVERED THICK STONE SLAB, SHOWING THE THASIAN MALE INDIVIDUAL *IN SITU*, LAYING IN AN EXTENDED SUPINE POSITION AND FACING SW (COURTESY OF EXCAVATOR, DR. EUSTRATIOS PAPADOPOULOS, EPHOR OF HELLENIC ANTIQUITIES).

Having survived three major early life systemic stressors, sequentially at 4.2, 4.75, and 5.3 years of age,[21] the individual presented a well-developed and robustly built skeletal body, at an *ante mortem* standing height of ca. 170.5 cm., with significant skeletomuscular emphasis on both the upper and lower extremities, indicative of his very active and long term participation in physically demanding activities. It was thus possible to assess that he had commanded a powerful rotation and flexion ability of the neck based on the imprints of *M. sternocleidomastoideus*, a retraction/supero-rotation/elevation and depression function of the scapula based on the traces of *M. trapezius* as responses to general stressors sustained by the scapulo-clavicular joints, with most prominently accentuated humeral

historiques, *Collection Archaiologia*, Presses Universitaires du Septentrion, Lille, p: 153-174; Agelarakis, A. P., and Serpanos, C. Y., (2010), 'Auditory Exostoses, Infracranial Skeleto-Muscular Changes and Maritime Activities in Classical Period Thasos Island', *Mediterranean Archaeology and Archaeometry*, 10:2, p. 45-57.

[19] The unit of study for the anthropological component has been the single human individual.

[20] Based on masticatory modifications of wear, attrition and pathogenesis (subject of the nature and quality of preparation of dietary intake and oral cavity hygiene) affecting dental crown surfaces and alveolar bones; evaluated to comparable, coeval, intrasite anthropological materials.

[21] Chronological calculation, based on the biological developmental processes of dental crowns, provided by linear enamel hypoplasias (LEH). LEH are permanent dental enamel defects demarcating the incidence of arrested and improved growth which in this case affected the individual within the later range of Infancy I (Birth to 6 years); there were also numerous enamel pitting defects, cf. Goodman, H.A., and Armelagos, J. G., (1985), 'The chronological distribution of enamel hypoplasia in human permanent incisor and canine teeth', *Archives of Oral Biology*, 30:6, p. 503-507, Sarnat, B.G., and Schour, T., (1941), 'Enamel hypoplasia (chronic enamel aplasia) in relation to systemic disease: a chronologic, morphologic, and etiologic classification', *Journal of the American Dental Association*, 28, p. 1989-2000.

FIGURE 9. MANDIBULAR *RAMUS* RIGHT SIDE FRAGMENT WITH RETAINED CONDYLE (COMPONENT OF THE TEMPOROMANDIBULAR *DIARTHROSIS*) SHOWING MOST ADVANCED MANIFESTATIONS OF OSTEOARTHROPATHIC CHANGES; DELINEATED BY THE REDLINED OBLIQUE SHAPE.

FIGURE 10. PUBIC SYMPHYSIS, RIGHT SIDE COMPONENT, SHOWING SURFACE CHANGES RELATIVE TO AGING PROCESS; DELINEATED BY THE REDLINED SHAPE.

Figure 11. Forearm bones (radius, and distally incompletely preserved ulna) of left side.

deltoid tuberosities, yet with a somewhat greater right unilateral emphasis, thus tracing not only matters of dexterity, but also a *Ms. deltoideus* and *pectoralis major* synergy for the abduction-rotation and circumduction of the arms in the performance of tasks from both elevated and underarm positions. Additional traces of hyperactivity were documented between muscle antagonists such as *M. triceps brachii* versus *Ms. biceps brachii* and *brachialis* in the adduction function of the shoulder while extending forcibly and with high intensity the arm and elbow with anti-fatigue stamina versus the powerful flexion of the elbow and supination of the forearms respectively. The latter was further attested by the significant crest and depressed *fossa* at the ulnar insertion locus of *M. supinator*, manifestations which were mirrored by the emphasized changes of hypertrophy and depressed *fossa* at the insertion of the radial tuberosity for *M. biceps brachii,*[22] synergist muscles particularly during prevalent actions when considerable load stressors were afforded on the supinated and extended elbow joint and forearm (Figure 11). Unfortunately critical components of the right forearm bones did not preserve for assessing the possibility of unilateral diversity in skeletomuscular robustness not only of the two aforementioned synergists, but also in reference to the most emphasized left side insertion imprints of *M. brachialis*, principal flexor of the forearm.[23]

And yet, most significant muscle imprints of origin and insertion on the left forearm bones lent support to the long term flexion and extension kinetics of the elbows combining *sino*, and *dexto*-rotatory actions which extended to the carpal domains, yet with most emphasized imprints traced of the *Ms. flexor carpi radialis* and *ulnaris*, the *pronator teres*, and all the flexors of the palm and hand digits; indicative of very strong hand grip abilities with the capability for both powerful wielding and throwing manipulations. The documentation and subsequent assessments on kinetics of the upper extremities, derived through a synthesis of skeletal anatomic *loci* with significant bone built up/robustness and the expression of most emphasized manifestations of skeletomuscular markers were convergent to the nature and distribution of palaeopathological osteoarthropathic changes[24] which had targeted bilaterally the shoulder joints

[22] Also laden with peripheral and focalized enthesophytes.
[23] Skeletomuscular manifestations which had been afforded on the left upper extremity involving the shoulder, the upper arm, the elbow joint and the forearm bones could simulate changes relevant to those sustained by archery.
[24] In the form of pitting uniformly manifested in hyperporous sizes, and peripheral osteophytic lipping.

and particularly the glenoid cavities, yet with slightly greater intensity at the right counterpart, as on the humeral heads, the elbow joints and the preserved components of the left distal ulnaro-radial articular surfaces.[25] In addition, enthesophytic growths[26] were documented bilaterally in the acromial origins of *M. deltoideus*, particularly in the region of its middle fibers which in aiding the posterior and anterior fibers would generate the leading capacity for the internal rotation of the shoulder during fronto-lateral arm abduction; a greater emphasis of those manifestations was observed on the right side as was the case with the ipsilateral antagonist, *M. pectoralis major*, prominent in the flexion and adduction of the humerus. Enthesophytes were also recorded on the right humeral origin of *M. flexor carpi ulnaris* which flexes and adducts the carpus and hand, as well as on the ipsilateral origin of *M. anconaeus* which in relative synergy with the *M. triceps brachii* facilitate in the extension of the forearm while also providing strength and stability to elbow joint functions.

As with the upper appendicular bone components, skeletoanatomic manifestations of the lower extremities indicated robustly built bones reflective of a continued, active, participation in physically demanding activities.[27] Based on most accentuated muscular imprints of origin and insertion, a physiological process of bone response to the specificity of sustained focalized and trajectory stress forces, it was possible to determine that synergist and antagonist muscle groups generated the strength, stabilization, and stamina which were apparently required for the essentials of his bipedal locomotory behavior inclusive of standing, walking, jumping, sprinting and running.[28] Namely, *Ms. gluteus medius* and *minimus* were noted as very emphasized abductors and thigh rotators at the hip, while of the adductors, *Ms. pectineus*, *adductor brevis*, *ad. longus*, *ad. magnus*, *ad. minimus*, *gracillis*, and *pectineus* were also very emphasized. Of the extensors *Ms. semimembranosus*, *gluteus maximus*, *gluteus medius* (with its posterior fibers), *biceps femoris*, and the quadriceps group were very emphasized. Most emphasized attachment imprints of the flexors were recorded on the femoral insertion of *M. iliopsoas* which was laden with enthesophytic growths, the locus of origin of *M. rectus femoris*, the attachments of *Ms. adductor magnus*, *longus* and *brevis*, as well as of *M. gracillis*. Particular emphasis on muscular imprints were also recorded with the *Ms. plantaris* and *popliteus* for the flexion and stability of the knee, for keeping balance in the standing posture and for additional bipedal actions with the *Ms. gastrocnemius* and *soleus*, and along with the later for the flexion of the foot and toes *Ms. tibialis posterior* and *flexor digitorum longus*.

As reflected through evidentiary data retrieved from the skeletomuscular system of the Thasian male individual, he had been involved in most prevalent physically demanding kinesiologic tasks and activities, suggested to have been inclusive of both occupational and habitual nature. These had afforded long term anatomical load-bearing stressors on both axial[29] yet more predominantly on the upper and lower appendicular components, discernibly with a slightly greater emphasis on the right counterparts.[30] Further, skeletal reaction areas of incipient Poirier's facet, but well defined Plaque and Allen's fossa manifested on the antero-superior femoral neck regions (Figure 13) were indicative of the prevalent hyperflexion of the thighs at the hip joint;[31] conditions which could have been accordant to

[25] Although the proximal row of carpal bones, counterparts to the distal articular surfaces of the forearm bones, were not recovered.

[26] Villotte, S., and Knusel, J. C., (2013), 'Understanding Entheseal Changes: Definition and Life Course Changes', *International Journal of Osteoarchaeology*, 23:2, p. 135-146.

[27] There was an absence of evidentiary data indicative of a declining participation in physical activities due to aging.

[28] Versions of similar muscle group actions were to be operating during swimming and free diving conditions, for a narrative on the latter cf. Frost, J. F., (1968), 'Scyllias: Diving in Antiquity', *Greece & Rome*, 15:2, p. 180-185.

[29] Lower thoracic and lumbar vertebrae preserved were indicative of advanced spondyloarthropathic changes mainly in the form of peripheral vertebral body osteophytic growths, some of moderate sizes (Figure 12), and sporadic pitting of cribrotic size on supero-inferior body surfaces, while their articular processes and costal facets were discerning smooth peripheral lipping; there was also some detectable *ligamenta flava* ossification.

[30] With the exception of the majority of the right forearm components that did not preserve.

[31] Whereby the femoral neck was in very close proximity and/or frictional contact with the acetabular margin, and whereby

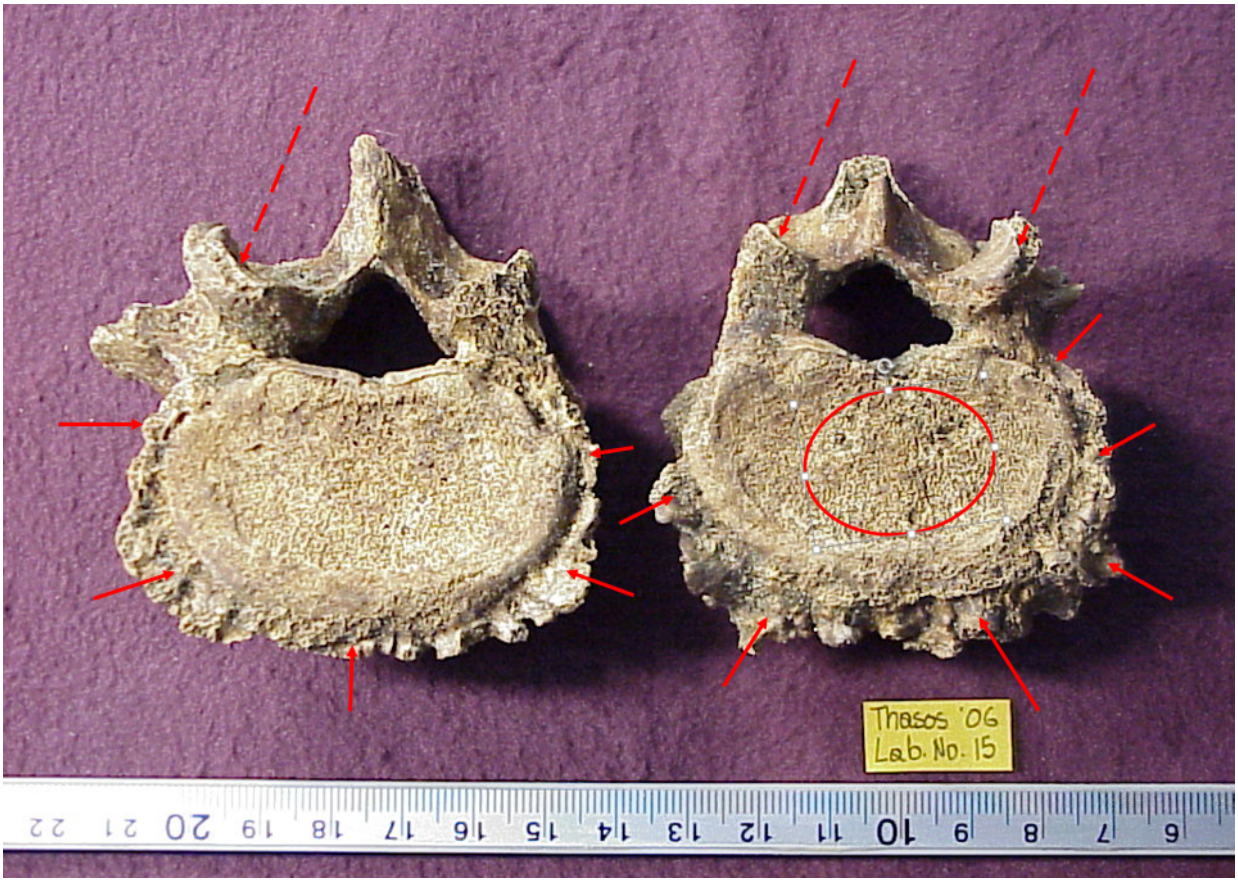


Figure 12. Superior view of lumbar vertebrae: small arrows identify advanced spondyloarthropathic in nature osteophytic growths, marginal to the vertebral bodies; dotted arrows indicate spondyloarthropathic lipping at superior articular processes; ovoid shape delineates body surface spondyloarthropathic hyperporous-cavitational changes.

