

Eastern Roman Mounted Archers and Extraordinary Medico-Surgical Interventions at Paliokastro in Thasos Island during the ProtoByzantine Period

The Historical and Medical History Records
and the Archaeo-Anthropological Evidence

Anagnostis P. Agelarakis



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Eastern Roman Mounted Archers and Extraordinary Medico-Surgical Interventions at Paliokastro in Thasos Island during the ProtoByzantine Period: The Historical and Medical History Records and the Archaeo-Anthropological Evidence

Introduction

Sailing through the waters of her western passage, your gaze is lost in the beauty so generously bestowed upon Thasos Island (Figures 1, and 2). Girded by Poseidon's deep blue sea its littoral emerald-like garlands and gilded beaches graciously yield to Athena's greyish-green ornaments, swaying delicately to the touch of the mistral, dressing up the uplands towards the imposing foothills of Mount Ipsarion. At the very first instance you lay eyes upon her, she entices you to discover her...perhaps just as she



Figure 1. Thasos island in a regional map of the Eastern Roman Empire, rendering by Argie Agelarakis.



Figure 2. Map of Thasos island, with the location of its capital city Limenas, its villages and settlements, and the location of Paliokastro (see arrow) in the region of Rachoni village, rendering by Argie Agelarakis.

did back then, with Parian Tellis and Kleobeia.¹ Moreover, in the midst of the wealth of this enchanting beauty, you may at first unwittingly overlook the spread of vestiges of diachronic human dynamics

¹ Agelarakis, A. P., (2017), *Parian Polyandria: The Late Geometric Funerary Legacy of Cremated Soldiers' Bones on Socio-Political Affairs and Military Organizational Preparedness in Ancient Greece*, Archaeopress, Oxford; Agelarakis, A. P., and Zafeiropoulou, E., (2017), 'Parian Polyandria and the Military Legacy of Archilochus' Forebears', in (Ed.) D. Mulliez, *Métropole et colonies, Proceedings of International Symposium-Memorial Marina Sgourou*, Recherches Franco-Hellénique, École



Figure 3. Seaward view of Rachoni region and location of Paliokastro site.

nestled between steep rocky hills and the mantles of her green valleys. But when kneeling respectfully to search and attentively study the plethora of cultural elements and achievements of the rich history of the Thasians, guarded with lavish care over the passage of time by the earth of Thasos, the island's rare beauty becomes enriched with unprecedented as often complex bearings unveiled from the folds of Cleo's parchments.

The archaeological site, finds, relative dating, project overview

On one of the island's exquisite mountain slopes (Figure 3), densely crowned with oak, spruce and chestnut trees, trellised by labyrinthine age old ivies and impenetrably thick bushes, concealed high up above the olive groves of Rachoni village, the steep and remote site known as Paliokastro (translated as 'old fort'), at a 460 meter elevation, strategically commands with an eagle-eyed view the plain below, overseeing straight over the expanse of the Aegean sea across, towards Paggaion mountain imposing on the mainland (Figure 4) of Eastern Macedonia. There, at Paliokastro, an archaeological rescue excavation carried out in 2000, under the supervision of archaeologist Dr. Efstratios (Stratis) Papadopoulos, brought to light an orderly cluster of four adjacent and uniformly structured graves, clustered at the western end in the floor of a notable quadrangular building² with exterior dimensions of 10.0 m (E-W) by 5.0 m (N-S), wall thickness of 0.70 m, and a surviving maximum wall height at the time of excavation³ of 1.10

Française d' Athènes, Paris, pp. 47–6; Zafeiropoulou, F. and Agelarakis, A. P., (2005), 'Warriors of Paros', *Archaeology*, 58.1, pp. 30–35.

² The shared long walls between the box-shaped/quadrangular graves, positioned on an E-W orientation as that of the building itself, measured a thickness from 30.0 to 32.0 cm; the internal dimensions of the graves measured 2.07 m. in length by 0.72 m in width, and ca. 1.0 m in depth. While only one of the graves, grave No. 1, had been coated internally by a layer of plaster, each of the four graves was covered by four gneiss slab stones, of the same type, craftsmanship, and relevant thickness dimensions (mostly of 0.12 m) as those of the rest of the building floor.