Figure 13. Left femoral proximal third component focusing on anterior neck changes; delineated by the ovoid shape.

the flexion of the knees.[32] Lending support to the latter were bone marks of tibial imprint on the femoral disto-dorsal *loci*, above the medial epicondyle and below the origin locus of *M. gastrocnemius,*[33] along with the marginal sloping at the dorso-lateral region of the tibial condyle, indicative of an *in vivo* most frequently assumed squatting body posture; not unlike the habitual low-seated or resting position with hyperflexed thighs-hip joints and tightly flexed knee and talo-crural joints documented by the author as prevalent manifestations among the skeletal remains of coeval Late Adulthood (35-45 years of age) and older cohorts of Thasians and of other ancient Hellenic populations in both mainland and island sites.[34] Further on matters of the Thasian's long term load bearing stress sustained by the knees, relevant to issues of particular kinetic tasks and locomotory behavior along with the prevalent body posture of tightly flexed knee joints, in addition to the skeletomuscular manifestations, palaeopathological changes of osteoarthropathic lipping were diagnosed which had affected the distal femoral intercondylar domains, coupled by osteoarthropathic and subsequently eburnation changes[35] on lateralward femoro-condylar articular *loci* bilaterally (Figure 14).

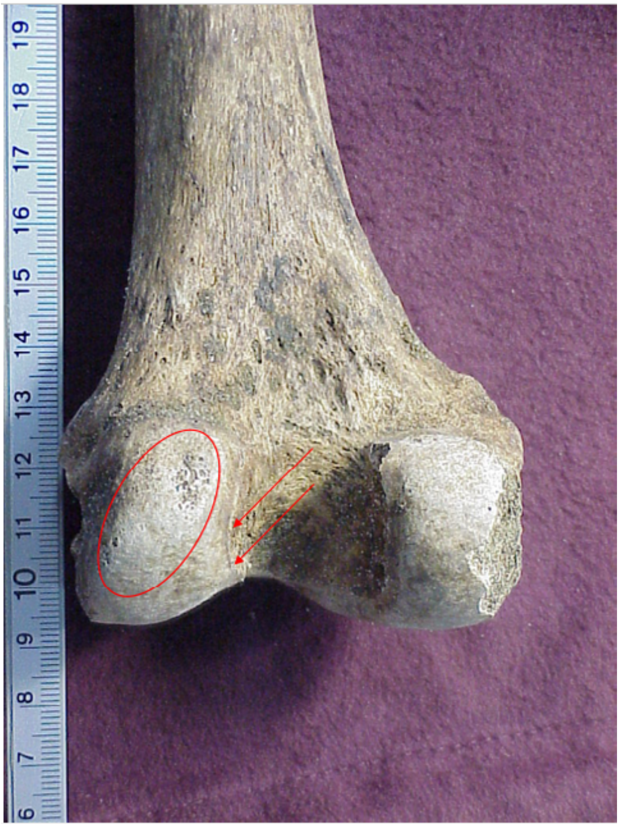


Figure 14. Left femoral distal third component focusing on intercondylar osteoarthropathic lipping (arrows), and subchondral condylar bone osteoarthropathic changes compounded by sclerotic, eburnated, *loci*.

Searching for additional clues which decoded from the skeletal record could elucidate facets of life conditions experienced by the Thasian, it was possible to derive through palaeopathological analyses of jaws and teeth aspects of the dietary intake, cues of its preparation quality, and even of components

the prevalent action of M. *rectus femoris'* tendon was pressing on the bursa and thus the particular locus of the femoral neck, cf. Villotte, S., and Knuscel, C. J., (2009), 'Some remarks about femoro-acetabular impingement and osseous non-metric variations of the proximal femur', *Bulletins and Memoires de la Societe d'Anthropologie de Paris*, n.s.,1:2, p. 95-98; Finnegan, M., and Faust, M. A. (1974), 'Bibliography of human and nonhuman non-metric variation', *Research Reports of the Department of Anthropology* 14, University of Massachusetts; Angel, J. L., (1964), 'The reaction area of the femoral neck', *Clinical Orthopaedics and Related Research*, 32:2, p. 130-142.

[32] Boulle, E. L., (2001), 'Evolution of two human skeletal markers of the squatting position: A diachronic study from antiquity to the modern age', *American Journal of Physical Anthropology,* 116, p. 50-56; Oygucu, I. H., Kurt, M. A., Ikiz, I., Erem, T., and Davies, D. C., (1998), 'Squatting facets of the talus and extensions of the trochlear surface of the talus in late Byzantine males', *Journal of Anatomy,* 192:2, p. 287-291; Ubelaker, D. H., (1979), 'Skeletal Evidence from Kneeling in Prehistoric Ecuador', *American Journal of Physical Anthropology,* 51, p. 679-686.

[33] Which by the way assists in the flexion of the knee, as does *M. plantaris* which originates lateralward to the former.

[34] The author recalls from his teenage years (late 60s) and later during his early ethnographic work (late 70s) in Thasos island, Easter Thrace and Macedonia that similar body postures were the habit among older individuals, indiscriminately of gender, while they would rest during agricultural work in the fields, but also in the context of their rural homes where the seating stools and the eating tables were not further than ca. 25 cm from the floors; before modern chairs and higher tables were, reluctantly for the older people, introduced by the younger generations.

[35] Through focal deterioration of the hyaline layer and resultant friction-wear of subchondral bone *loci* between counterpart femoro-tibial articular surfaces.

of its nature. It was thus feasible to determine that incisal and particularly occlusal wear patters,[36] commensurate to aging processes, did not score a significant difference when compared to the dental anthropological profile of the coeval Thasian intra-male age cohort; indicative of a rich and well prepared diet the baulk of which was based on agricultural products. However, unlike the majority of his coeval male cohort it clearly appeared that during a rather brief period that preceded his death there had been a discernibly rampant change in the quality of preparation of foods consumed. Those had afforded a range of dental crown enamel ring micro, and moderate flacked off traumatisms sustained mostly on buccal teeth,[37] comprising focalized areas of exposed primary dentin a number of which had started to suffer from cariogenic infectious lesions, particular to a declining dental and oral hygiene; manifestations which had superimposed but not masked the noticeably homogeneously better condition *ante* of dental health status, particularly of a smooth curve of Spee pattern of dental wear and attrition, as well as dento-alveolar bone relations. Such abrupt, yet prominent, palaeopathological changes ingrained onto the dental clinical surfaces of the Thasian, notably afforded during a transitory period before his death, acutely discriminative to the record of his prior odontological conditions, were perceived as potentially illustrative of ominous circumstances which would have prevailed at that juncture of his life pathways. Suspecting that those parameters resultant to the drastic deterioration of his overall oral health could not have been but symptomatic to a rather sharp decline of certain elements of his quality of life, at best as far as the inaccessibility to the qualitative level of foods prepared and consumed in his prior years, palaeopathological manifestations of the axial skeleton were to provide apocalyptic testimonials, paramount to the fate and the *perimortem* experience of the Thasian.

Palaeopathological differential diagnosis: Not a sternal foramen

A discrete skeletal manifestation was traceable at the *corpus sterni*,[38] located inferiorly to the line of union between the 3rd and 4th sternebrae[39] (Figure 15) and superiorly to the xiphosternal synchondrosis, dichotomized diametrically as it were supero-inferiorly by the virtual passage of the mesial anatomic line.

At a macroscopic glance of an initial inspectional evaluation the manifestation appeared to simulate, given its particular anatomic locus and size, the case of a round in shape sternal foramen[40] (Figure 16). It would have been caused by a congenital developmental anomaly of incomplete cartilaginous sternal-bar fusion[41] on their respective mesial lines, consequently obstructing the ossification process[42] at the specific *locus* which would have commenced approximately after the first postnatal year. Such a condition, considered in osteological research as a discrete trait of sternal variability could have been asymptomatic during the life of the individual except in a case of potential splanchnic penetration

[36] Occlusal surfaces showed obliterated enamel components with smoothly concave and slightly oblique platforms with evidence of intra-tubularly deposited tertiary reparative dentin.
[37] On both bucco-linguo-palatal surfaces.
[38] The body of sternum (between the *manubrium* and the xyphoid process), alternatively termed *gladiolus*.
[39] Which comprise at their bilateral junctures the 5th costal cartilage facets.
[40] Gkantsinikoudis, N., Chaniotakis, C., Gkasdaris, G., Georgiou, N., and Kapetanakis, S., (2017), 'Morphological Approach of the Sternal Foramen: An Anatomic Study and a Short Review of the Literature', *Folia Morphologica*, 76:3, p. 484-490; Paraskevas, G., Tzika, M., Anastasopoulos, N., Kitsoulis, P., Sofidis, G., and Natsis, K., (2015), 'Sternal Foramina: Incidence in Greek Population, Anatomy and Clinical Considerations', *Surgical Radiologic Anatomy*, 37:7, p. 845-51; Bermio V. S., and Hemalatha, G. A., (2014), 'Congenital Foramen in the Body of Sternum', *International Journal of Anatomy and Research*, 2:3, p. 545-548; Fokin, A. A., (2000), 'Cleft sternum and sternal foramen', *Chest Surgery Clinics of North America*, 10, p. 261-276; Cooper, P. D., Stewart, J. H., and McCormick, W. F., (1988), 'Development and Morphology of the Sternal Foramen', *The American Journal of Forensic Medicine and Pathology*, 9:4, p. 342-347; Taylor, H., (1974), 'The Sternal Foramen: The Possible Forensic Misinterpretation of an Anatomic Abnormality', *Journal of Forensic Sciences*, 19:4, p. 730-734.
[41] Between the eight and tenth weeks of uterinal life, but closer toward the tenth week considering the sequence of fusion which initiates proximally and advances distally.
[42] At the fifth out of the six sternal centers of ossification.

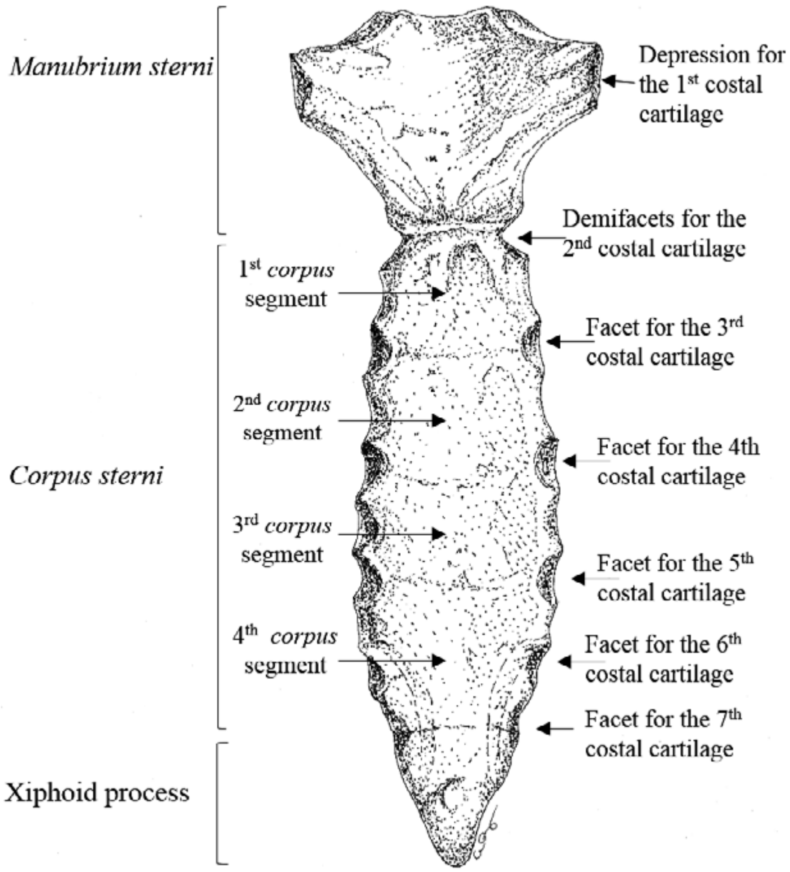


Figure 15. Illustration of sternal anatomic components.

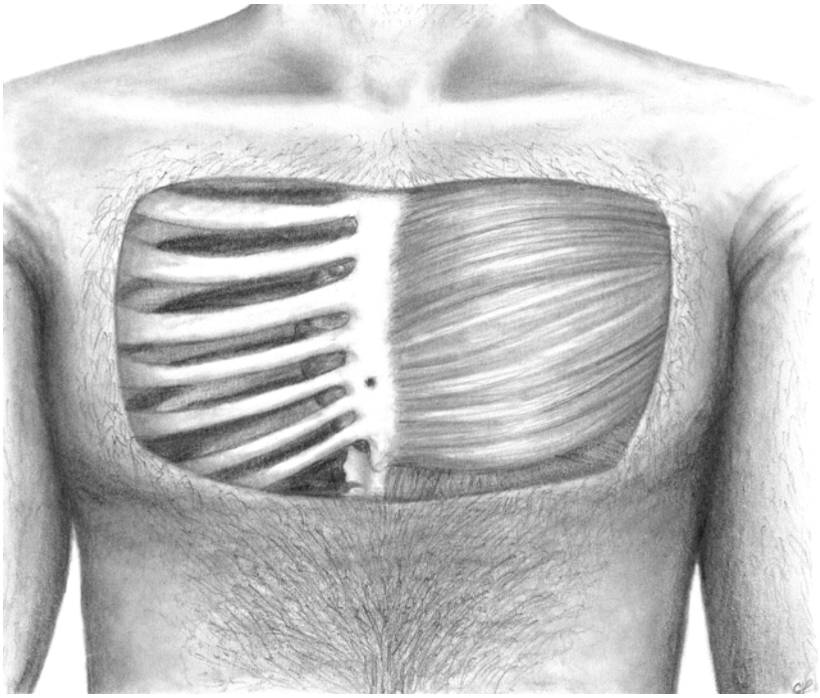


Figure 16. Illustration of demi-macerated thoracic cavity to illustrate a rendering of an approximate position and size of a sternal foramen.

through the tubular passage of the foraminal canal.[43]

FIGURE 17. STERNAL *MANUBRIUM*, *CORPUS*, AND XIPHOID PROCESS OF THASIAN MALE, VENTRAL VIEW.

Following careful cleaning procedures at the laboratories of the Archaeological Museum of Thasos island[44] however, and upon closer palaeopathological examination (Figures 17, and 18), it became immediately apparent that this case did not pertain to a developmental anomaly of sternal foramen, but to a multilevel mechanically caused orifice, one that had been sustained by a through and through gladiolar injury. A heptagonal *hedra*[45] with sharply imprinted edges was clearly defining the superficial component of the penetrating trauma (Figures 19, and 20). While the polygon measured at its maximum disto-proximal length 15.240 mm and 11.769 mm at its maximum latero-lateral width, its seven sides were of anisometric lengths ranging from 5.041 mm to 9.012 mm[46] (Figure 21). Within that delineated *hedra* domain the ventral[47] bone surface of the *gladiolus* had been compressed at an average depth of 1.860 mm, forming a flattened plateau by the crushed and fissured compact bone table pressed into the underlying domain of the cancellous bone; schematically representing a peripheral base as it were tapering off toward its center where a well-defined heptagonal cavity was revealing the result of the through and through fracture. The latter was the consequential imprinted effect of a sharply projecting weapon tip component which had severely and precisely through and through penetrated to the splanchnic surface of the *corpus sterni*. At its ventral surface the maximum disto-proximal length of the cavity measured 7.220 mm, its latero-lateral width 6.970 mm, while the length of its heptagonal sides was anisometric ranging from 2.907 mm to 4.150 mm[48] (Figure 22). At the dorsal[49] surface of the *gladiolus*,

[43] Gossner, J., (2011), 'Relationship of Sternal Foramina to Vital Structures of the Chest: A Computed Tomographic Study', *Anatomy Research International*, 2013, Article ID 780193; Ernst, E., and Zhang, J., (2011), 'Cardiac Tamponade Caused by Acupuncture: A Review of the Literature', *International Journal of Cardiology*, 149:3, p. 287-289.

[44] In collaboration with chief conservator Mr. Dimitris Siabanopoulos.

[45] *Hedra* is a term borrowed from the Hippocratic Corpus used in this context to describe the broader bone imprint that was created by the impact of the weapon surface supporting the sharp styrax tip. For the term *hedra* cf. Hippocrates III, *On Wounds in the Head*, (Ed.) G. P. Goold, (transl.) E. T. Withington, Loeb Classical Library, Harvard University Press, Cambridge MA., VII. 1-31, p. 16-18.

[46] Clockwise length description of the heptagonal sides (in mm), initiating from the proximal locus: 5.512; 9.012; 5.041; 5.670; 5.091; 7.878; and 6.989 mm.

[47] Alternatively termed anterior.

[48] Clockwise length description of the heptagonal sides (in mm), initiating from the proximal locus: 4.150; 3.991; 4.150; 3.040; 2.920; 3.270; and 2.907 mm.

[49] Alternatively termed posterior.

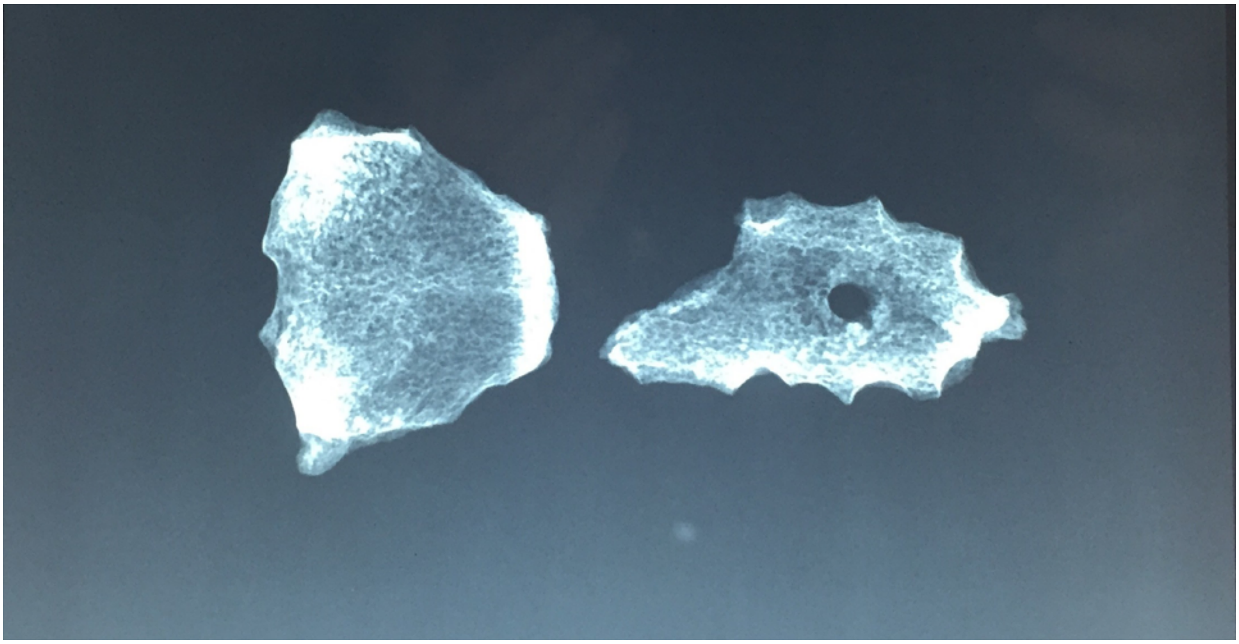


Figure 18. X-ray image of sternal *manubrium*, *corpus*, and xiphoid process of Thasian male, ventral view.

at a depth of 7.360 mm from its ventral surface,[50] the heptagonal splanchnic exit wound boundaries were demarcated by uncuspidated,[51] sharp yet anisometric in length edges, ranging from 2.020 mm to 3.250 mm;[52] whereas the polygon measured a maximum disto-proximal length of 6.310 mm, and 5.780 mm in maximum latero-lateral width (Figure

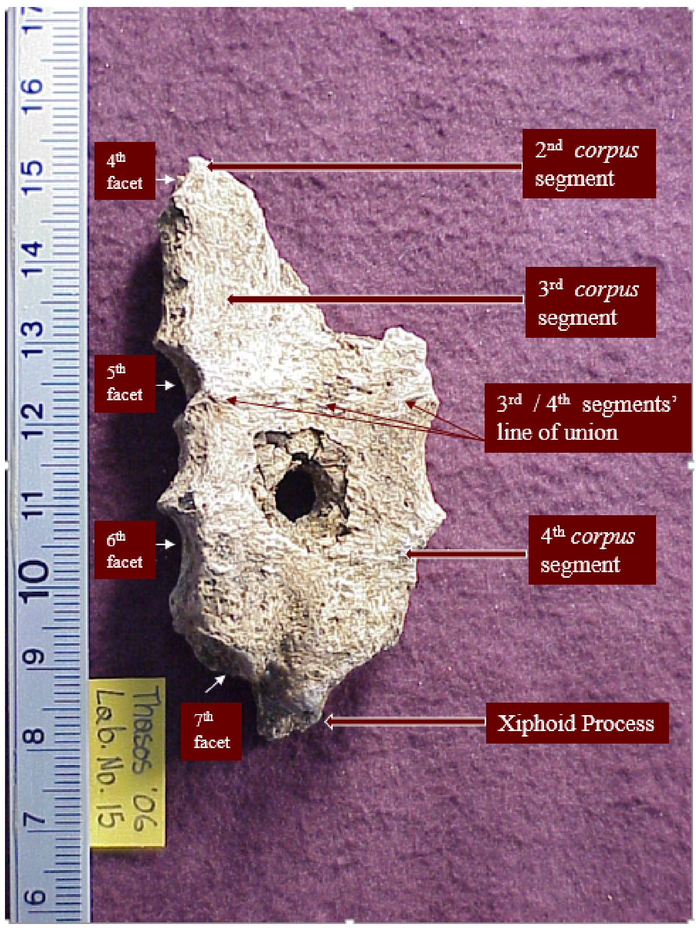


Figure 19. Sternal *corpus* and xiphoid process of Thasian male, ventral view.

[50] Represents the *corpus sterni* ventro-dorsal measurement between the entry and exit wounds.
[51] Hence the heptagonal edges were non-serrated.
[52] Counterclockwise length description of the heptagonal sides (in mm), to be easily compared with those of the ventral side as they appear in sequence in footnote 48 (*supra*); hence initiating from the proximal locus: 2.830 (-1.320 mm difference from the locus of the ventral surface at 4.150 mm); 3.25 (-0.741 mm from 3.991 mm); 2.020 (-2.130 mm from 4.150 mm); 2.670 (-0.370 mm from 3.040 mm); 3.160 (+0.240[*] mm from 2.920 mm); 3.11 (-0.16 mm from 3.270 mm); and 2.460 mm (-0.447 mm from 2.907 mm). [*]This exception is suggested may relate to a possible surface anomaly of the particular heptahedrical side of the sharp tip due to use wear modifications, and/or the result of a skillful hand movement by the deliverer of the jabbing, moving the spear shaft in order to dislodge the styrax tip that was embedded into the *corpus sterni*.

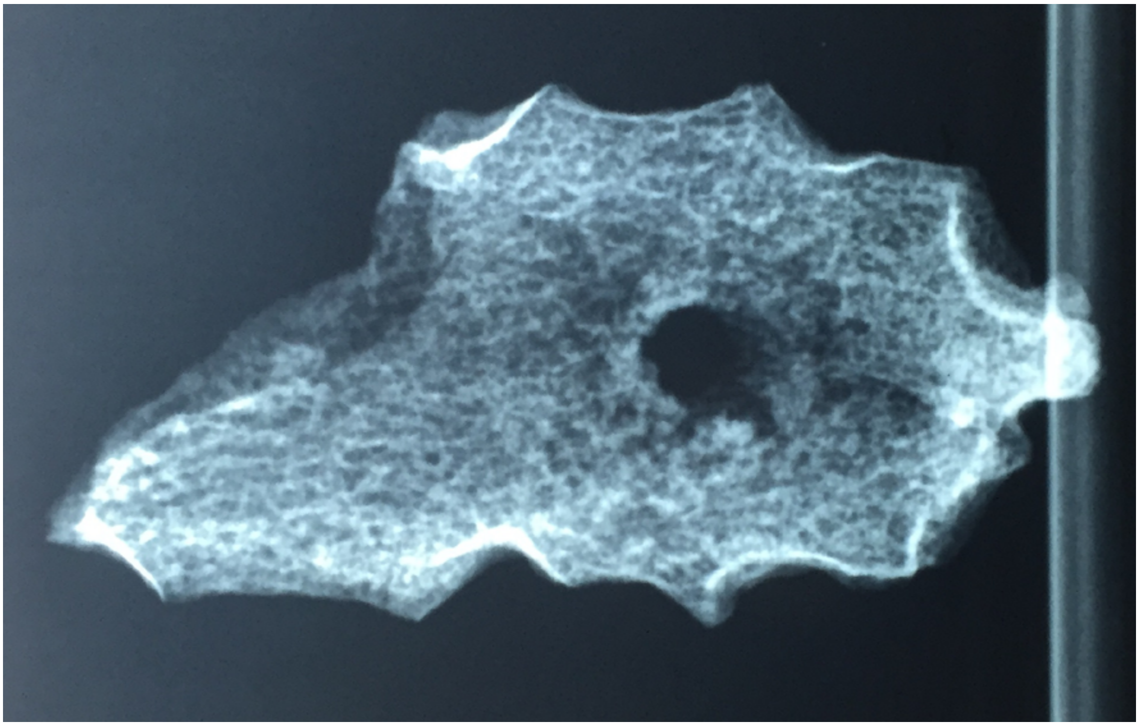


FIGURE 20. X-RAY IMAGE OF STERNAL *CORPUS* AND XIPHOID PROCESS OF THASIAN MALE, VENTRAL VIEW.