³ Excavation recordings are courtesy of Dr. S. Papadopoulos, currently Ephor of Prehistoric and Classical Antiquities of Drama prefecture. Additional excavation data were gathered through numerous communications with Dr. Papadopoulos over the years since 2002 (start of the osteological analysis of site materials at the Archaeological Museum of Thasos) until the drafting of the present work.



Figure 4. Field of view just above the olive groves of Rachoni village, at a lower elevation than the site of Paliokastro.

m (Figures 5, and 6). While the function of the building was identified as that of a *naiskos*,⁴ evidently it included a funerary activity area, its construction, and particularly that of the graves had been carried out with great architectural care and skillful masonry techniques, using native Thasian gneiss⁵ as the prime building material set with mortar⁶ (Figure 7). Yet, the small archaeological site, with the exception of the grave features and anthropological materials involved did not yield a rich record of associated artifacts, but of a small assemblage of ceramic fragments from the graves, an oxidized lump of iron from grave No. 2, and a few decorative architectural finds, not *spolia*. These were nevertheless instrumental in establishing a relative dating of the site to the ProtoByzantine period⁷ which ranged chronologically between the 4th and 7th centuries AD⁸ (Figure 8), while the stylistic typology of the Latinizing reliefs on

⁴ Dr. S. Papadopoulos has identified the nature and original function of the building as of a ProtoByzantine *naiskos* (translated as 'a small church').

⁵ Ageloudi-Zarkada, S., (1999), 'The quarrying and use of slate and gneiss in Thasos' (in Greek), *Actes du Colloque International Matières premières et Technologie de la Préhistoire à nos jours*, Limenaria, Thasos, French Archaeological Institute in Greece, Athens, pp. 91-99.

⁶ Papadopoulos, S., (2000), Rahoni, Agrotimahio Th. Pashali, *Arhaiologiko Deltio*, 55, p. 861-862.

⁷ The term 'ProtoByzantine' has replaced in archaeological terminology the term 'PalaioChristian'.

⁸ The following serves as a relevant sample of Thasos specific bibliographic references for the ProtoByzantine period, with emphasis on the record of archaeologically recovered artifactual materials (mostly on ceramics), and architectural structures: Blondé, F., Δαδάκη, Σ., Kozeli, T., Μπόνιας, Ζ., Muller, A., Mulliez, Πετρίδης, Π., and Σανίδας, Γ., (2015), 'The ProtoByzantine House DOM5 in Thasos' (in Greek), *Archaeologiko Ergo stin Makedonia kai Thraki* 24, p. 549-556; Blondé, F., Dadaki, S., Fournier, J., Kozelj, T., Muller, A., Petridis, P., Sanidas, S., Sgourou, M. (f), and Wurch-Kozelj, M., (2014), 'Mutations et permanence architecturales au cœur de Thasos (VIIIe s. av. J.-C. – VIIe s. ap. J.-C.)', *Comptes Rendus de l'Académie des Inscriptions et Belles-Lettres*, 2012.4, p. 1811-1845; Blondé, F., Dadaki, S., A. Muller, P. Pétridis, and G. Sanidas, (2014), 'Thasos. Les abords Nord de l'Artémision (THANAR), 'Campagnes 2012-2013', *Bulletin de Correspondance Hellénique* 138, p.613-661; Blondé, F., Gros, S. J., and Pétridis, P., (2011), 'La céramique au quotidien à Thasos de l'époque archaïque à l'époque protobyzantine', *Revue des Etudes Grecques*, 124, p. 193-204; Blondé, F., Muller, A., and Mulliez, D., (2010), 'Terra Sigillata et Céramiques communes de la fin de l'antiquité tardive à Thasos, le cas de DOM 5', in (Eds.) D. Papanikola-Bakirtzi and Nt. Kousoulakou, *Ceramics of Late Antiquity from Greece* (3rd to 7th centuries AD (in Greek), Thessaloniki, p. 402-420; Blondé, F., Muller, A., and Mulliez, D., (2003), 'Thasos. La céramique d'usage quotidien dans une demeure paléochrétienne, in (Ed.) Ch. Bakirtzis, *Proceedings of the 7th International Conference of Medieval Ceramics in the Mediterranean*, Athens, p. 773-776; Sodini, P. J., (1995), 'La ville de Thasos à l'époque protobyzantine: les lacunes de la topographie', *International Symposium on Byzantine Macedonia, 324-1430 AD*, Macedonian Library, Thessaloniki 82, p. 279-294; Abadie-Reynal, C., and Sodini, P. J., (1922), *La céramique paléochrétienne de Thasos*, Études



Figure 5. Uncovering the slab stones from the graves within the *naiskos*' floor.