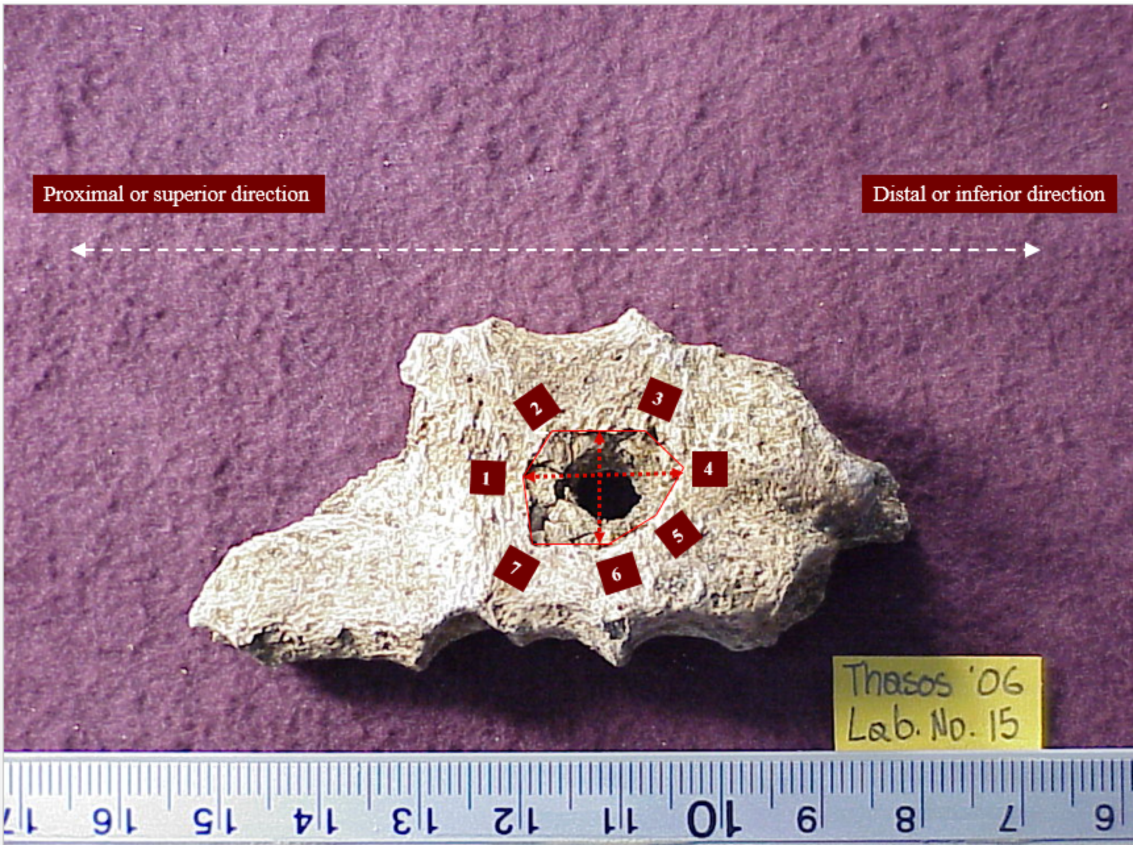


FIGURE 21. FOCUS ON THE VENTRAL SURFACE OF *MANUBRIUM STERNI* AND THE HEPTAGONAL *STYRAX*' BASE OF SHARP TIP *HEDRA* IMPRINT AND ITS METRICS.

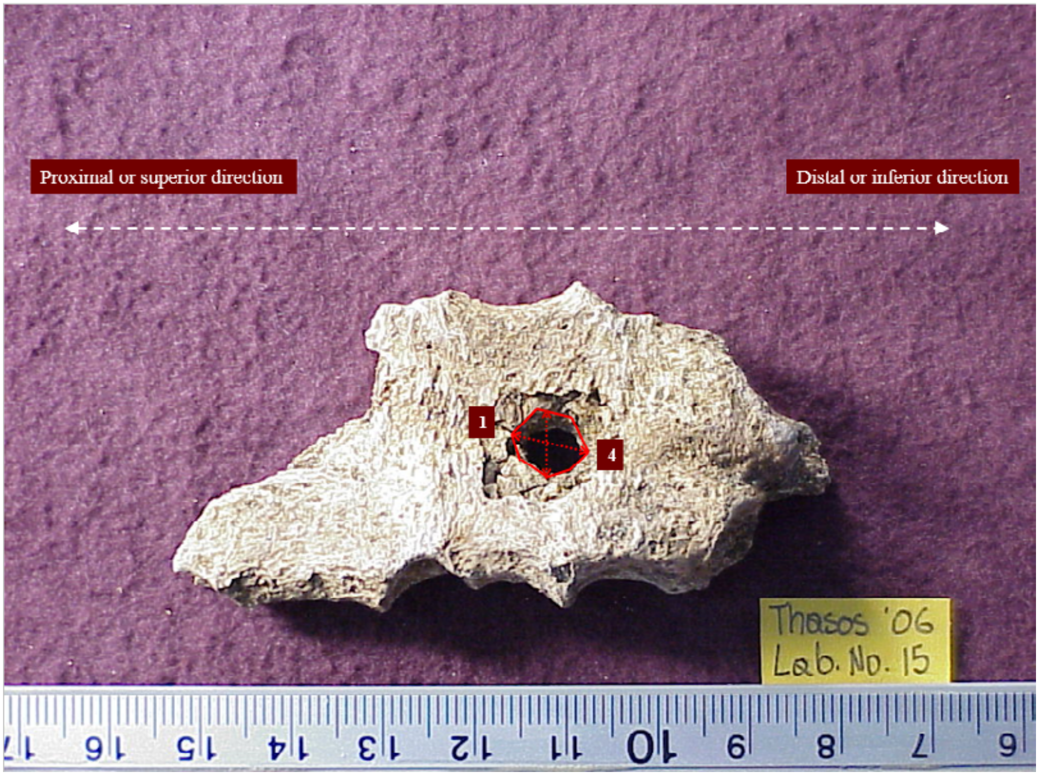


FIGURE 22. FOCUS ON THE VENTRAL SURFACE OF *MANUBRIUM STERNI* AND THE *STYRAX*' HEPTAGONAL SHARP TIP PENETRATION IMPACT AND ITS METRICS.

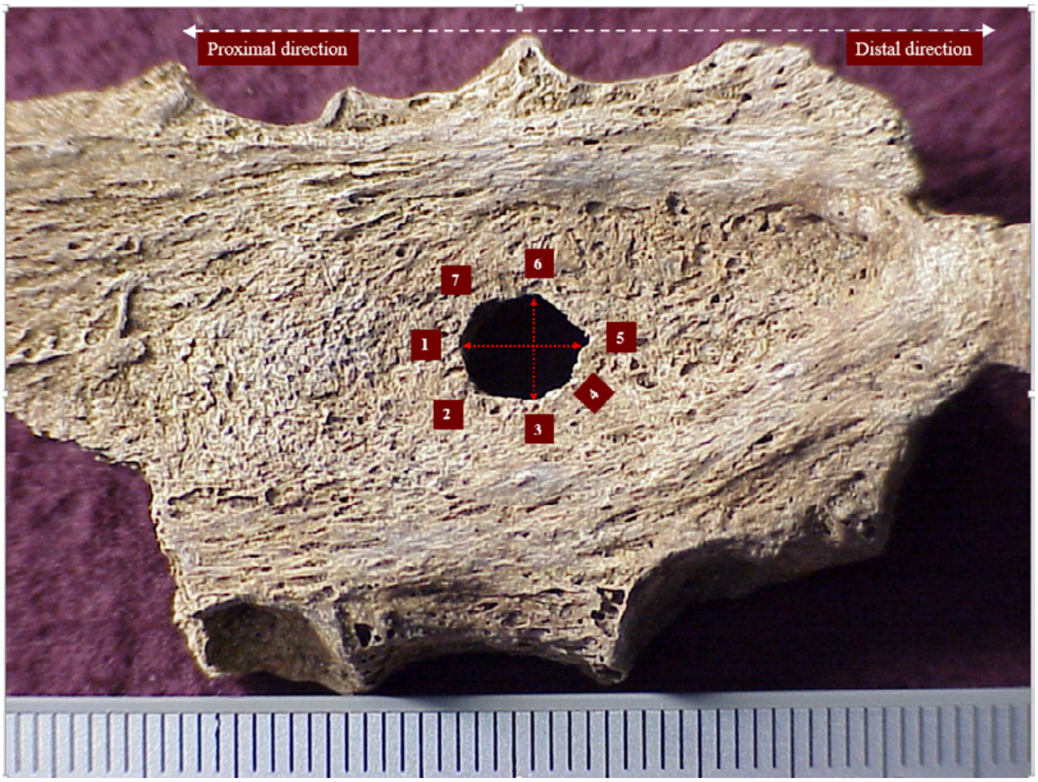


FIGURE 23. FOCUS ON THE DORSAL SURFACE OF *MANUBRIUM STERNI* AND THE *STYRAX*' HEPTAGONAL SHARP TIP PENETRATION 'EXIT' IMPACT.

23).

Identification and reproduction of the weapon type and component which was used to pierce through the *corpus sterni*

Based on the retrieval of evidentiary data imprinted on the sternal bone component, sustained by the traces of the through and through penetrating injury, and placing particular emphasis on the metric study of the trauma impact it was possible to reconstruct with relative accuracy essential aspects of the weapon's exterior morphological shape, depicted initially in archaeological in-scale drawing (Figure 24).[53] Subsequently, an accurate 3D model reconstruction of the weapon was created in wax in order to generate an accurate mold for a precision casting process in bronze.[54] The bronze alloy used for casting the weapon consisted of a rather nowadays proportionality of about 90% copper, 8% tin, and 2% zinc, lacking any additional metal mixtures[55] in its composition which could possibly have been used in bronze weapon making during the particular chronological period in antiquity. Hence the real chemical configuration of the alloy, should the weapon had been made in bronze, its precise hardness index, as well as its true weight could not be accurately reproduced.[56]

Nevertheless, the availability of the reproduced artifact, tangibly presented in material form, in relative morphological size and shape accuracy, was conducive in better elucidating and conceptualizing of certain weapon components' details regarding its form and function, particularly through a handheld operative mode, supporting the conclusion that it represented the component of a *styrax.*[57] Instrumental points to this identification were the sharply projecting heptagonal tip of the weapon, which had through and through penetrated the *gladiolus*, gauging that according to the reconstructive process based on the imprinted ventro-dorsal metrics it would have measured an optimal maximum length of ca. 138.290 mm to its extreme tip; affixed and structurally supported as it was to the wider (15.240 x 11.769 mm) heptagonal metal base. The maximum length of the latter remained unassessed[58] other than its 1.860 mm component measured by the depth of its imprinted *hedra* to the ventral surface of the *corpus sterni* (Figure 25).

Support to the determination that the injurious event had been afforded by a *styrax* was lent by a combination of the structural morphological features of the weapon reconstructed according to its engraved traces on the bone surfaces, the characteristic attributes of the traumatic manifestation documented on the bone surfaces along with the specific relation of the angle of penetration into the

[53] For relevant illustrations of the styrax component, part of the methodological base and training techniques in student sponsored research by Prof. Argiro Agelarakis, cf. Morrison, K., Agelarakis A., and Agelarakis, A. P., (2016), 'A Reconstruction of an Ancient Styrax', electronic poster presentation, 13th Adelphi Research Conference, April 12, 2016, New York.

[54] An easier metal-casting process than forging iron performed in collaboration with the Art Department laboratories of Adelphi University, with the kind assistance of Prof. and former Chair David Hornung, and the participation of the late Prof. Tom McAnulty, and Prof. Anti Liu.

[55] For example led, iron, and/or a metalloid like arsenic.

[56] The author considers that under most probabilities the replica models of the weapon component reproduced were lighter in weight and with a lower hardness index should they be compared to the analogous segment of the ancient original, which by the way could have been made in iron.

[57] Also known as *sauroter*, the bottom-end spike of a thrusting spear, as those used by hoplites in phalangeal (pitched) battle tactics, cf. Snodgrass, A. M., *Arms and Armour of the Greeks*, Thames and Hudson, London, 1967, p. 56, 80.

[58] It is suggested that as it ascended it would have increased in width in order to provide for a socket, a receptor for the sturdy hafting of the wooden component of a thrusting spear; its shaft is suspected could have a range of diameter between 250+ to ca. 475.0 mm.

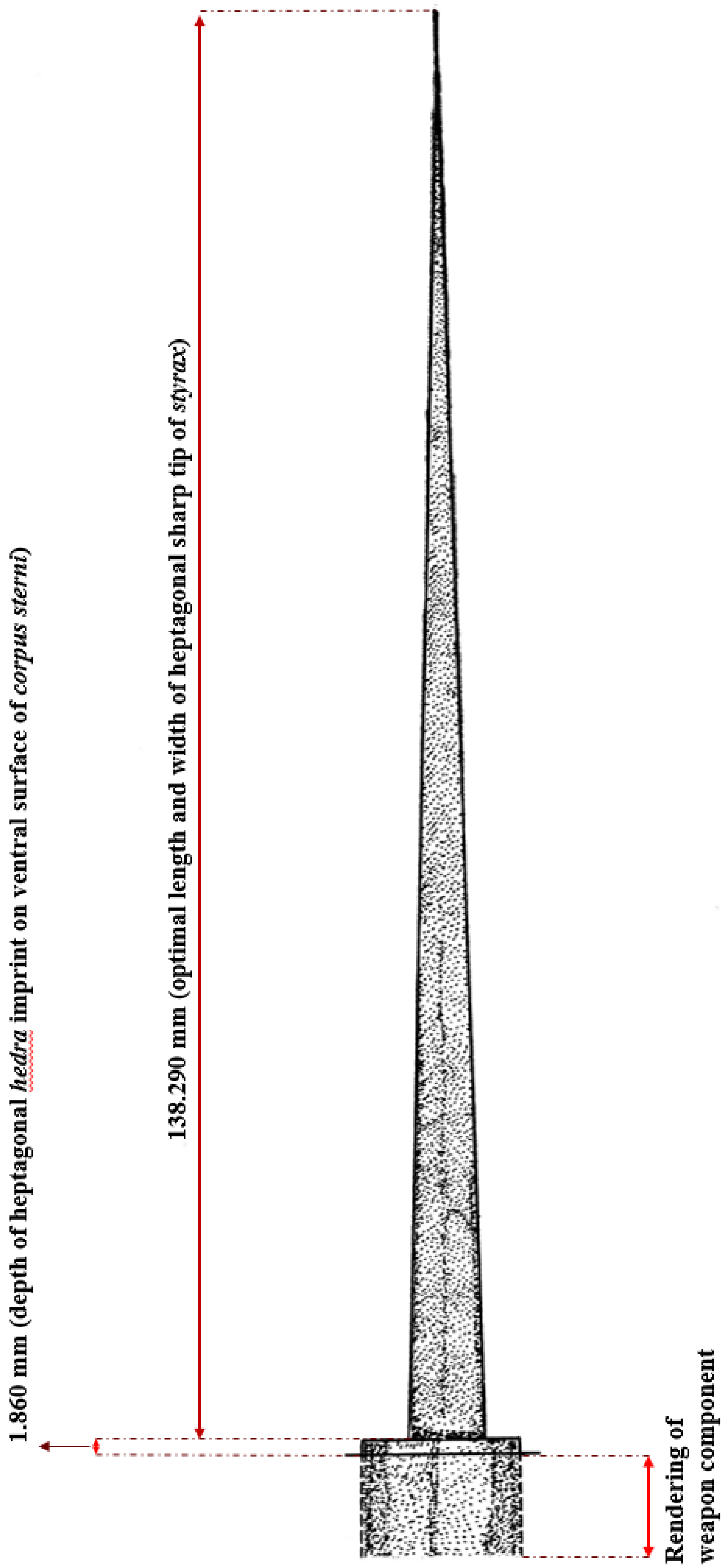


Figure 24. Technical drawing, rendering of *styrax*' base and sharp tip component based on retrieved and reconstructed metrics.

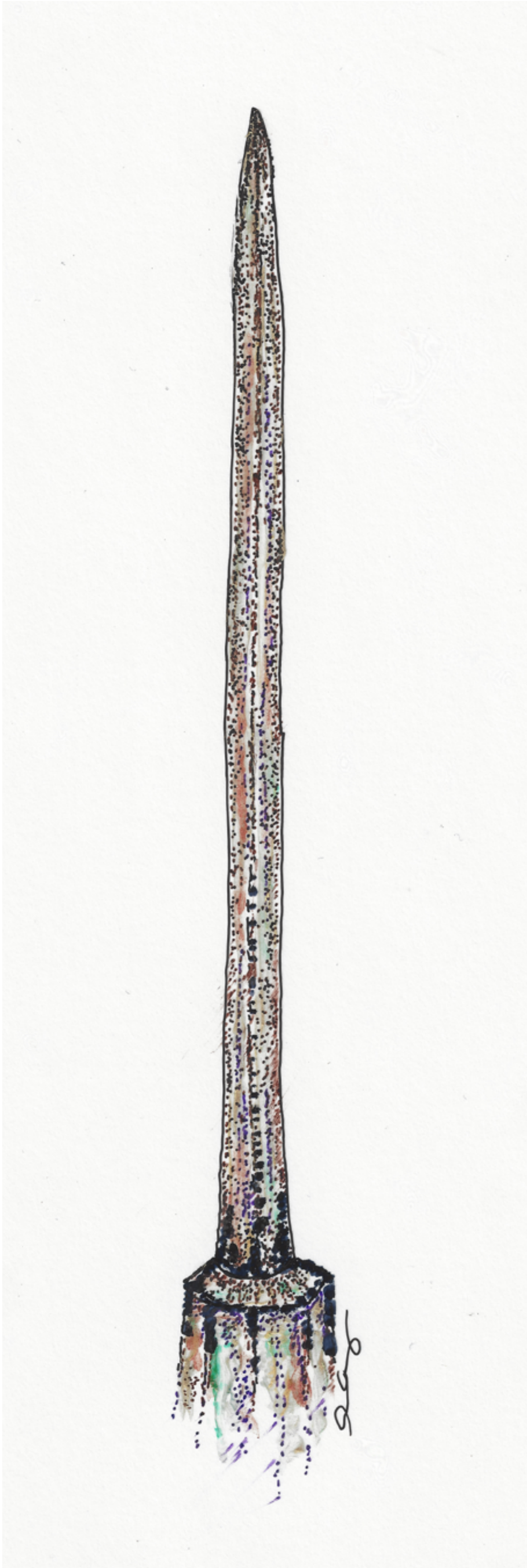


Figure 25. Illustration, rendering of the *stryrax* component cast in bronze.

corpus sterni imprinted by the weapon's sharp tip comprising polygonal edges and supporting base segment, both of a heptagonal perimetrical configuration.[59]

Considering the absence of bilateral or trilateral wedged imprints an unbarbed bi- or trilobed arrowhead, hafted on an arrow shaft, would have left on the sides of the *gladiolus* orifice, likewise of any ballistic effects of a heavier projectile, bearing in mind the wider, bulkier, and heavier heptagonal base that was affixed to the heptagonal weapon tip, may in fact nullify competitive explanatory hypotheses arguing that the weapon used would have been a propelled projectile; such as an arrow through a bow, or a bolt through a *gastraphetes*[60] (see Figures 17-23). Similarly, based on the external structural morphology of the weapon, focusing on the wider heptagonal base supporting the piercing tip, the case of a javelin[61] hurled could also be invalidated.

In the case a ranged weapon would have been used, such as the throwing of a javelin, it would be expected under most probabilities that the weapon impact on the bone surfaces would have left cues of the directional course of the projectile, alluding to the gradient of its trajectory[62]and prescribing aspects of the range of horizontal distance from the projectile launched to its target; ballistic matters of the projectile's elevation angle in relation to the inclination angle of the target (the individual) being at an erect standing to a laying on a supine positioning. Remarkably, however, the particulars relative to the striking angle of the weapon at the point of impact on the thoracic area of the individual involved were revealing a clear absence of any diagnostic morphological or metric attributes which would provide clues amenable toward a clustering of parabolic or partially parabolic path tendencies. Instead there had been a perfectly horizontal trajectory prescribed by the deliverance of the through and through penetration at an anatomically transversal plane, vertical to the long axis of the *corpus sterni*; flawlessly positioned on the sagittal plane. The trauma orifice exacted were to be dichotomized by the virtual run of the mesial line (Figure 26). Such conditions indicative of the weapon entry and exit movements at the impact *locus* along with the absence of any evidentiary data which could suggest that there had been in action any dynamics relative to body movement(s) of the target individual, peri-transitory to the juncture of weapon impact, could hardly be attributed to a penetrating wound by the launching of a javelin from a distance, a stabbing during an altercation by an assailant, or of a thrusting spear held at an *overhand* or *underhand* position as for example during phalangeal *othismos* and/or during the turmoil of the ensuing melee at the battlefield.

It is in light of the above that a plausible explanatory scenario is submitted for an inherent context of the case study, described as a close encounter sharp force injury, a stubbing by a thrusting spear's *styrax,*[63] whereby the trauma recipient had been immobilized,[64] either in an erect-ventral standing against a hard surface, in a sitting kneel posture with hands tied in the back, or onto the ground in a supine

[59] Those weapon component morphometrics comprised identifying intrinsic weapon-tip properties.

[60] For Heron's *Belopoeica* see, Marsden, W. E. (1971), *Greek and Roman Artillery: Technical Treatises*, Oxford University Press, New York.

[61] The awkward shape and asymmetric heptagonal sides of the weapon edge would not conform to the smoothly contoured structure, weight balance needs, striking-end durability, and penetration potential of a javelin; required for its functional purposes.

[62] Except under zero gravitational forces.

[63] It should be of interest to note that a striking by a styrax is recorded in Xenophon's *Hellenica*, delivered by the Spartan commander Mnassipus to one of his mercenary contingency captains for insubordination at the battlefield while endeavoring to recover Corcyra from the Athenians in 373 BC , see Xenophon, *Hellenica*, VI. ii.16-19, (2003), [Ed.] J. Henderson, Loeb Classical Library, Harvard University Press, MA., p. 136, while the styrax shaped ends of javelins were recommended for military training in simulated battle tactics, see Onasander, *The General*, x. 3-5, (2001), [Ed.] J. Henderson, Loeb Classical Library, Harvard University Press, MA., p. 410-412.

[64] Given that there were no traces as a result of a 'twisting' distortion at the sternal locus of penetration which would have otherwise been expected under inordinately strenuous conditions of movement to ward off the jabbing and as the body's spontaneous reaction during the piercing and even during the exit of the weapon tip from the body had the victim not been incapacitated or restricted in a rather static positioning.

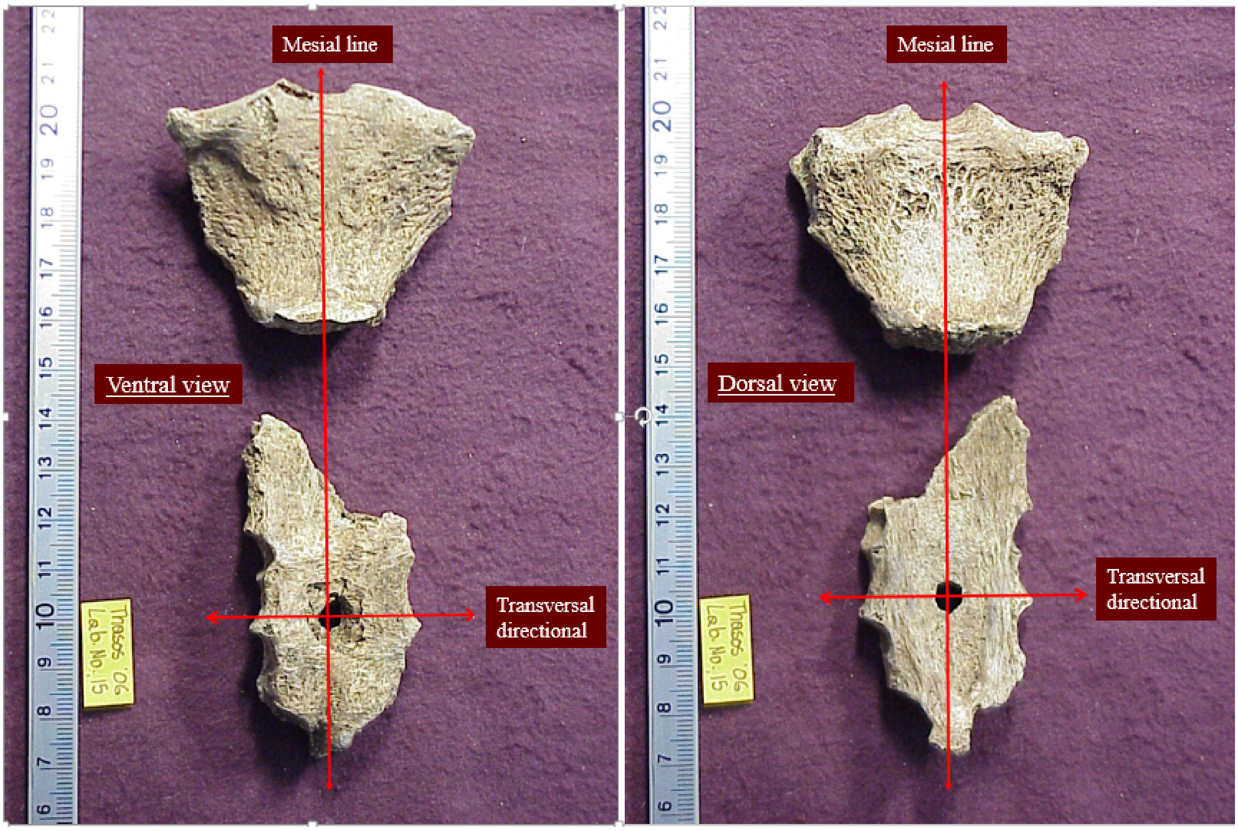


Figure 26. Projections of the mesial line and of a transversal directional on the 'entry' and 'exit' wound imprints caused by the 'through and through' *corpus sterni* stabbing.

body positioning, in order to receive a contact (εξ' επαφής) thrusting of an accurately anatomically calculated, precisely positioned, and well-delivered striking into the inferior mediastinum region of the thorax;[65] effectively involving a fatal traumatism that is suggested would have been sustained during the incident of a prepared execution event.