Figure 6. The four graves within the *naiskos*' floor.

Thasiennes 13, Athens-Paris; Bakirtzis, Ch., (1989), 'What happened to Thasos at the start of the 7th century' (in Greek), in Φύλια Ἑπη Εἰς Γ.Ε. Μυλωνάν, Ἰ, Athens, p. 339-341; Grandjean, Y., Des Courtils, J., Maffre, J-J., Salviat, F., Jacquemin, A., Muller, A., Mulliez, D., Garlan, Y., Kozelj, T., Sodini, P. J., and Holtzmann, B., (1981), 'Thasos', *Bulletin de correspondance Hellenique*, 105, p. 924-963.



Figure 7. North, long, wall of grave No. 2.



Figure 8. *Pessokranon*, decorative architectural component of *naiskos*.

two pillar-architraves⁹ were dated to the 5th/6th centuries AD.¹⁰ Even though the latter chronological assessment was offering a narrower temporal framework within the range of the ProtoByzantine period, relevant to activities and endeavors that would have transpired at the site, inclusive of the ostensible incorporation of said architraves in the architectural structure of the *naiskos*, it could rather function, it is suggested, as a *terminus post quem* in reference to the construction of the four graves at the floor of the building and the subsequent undertakings of funerary processes; coeval, or of a post-dating phase in time within the ProtoByzantine period for an unknown length of time in years, nevertheless before the end of the 7th century.

Although hypotheses could remain hypotheses with explanations or answers lost in history, there had been a number of questions bequeathed for the archaeo-anthropologist regarding not only matters of the nature and function of the site, but also of the reasons for abandonment (if indeed it was the case) of the ecclesiastical purpose of the *naiskos* and its conversion to funerary functions through the span of a rather brief time interval, considering the officially established role and importance of Christianity within the Eastern Roman Empire during the period, yet also of the plausibility that the effects of the historically turbulent conditions that occurred in the region during the ProtoByzantine period¹¹ could have been consequential to the regional domain of the site. As such, the vested interest in aiming to retrieve explanatory scenarios from the archaeo-historical records of the site were to be reliant upon the study of the human skeletal remains.

Indeed, the careful recovery, preservation, and study of the anthropological materials, it was projected, as in earlier studies of archaeological human skeletal collections in Thasos,¹² that it could enable the retrieval of meaningful data which would hopefully reflect at least upon a number of aspects of the living circumstances and thus of the human condition that would have been experienced at the level of the individual at Paliokastro during the period; conditions which in praxis would have rather been

⁹ The term 'pillar' (πεσσός in Greek) would describe in the French bibliography (The French School of Archaeology at Athens, established in 1846, initiated excavations in Thasos in early 1911, cf. www.efa.gr) the architectural element as of a square or rectangular cross-section, and if adorned with a decorated architrave (πεσόοκρανο in Greek) it would have been described as a *parastade*, had it been a structural component of a window. However, in the English terminology the latter would be described as an 'Attic pier', according to *columna Attica*, cf. Tsatsaroni L., (2018), *Pessoí stin Elliniki Arhitectoniki kai ta Nea Eurimata stin Athina*, National Kapodistrian University of Athens, School of Philosophy, Department of History and Archaeology, Athens, p. 5-9.

¹⁰ See footnotes 3, 4 and 6, *supra*.