The anatomic consequences of the trauma impact by the thrusting of the *styrax* into the mediastinum, and assessment on the cause of death

In reconstructing a sequence of moribund consequences sustained by the trauma impact on the splanchnic structures, the penetration of the cutaneous component and radiate sternocostal ligamnets through to the *corpus sterni* by the *styrax* once into the mediastinum primarily sliced through the endothoracic fascia and the invaginated right pulmonary pleura; initially of its durably adhering to the thoracic cavity parietal membrane and further through the pleural space into the serous in nature visceral membrane which was covering the ipsilateral lung (Figure 27). It should be mentioned in reference to certain interrelated functions of those thoracic cavity structures[66] that during the inhalation stage of the breathing cycle the expansion of the thoracic area, mainly by function of the intercostal muscles and diaphragm,[67] pulls the affixed parietal membrane outward (ventrally) and consequently

[65] The central thoracic splanchnic region with particular focus on the heart organ.

[66] Instrumental to the interdependent function of the two pleural membranes is the constant tension pressure that is achieved between them by means of the pleural fluid available within the inter-membranous pleural space.

[67] Elemental to inhalation during the breathing process is a negative atmospheric pressure environment that is generated within the pleural cavity, by the contraction and downward (distally) compression function of the thoracic *diaphragma* muscle.

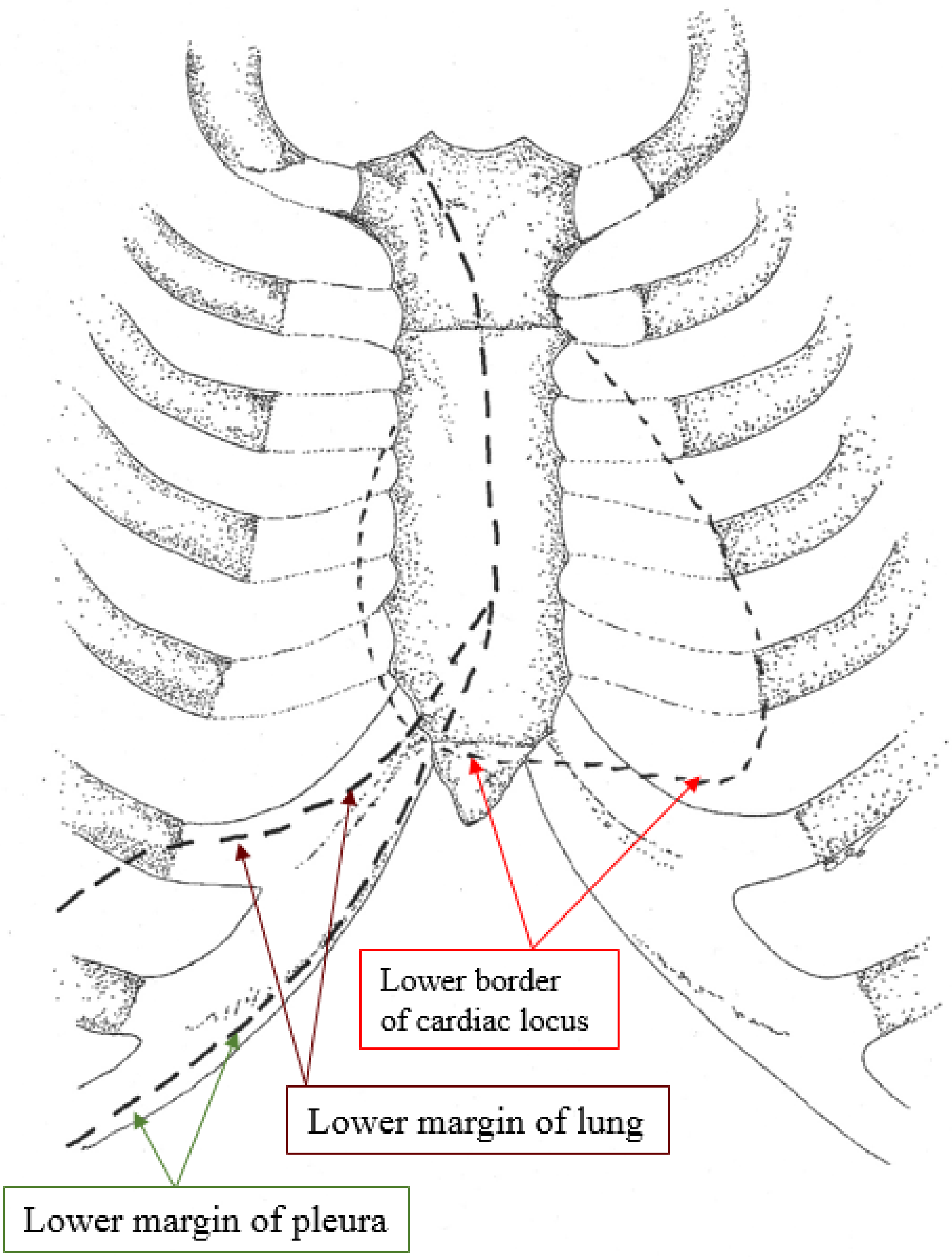


Figure 27. Illustration of a generic sternocostal component with emphasis on the delineated mesial traces of the right pleural and lung domains, as well as of the cardiac position.

its interconnected visceral, serous in nature, membranous counterpart which congruently adheres to each of the lungs. This function stretches and expands the internal volumetric capacity of the lung organs. Thus, by the rushing-in of air into the lungs inhalation is achieved. Hence, consequent to the styrakian[68] penetration, the breathing process of the wounded was compromised, sharply initiating from the right lung region. The obliteration of the negative atmospheric pressure context by means of air and blood which rushed into the pleural cavity, and the elimination of the pleural intramembranous tension pressure by the intrathoracic spilling of the pleural fluid ensued the inability to overcome the

[68] Instead of 'styraxean' the author selects to use a transliteration of the Greek word, namely 'styrakian'.

elastic recoil of the lung tissue. The respiratory function was further compounded by the continued dorsalward (posterior direction) styrakian piercing into the right lung's middle lobe, particularly at its most mesial domain,[69] slashing through tertiary *bronchi*, *bronchioli* and *alveoli*, as well as by the localized rapturing of pulmonary vascularization.

In a scaffolding process of assessing the successive consequences of the splanchnic tissues' damages, while the styrakian strike was piercing the chest ventro-dorsally, and in aiming to uncover aspects of the victim's *perimortem* circumstances, the initial phase of the injurious penetration allowing the leaking in of air combined with the spilling of pleural fluid into the thoracic cavity would have caused the collapsing ability of lung function. At that juncture such a condition would be diagnosed as a case of pneumonothorax, with symptomatic manifestations of acute thoracic pain,[70] a gasping for air with recurrent coughing and tachycardia while the compression of thoracic visceral components would also constrict blood vessels supplying the heart.

Further, the continued, deeper, piercing of the *styrax* into the visceral domain of the thoracic cavity, surpassing the lung tissue, would have penetrated the pericardial sack, initially through its external fibrous layer and subsequently through its underlaying double and serous in nature membranous layer; firstly of its parietal component that was firmly affixed to the fibrous layer and subsequently of the inner visceral *pericardium*. The parietal and visceral pericardiac membranes offer through their serous ability a protective context and buffering lubrication to the heart muscle during its functional modality; the latter of the two is considered as the *epicardium* for it's immediate adjacency to the *myocardium* (the heart muscle). The rapture effects of those two serous in nature pericardial membranes would imminently cause the release of their intramembranous pericardial fluid into the pericardial sack causing a compression of the heart. At that juncture such a distinct condition of fluid congregation in the pericardial membrane would be diagnostically assessed as a cardiac effusion[71] to an incipient case of cardiac tamponade. And yet at this stage of visceral injurious impact there would have been already enough of a combination of air, fluids, and especially blood spilled into the thoracic cavity to consider the sequence from the hazardous case of haemopneumonothorax, with symptomatic manifestations of thoracic compression, pain and dyspnea, to the more severe state which combining the latter along with the piercing of the pericardial membrane would be diagnosed as a case of haemopneumonopericardium; with symptomatic expressions of breathing inability, sharp chest pain, fainting and loss of consciousness. This would have been a condition of moribund effects transient to the final and most perilous stage in the scaffolded narrative of the injurious event sustained by the Thasian male. It would have involved the styrakian penetration of the myocardial muscle at the right antero-lateral *facies sternocostalis cordis* through to the endocardial tissue, into the inner heart chamber, which based on forensic anthropological assessments would have pierced through the most antero-mesial vicinity of the atrioventricular valve and the immediately adjoining region of the right ventricle.[72] This would have caused the returning-deoxygenated blood into the heart from the *venae cavae* and via the right atrium/ventricle puncture to rush into the pericardial sack,[73] and further through its sliced membranous wall into the sternal cavity. Hence, in addition to imminent effects as a result of the associated moribund injuries to the thoracic structures, the rapture of the heart wall would have caused a catastrophic blood flow inadequacy

[69] The particular *locorum* of the right lung component at the time of the styrakian penetration may have been affected by parameters relative to the standing of the body, from an upright standing to that of a supine on the ground positioning.
[70] Due to a combination of the trauma impact and the imminent compression of thoracic visceral components.
[71] Accumulated liquid within the pericardial sack.
[72] Pending on the standing of the body which could have ranged from an upright to a supine to the ground positioning. Yet, it would have been locus specific without producing a transmural myocardial wound.
[73] This would have been diagnosed as a clear case of cardiac tamponade, whereby a modern medical intervention in order to avoid fatality would initially require the draining of liquids through pericardiocenticis.

resulting to cardiac shock[74] leading to fatality, estimated to have taken place within approximately the span of a minute,[75] due to penetrating trauma induced heart exsanguination.

Experimental archaeometry through Physics, testing for data relevant to a *styrax* thrusting into the thorax

Pivotal to the forensic assessments presented above on the traumatic effects sustained and the consequences of the stabbing injury were the specificity of anatomic location, the means of delivery of the blow, and select intrinsic properties of the penetrating weapon tip; particularly the heptagonal shape and length[76] of its non-serrated sharp edges which penetrated from the epidermis to the terminal impact-point reached within the mediastinum. Hence, while classical medical teaching quotes a 50.0 to 54.0 mm distance in sternotomy for the sternal angle to the mid-right atrium, the interquartile range of modern surgical intervention provides for 47.0 to 61.0 mm in supine patients, whereas as a rule of thumb a stab wound of 75.0 mm penetration toward the heart is considered to cause death if unable to be treated surgically.[77] Therefore, in evaluating the potential depth of penetration relative to the thoracico-splanchnic injuries of the present case study, the optimal maximum length at 138.290 mm of the heptagonal, sharp-edged, styrakian tip-component would have easily afforded a catastrophic injury through to the heart wall; even if by parameters of use-wear functions its optimal maximum length would have been drastically reduced to nearly half its length. In fact it will be argued that based on the wound interpretation of the anterior *corpus sterni* impact the degree of force by which the thrusting was delivered could be classified as of the *extreme level* given the well demarcated *hedra*, at a nearly isometric depth imprint of 1.860 mm (discernible in Figures 19, 21 and 22), created by the support base[78] to the styrakian sharp tip. As such the implementation of the thrusting process exerted at the lower component of the sternum would have generated considerable compressive forces applied on the thoracic region,[79] which would have increased the overall depth potential reached by the sharp tip into the mediastinum; decreasing the critical distance of penetration which would have been required for resultant catastrophic injuries by reaching into deeper chest structures, including the endocardial chambers. Given however, that the depth of thrust would have been affected by resistive forces of the skin, the fasciae, bone, and splanchnic soft tissues, a set of experimental physics-based archaeometric tests were designed and conducted,[80] aimed to evaluate and to expectantly deepen our understandings on matters of *Force*, *Speed* and *Momentum* which could have been relevant at the juncture of the trusting process for penetrating the chest region, especially for piercing through thoracic bone components[81]

[74] Effectively cardiac arrest by the loss of approximately half to two thirds of blood, personal communications (2006-2009) with cardiology and heart surgery staff overseen by Dr. George Brief, Clinical Professor of Medicine and Attending Cardiologist at Lenox Hill Hospital in the City of New York.

[75] Personal communication (2012-2015) with Dr. William Tenet, Medical Director NYU Langone Cardiovascular Associates and Clinical Associate Professor of Medicine NYU School of Medicine, and (2006-2009) with Dr. George Brief, Fellow of the American College of Cardiology (FACC).

[76] The weight of the weapon could not be calculated accurately given that no artifactual evidentiary data were preserved in order to provide possibilities on calculating the weight of its components.

[77] Personal communication (2012-2015) with Dr. William Tenet, Medical Director NYU Langone Cardiovascular Associates and Clinical Associate Professor of Medicine NYU School of Medicine, and (2006-2009) with Dr. George Brief, Fellow of the American College of Cardiology (FACC).

[78] Of a well delineated wider heptagonal shape as explained above; it could be paralleled to a case of hilt mark traced in a deep penetrating stabbing by a fixed-blade dagger or combat knife.

[79] The compressive ability of the thoracic region is suggested lends an additional line of support to the assessment of *extreme level* force applied during the delivery of the thrusting strike; given that despite the indenting flexibility of the thorax a 1.860 mm bone imprint was to be generated on the *corpus sterni* by the base of the styrax tip.

[80] In collaboration with Prof. Sean Bentley, Ph.D., Physics Department, Adelphi University.

[81] Evaluations carried out in Dr. Bentley's Physics lab during the experimental piercing of the thoracic region included, in addition to the focal area of the sternum, the targeting of rib bones and intercostal *loci* on a life size ballistic model for generating comparative data.

Figure 28. Dr. Bentley in area of the Physics Department laboratories with student assistants in preparations for the archaeometric tests.

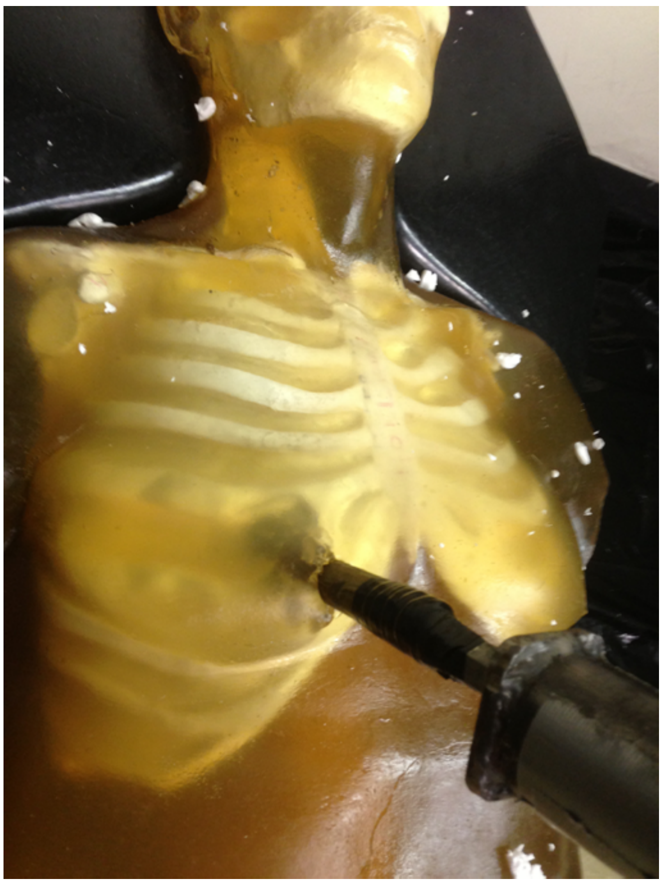


Figure 29. Ballistic model penetrated by the sharp tip of the *styrax* in the rib case (broken rib); jabbed through an 'overhand' striking, by the author.

(Figures 28, and 29). In conducting those tests it was reckoned as prudent to use a model of the styrakian tip component that would not represent the reconstructed artifact at its optimal maximum length of 138.290 mm (5.444 inches), terminating to a 0.38 mm (0.01496 inches) point at its extreme tip, but rather considering a modified version in length at ca. 88.00 mm (3.465 inches), terminating to a 1.50 mm (0.06692 inches) point at its extreme tip (Figure 30). The aim was to avoid the assumption that the weapon tip used for striking the victim must had been in mint condition, while the investigation would evaluate the possible piercing dynamics of the weapon tip that could have been submitted to wear processes through prior functional use.[82] The matter of sharpness of the extreme weapon tip and the overall shape and width of the tip body comprise critical factors on the resultant depth of penetration, providing elemental attributes in the correlation of biomechanical equations between the sum of forces (including the thrusting force) applied in delivering the striking versus the resistive forces which would have been raised by the victim's body.[83] The reduced length of the testing model at the 63.634% of the optimal maximum length of the reconstructed artifact was also intending to review the potential of the maintained classical teaching that a stabbing injury by a tip of 75.0 mm (a length of 3 inches) causes fatality, as in homicide cases and/or in close battle encounters, by penetrating the chest and reaching through to the epicardium / myocardium.[84] Henceforth, during the experimental process of carrying out contact thrusting tests at the thoracic region yet mainly on

Figure 30. Two replicated *styrax* component models, with an elongated base component so that hafting to a wooden spear shaft would be possible (one with the sharp *styrax* tip broken off due to heavy handling) used in the Physics lab for the archaeometric tests.

[82] The author having hafted the reconstructed *styrax* component to a wooden shaft, simulating that of a spear, had been testing the effectiveness and durability of the sharp point via periodic thrusting tasks through a range of various materials (from multilayered textiles combined with leather sheets, thinner wooden surfaces, thinner copper and brass sheets) of differential weight, consistency and penetration resistivity, including vertical to the ground stabbings over a period of ca. three years, prior to its use at the Physics laboratory at the reduced length of the sharp tip at 88.0 mm; due to the recurrent filling of the tip for retaining its sharpness.

[83] Based on the suggested scenario of a prepared case of execution no clothes or other protective gear (i.e. a version of a *linothorax*) were considered to be involved in offering resistive forces.

[84] See footnote 77, *supra*

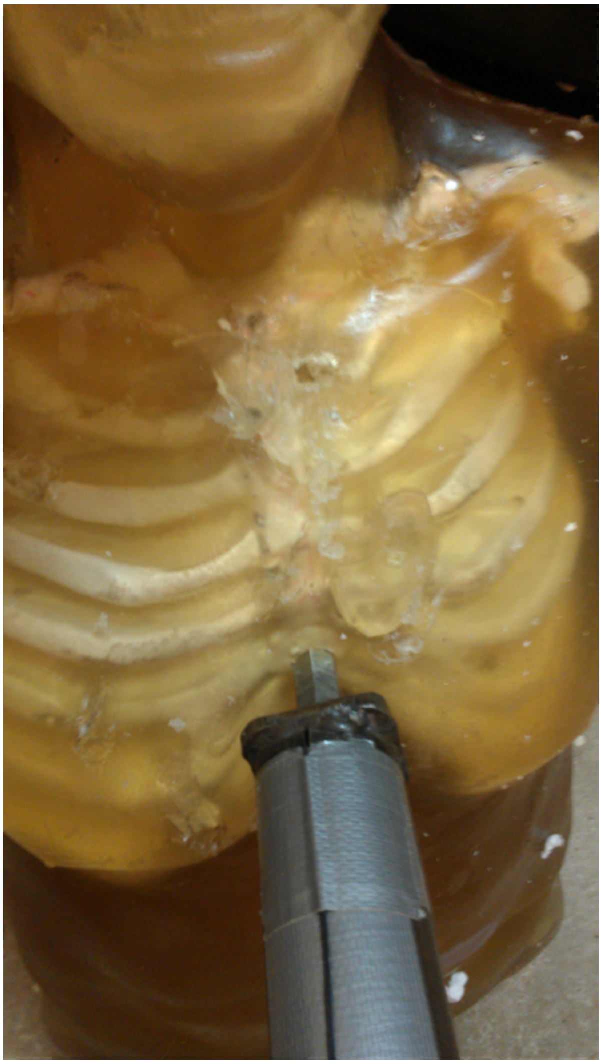


Figure 31. The 4th sternebra of the ballistic model penetrated by the sharp *styrax* tip; jabbing by contact thrusting, by Dr. Bentley (courtesy of Dr. Sean Bentley).

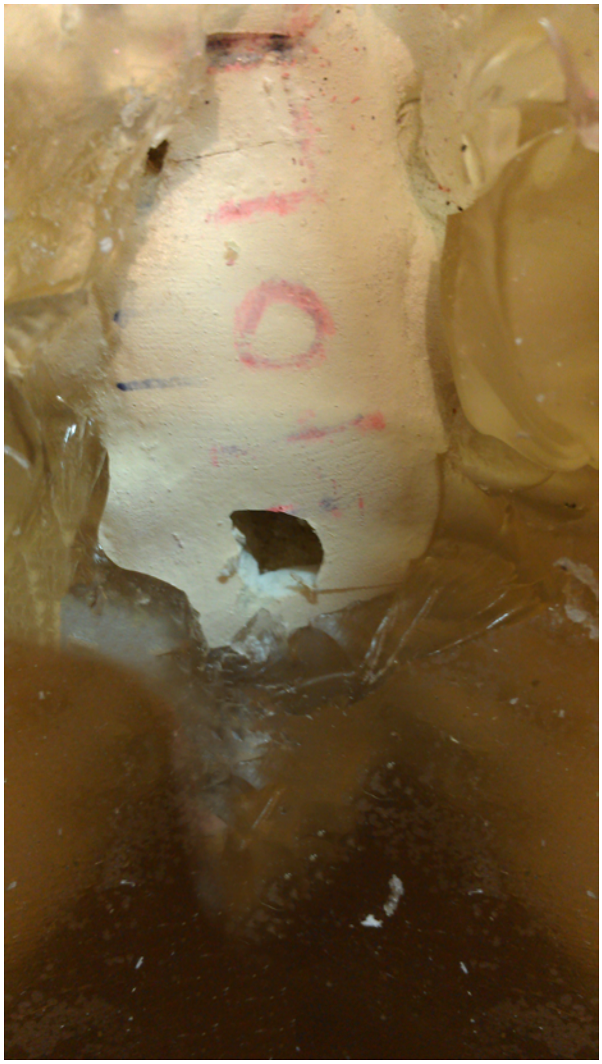


Figure 32. Close up of the 'through and through' jabbing of the 4th sternebra by contact thrusting (courtesy of Dr. Sean Bentley).

the 4th sternebra on a ballistic human male model (Figures 31, and 32), it was possible to establish that a force (*F*) exceeding 2227 Newtons (converted *F* units to ≈500 lbs or ≈227 kg weight), at a range of 565 lbs with a speed of 2.7 m/s was necessary,[85] along with the compressive tendency of the thoracic region, to evidently overarch body resistive forces and to reach in adequate mediastinum depth for perforating the myocardial wall; particularly at the depth level of the right ventricle[86] of the ballistic model-individual laying on the ground in the supine position.[87]

[85] Additional testing results on contact thrusting for the penetration of the 2nd sternebra to a depth of the myocardium in the supine position ranged to an applied force (F) of 2895 Newtons (converted F units to ≈650 lbs or ≈295 kg weight) at a speed of 2.4 m/s. Those metrics were based on test data collected and studied by colleague and collaborator Dr. Sean Bentley, Physics Department, Adelphi University. Dr. Bentley is finalizing the calibration analyses of relevant data, including high-speed video, force data, and materials analysis, for a forthcoming article which will aim to establish an analytical model for stabbing analysis of better accuracy and applicability than available from any previously published studies.

[86] As the most anterior of the heart chambers and thus prone to be affected from both ventral blunt and penetrating injuries.

[87] In a hypothesized case whereby the Thasian male were to have been wearing a type of clothing or protective covering at the

Trauma interpretation and discussion of causes for the execution of the Thasian

In retrospect, clues deriving from the trauma interpretation when canvased together reflect on a non-random, but well calculated thrusting strike by an experienced hand at a precise anatomic point known that it could and would provide for a fast and irrefutable way to kill.[88] Affixing the styrax end at the anatomic position of the fourth sternebra would have provided for an adequate stabilization to the weapon tip[89] preparatory to the delivery of the strike, in either the upright, sitting kneel, or supine to the ground position of the victim, the greatest degree of thoracic compressibility[90] to reach deeper into the viscera with less thrusting effort, while it would also offer an unmistakably precise anatomic demarcation for the delivery of a single death-causing strike. It was further assessed that the specific implementation of the act would suppress the victim in near silence by rendering him voiceless due to the immediate consequences of severe dyspnea and pulmonary incapacitation along with the ensuing cardiac shock and arrest while it would also provide for a containment of external hemorrhaging, entrapping it internally within the thoracic cavity, particularly with the victim in the supine position on the ground.

On account of the above could it be perceived that those considerations were unveiling of propriety trappings for the particular punishment of the condemned that had to be carried out, and/or that there might have been a distinct concern for the effects on the spatial milieu[91] where the killing was to take place? For it could be surmised that the individual was killed in Thasos, or at least in its relative proximity for funerary rights to have involved his timely repatriation and formal non-cremated interment[92] at the burial ground of the ancient polis. Further, it could be ostensibly considered that the killing of the victim would not have been inflicted as a resultant penalty of a purely sacrosanct or communal curse,[93] nor consequential to an act of expulsion of the *Pharmakos.*[94] Had the killing represented an administration of justice, based on malefaction against the statutes of the city state or the principles on which the legislators would have prescribed laws since the Archaic and Classical periods[95] it would have been for punishing the offender for significant, rather deliberate,

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specific thoracic region a greater thrusting force would have been required in order to penetrate into the visceral components reached.

[88] Apparently carried out by an experienced hand, and rather not under the circumstances of a crazed vengeance, as for example in the case of seizing a male perpetrator during an adulterous act with a married woman, [cf. Lysias, *On the Death of Eratosthenes: Defense Speech*, in (Ed.) M. Gagarin, (transl.) S. C. Todd, *The Oratory of Classical Greece*, University of Texas Press, Austin, 1. 24-29, 2000, p. 20-21. Lysias, *On the Murder of Eratosthenes: Defense*, (Ed.) J. Henderson, Loeb Classical Library, Cambridge, MA., 2006, I. 1-50, p. 4-26.], but rather through a process subsequent, it is suggested, to the decision making of a dikastic court or relevant assembly.

[89] Due to the wider and flatter morphology of the bone substrate compared for example to the xiphoid process.

[90] Compared to the 3rd or 2nd sternebrae where the rib cage anatomy would offer increased resistive forces.

[91] Such concerns would not have been consequential of committing perfidy, impiety, or sacrilege (relevant to' άγος) had the killing taken place outside the boundary of the polis under outlawry, on a non-sacred territory, and/or in the context of a battlefield.

[92] Bearing in mind the variable *post mortem* effects of temperature and humidity due to seasonality on the victim's body, the putrefaction of tissues and organs would have severely affected the condition of preservation and thus the ability to transport the corpse from longer distances to Thasos, particularly given the nature of sustained injuries.

[93] Possibly with some exceptions, i.e. as in the case of *hubris*, which could result to a death sentence, applied even toward cases of rape, cf. Carey, C., (1995), 'Rape and Adultery in Athenian Law', *Classical Quarterly*, 45, p. 407-417.

[94] Burkert, W., (1985), *Greek Religion*, Harvard University Press, Cambridge (II 4.2-4.5, II 5.4-6); Parker, R. (1983), *Miasma. Pollution and Purification in Early Greek Religion*, Clarendon Press, Oxford; *id.* (1989), 'Spartan Religion', in (Ed.) A. Powell, *Secrets of Spartan Success-Classical Sparta: Techniques behind her Success*, London, p.142-172; id. (1996), *Athenian Religion: A History*, Clarendon Press, Oxford.

[95] As legislated similarly in numerous ancient *poleis*, see Youni, S. M. (2007), 'An Inscription from Teos concerning Abdera', in (Ed.) A. Iakovidou, *Thrace in the Graeco-Roman World*, Institute for Greek and Roman Antiquity, National Hellenic Research Foundation, Athens, 724-736.

crime(s) against the polis, its constitution and its citizens by the extirpation of the traitor[96] and the complete elimination of his patrimony and footprint from the workings of the polis, including the purification of the city of his buried bones.[97] And yet, the peripheral context and funerary features of the ancient burial ground of Thasos surrounding his grave, the intra-grave stratigraphic conditions in relevance to the anatomic associations of his skeletal remains and the burial offering of an iron strigil had not been disturbed, as documented archaeologically,[98] other than the effects caused by taphonomic bioturbation.[99] Hence, the victim would not have been condemned and banished from the city or convicted as a traitor to the polis of Thasos,[100] arrested in the city and executed to death by a judicial decision through a dikastic or an ephetic court, nor killed subsequent to outlawry and under conditions of proscription by citizen(s)' action. Otherwise the formal interment of his body at the city's burial ground would not have been permitted under most probabilities. Although the circumstances of his forceful death may be lost in history, it would rather seem plausible to induct that the *demos* would not have had any *interna corporis* objections to his kindred burial in an easily visible cyst grave at the burial ground of the community.

Following what may have been entailed during Thrasybulus' punitive subduing of the Thasian revolt against Athens[101] in 407 BC, a considerable number of executions had taken place in Thasos as those documented by the treacherous conduct of Lysander, during his perfidious actions[102] to enforce an oligarchic regime change in Thasos, as with all Athenian allied cities, which had not been received with alacrity by the Thasians[103] (Figure 33) following his naval victory at Aegospotami in 405 BC over the Athenians.[104] It may be recognized that similar circumstances of reprisals could have taken

[96] Even by proscription, had he escaped an arrest by the authorities of the polis, see Youni, M. S. (2006), Νόμος πόλεως. Δικαιοσύνη και νομοθεσία στην αρχαία ελληνική πόλιν I. Οι αρχαϊκοί χρόνοι, Θεσσαλονίκη; *id.* (2001), 'The different categories of unpunished killing and the term *atimos* in ancient Greek law', *Symposion 1997*, Koln-Weimar-Wien, p. 117-137; Avery, C. A., 'The Three Hundred at Thasos, 411 B.C.', *Classical Philology*, 74:3, p. 234-242.

[97] In case he had already been interred in the burial ground of the city. On the matter of purification considering even the case of the insolent conduct of the Athenian Thirty, having denied the burial to those 'unjust' men they had brazenly put to death (Lysias 12.5) under the subterfuge of cleansing the polis of wrongdoers (Lysias 12.21), see Lysias, *Prosecution Speech Against Eratosthenes, Former Member of the Thirty: Delivered by Lysias Himself*, (2000), in (Ed.) M. Gagarin, (transl.) S. C. Todd, *The Oratory of Classical Greece*, University of Texas Press, Austin, 12.5, p. 117, and 12.21, p. 120; *Against Eratosthenes, Who Had Been One of The Thirty: Spoken by Lysias Himself*, (2006), (Ed.) J. Henderson, Loeb Classical Library, Cambridge, MA., XII. 1-100, p. 226-277.

[98] Archaeological data are courtesy of the site excavator and collaborator Dr. Eustratios Papadopoulos, currently Ephor of Antiquities, Director of Ephorate of Antiquities in Drama Prefecture.

[99] Mainly due to the consequences of seasonal ground water level fluctuations. For a discussion on taphonomic conditions, recovery, and post excavation handling of archaeological bone materials cf. Pokines, T. J, and Baker, E. J., (2014), 'Effects of Burial Environment on Osseous Remains' in (Eds.) J. T. Pokines, and S. A. Symes, *Manual of Forensic Taphonomy*, Taylor and Francis, New York, p. 73-114; Haglund, W. D., and Sorg, M. H., (1997), 'Introduction to forensic taphonomy', in (Eds.) W. D. Haglund, and H.M. Sorg, *Forensic Taphonomy: The Postmortem Fate of Human Remains*, CRC Press, Boca Raton, p. 1-9; Agelarakis, A. P., (1996), 'A Field and Laboratory Manual for Archaeologists, for the Excavation, Documentation, and Preservation of Human Osseous Remains', *Ariadne*, 8, p. 189-247; Henderson, J., (1987), 'Factors Determining the State of Preservation of Human Remains', in (Eds.) A. Boddington, N.A. Garland, and C.R. Janaway, *Death, Decay, and Reconstruction: Approaches to Archaeology and Forensic Science*, Manchester University Press, Manchester, p. 43-53; Brothwell, D.R., (1981), *Digging up Bones: The excavation treatment and study of human skeletal remains*, Ithaca: Cornell University Press.

[100] For example for treason, as a collaborator in a conspiracy, or in an uprising against the polis.

[101] Xenophon, *Hellenica*, I. iv. 9, (2003), (Ed.) J. Henderson, Loeb Classical Library, Harvard University Press, MA., p. 34; cf. Thucydides, I. C-CI, p. 166-170, for an earlier Thasian revolt against Athens (465 BC) and their humiliating defeat after a three year siege by the Athenians.

[102] Polyaenus, *Strategemata*, Polyaeni Strategematon (ΠΟΛΥΑΙΝΟΥ ΣΤΡΑΤΗΓΗΜΑΤΑ) Libri Octo, Syllogo Graeco Philologico Constantinopolitano, (1887), Reviewed by E. Woelfflin, and I. Melber, Lipsiae, Book 1, 45.4, p. 52-53 (in Greek, excerpt from https://archive.org/stream/polyaenistratege00polyuoft#page/52/mode/2up); *Cornelius Nepos: Lives of Eminent Commanders*, (1886), translated by the Rev. John Selby Watson , MA., pp. 305-450, (VI. 2, excerpt from http://www.tertullian.org/fathers/nepos.htm#Lysander).

[103] Plutarch, *Lives, Lysander*, (2000), (Ed.) J. Henderson, Loeb Classical Library, Harvard University Press, MA., XIX. 2-4, p. 282-284.

[104] Xenophon, *Hellenica*, (2003), (Ed.) J. Henderson, Loeb Classical Library, Harvard University Press, MA., II. i. 27-31, p. 98-100;

Figure 33. Mute stones of ancient Thasos, witnesses to Lysander's atrocities.

place in the following years and not only by the political turmoil brought about the action of the Spartan kings, who decided to depose the regimes Lysander had violently installed in all cities, thus restoring power to their respective *demoi;*[105] glimpses of those recurrent horrific disturbances are easily reflected through the case of Athens in 404, as recorded in Xenophon's Hellenica.[106] And yet, the question is begged if tangential conditions could not have transpired during the capitulation of Thasos from an Athenian control to Philip II of Macedon in ca. 338 BC, and subsequently following the death of Alexander III of Macedon and the political instability that ensued as well as the strife between the *diadochoi* generals,[107] particularly as the attempts for a relative chronological dating of the cyst grave allude to the Hellenistic period.[108]

Epilogue

Given that the reasons and circumstances that had transpired and which resulted to the violent death of the Thasian male individual may never be unveiled from Cleo's parchments, withheld by the Keres of death, and while the assessments made above based on the evidentiary data retrieved from the skeletal record, may still not provide for answers to the many questions that remain in retrospect of more than two millennia, certain tesserae it is suggested have been identified and hopefully placed in their rightful

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Plutarch, *Lives, Lysander*, (2000), (Ed.) J. Henderson, Loeb Classical Library, Harvard University Press, MA., XI, XIII. 3-4, p. 256-260, and 266.

105 Plutarch, *Lives, Lysander*, (2000), (Ed.) J. Henderson, Loeb Classical Library, Harvard University Press, MA., XXI. 1-2, p. 290.

106 Xenophon, *Hellenica*, 2003, (Ed.) J. Henderson, Loeb Classical Library, Harvard University Press, MA., II. iv. 20-22, p. 154-156.

107 For the political and military events by one of the *diadochoi* generals in the region of Thasos island cf. Lund, S. H., (2014), *Lysimachus: A Study in Early Hellenistic Kingship*, Routledge, New York.

108 Dated by the excavator and his collaborators, footnote 98, *supra*.

position within the framework of the larger mosaic of inquiry under study. As such it is derived through deductive processes that the Thasian was indeed of a very robustly built skeleto-muscular body,[109] of a well-conditioned physique persisting to the incidence of death, and reflective of his most active participation in physically demanding activities and actions. Those would have included both matters of occupational and habitual[110] nature, not unlike what would be expected of corporeal kinetics laden with considerable physiological load bearing stress such as may be relevant to gymnasium exercises,[111] the military arts,[112] exposure and specialization within the range of naval undertakings;[113] resultant to focal emphasized skeleto-anatomic changes and in due time to both axial and appendicular degenerative manifestations. It was further determined that he had contended with an abrupt lowering in the quality of intake preparation for a shorter period before his death, while he experienced a punitive death, executed within his 6th decade of life, whilst he had been physically restricted in order to receive the deliverance by an expert hand of a contact thrusting, jabbed with force of *extreme level* by a sharp and deeply penetrating heptahedrical in shape sharp tip of a *styrax* which having pierced from the *corpus sterni* to the endocardium caused death within the interval of one minute due to heart exsanguination.

Buried as a single interment in a conspicuous cyst grave among clusters of family graves within the ancient necropolis of Thasos, and without any archaeologically or bioarchaeologically detected restrictions imposed on funerary rights, provides valuable clues for assessing that the Thasian would not have been condemned by a dikastic court as a traitor to the people, or as a willing conspirator against the interests of the city of Thasos for having received the capital punishment. Hence, his execution would not have been the result of his arrest by city authorities, or the result of persecution following outlawry and his proscription.

Therefore, it may be postulated that his untimely and violent death could have been the result of political - military turmoil or reprisals, possibly during forceful regime changes and/or capitulation events of Thasian sovereignty to the known external forces that had sequentially dominated the region during the Hellenistic era.[114] Should that have been the case it would be reasonable to propose that on matters relevant to internal dynamics of the Thasian context during the period, characteristics and attributes of his persona and standing would not have represented those that would have been designated to an insignificant status position, involvement, and role function, but rather that he would have been recognized as a worthy opponent.

While a number of our questions may remain unanswered in the foreseeable future, we are nevertheless thankful that the embrace of the Thasian earth safely preserved his skeletal remains and traces of the funerary customs and practices, allowing to unmute important testimonials of his life record and most dramatic *perimortem* experiences; integral reflections of the human condition in Thasos' ancient history.

[109] Having surpassed three life threatening, cumulative, instances of early life arrested biological growth.
[110] As with a low seated/resting body posturing with thigh-hip joint hyperflexion, combined with tightly flexed knee joints and tightly dorsiflexed talo-crural joints.
[111] Of a long duration which could have started from his SubAdult years.
[112] Inclusive of possibilities ranging from hoplitic responsibilities, but without excluding a combination of abilities for archery and/or the launching of the javelin.
[113] Such as a sustainable ability for intensive rowing.
[114] Conditions which could ostensibly have re-emerged following the Cynoscephalae battle of 197 BC, cf. Polybius, *The Histories* V, (2006), (Ed.) J. Henderson, (Transl.) W. R. Paton, Harvard University Press, Cambridge, MA., XVIII: 18-28, p. 120-144; Plutarch, *Lives* X, *Titus Flaminius*, (2000) (Ed.) J. Henderson, (Transl.) B. Perrin, Loeb Classical Library, Harvard University Press, Cambridge, MA.,VII-IX 5, p.338-346.

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