¹¹ Selected sources on the Eastern Roman Empire with a focus on the Late Eastern Roman/ProtoByzantine period: Procopius, *History of the Wars*, (2001), (Ed.) J. Henderson, (Transl.) H.B. Dewing, Loeb Classical Library, Harvard University Press, Cambridge, Massachusetts; Agathias, *The Histories*, (1975), *Corpus Fontium Historiae Byzantinae, Volumen II A, Series Berolinensis*, (Eds.) H. G. Beck, A. Kambylis, and R. Keydel, (Transl.) J. D. Frendo, Walter de Gruyter and Co., Berlin; Menander Protector, *The History of Menander the Guardsman*, (1985), (Introductory Essay, Text, Translation, and Historiographical Notes) R. C. Blockley, Francis Cairns, Redwood Burn, Trowbridge, Wiltshire; *Maurice's Strategikon*, Handbook of Byzantine Military Strategy, (1984), (Transl.) G. T. Dennis, University of Pennsylvania Press, Philadelphia; Theophylact Simocatta, *The History of Theophylact Simocatta*, (1986), (Transl. with introduction) M., and M. Whitby, Oxford University Press, UK; The Miracles of Saint Demetrius Books I & II, (1971-1981), (Ed., with commentary) P. Lemerle, *Les plus anciens recueils des miracles de saint Démétrius et la pénétration des Slaves dans les Balkans*, Éditions du Centre National de la Recherche Scientifique, Paris, (Book I written by Archbishop John of Thessaloniki, Book II by an unknown author).

¹² 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', *BAR International Series* 1031, Oxford, Archaeopress, pp. 12-19; (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 premières et Technologie de la Préhistoire à nos jours*, Limenaria, Thasos, French Archaeological Institute in Greece, Athens, pp. 447-468; (1977), 'Physical Anthropology and Palaeopathology at the Classical Necropolis of Thasos', in Koukouli-Chrysanthaki, Ch., Sgourou, M., and Agelarakis, P. A., 'Investigations of Archaeo-Anthropological Nature at the Classical Necropolis of the Island of Thasos between 1979-1996', *Archaiologiko Ergo sti Makedonia kai Thraki*, 10 (B), pp. 770-794; (1994), 'The Thasos-Kastri Archaeo-Anthropology Project', *Research & Exploration*, National Geographic Society, 10, p.4.

improbable for the ancient historiographers to record and interweave in their works, as similarly documented with comparable case studies in Thasos.¹³

It was thus anticipated that the implementation of an interdisciplinary study-approach that were to combine bioarchaeological and forensic osteological methodologies could portray, in addition to matters of the demographic and palaeopathological profile of the population sample involved, lineaments unyieldingly engraved as discrete traces in the skeletal record that were to hopefully reflect on inquiries about the organizational abilities, the techno-economic and possibly even of facets on the capacities of the cultural context as these correlated to the life experiences of the ProtoByzantines interred at Paliokastro; established as an isolate, at a remote and hard-to-reach upland locality. It was clearly apparent considering the geomorphology of Rachoni region in Thasos island that the position for building any type of settlement, founded on such a naturally fortified topolocation, surrounded by an abundance of available natural resources and water springs, far away and somewhat concealed by the thick canopy of the forest from the shorelines of the region, with an unobstructed 165° wide field of view of the entire valley and peripheral mountain slopes, a range of 70° wide scope of the navigable sea routes and a clear line of sight to the visible horizon of Paggaion mountaintop in Macedonia (Figure 4) was ostensibly revealing attributes of an imposing mission in the territory yet with strategic goals of defensive nature. Although still seasonally detectable from observant eyes while cruising or having moored near the shores in the region¹⁴ its location alone would seriously impede, if not deter, any easy accessibility for raiding endeavors, not only from the navigable sea routes, yet also from the peri-coastal plain and even from the actually or potentially cultivable narrow meadows below. On that account it was of significant interest to conceivably recover through the osteological analysis independent lines of evidence regarding any components relevant to the nature and function of the site, juxtaposed to available historical references¹⁵ in order to better elucidate facets of the human condition experienced at Paliokastro, at the hitherto archaeologically mute Rachoni in Thasos.

The anthropological record and aspects of burial practices

Physical anthropological and forensic osteological analyses of the anthropological materials, conducted at the laboratories of the Archaeological Museum of Thasos at Limenas (Figure 9), established the presence of a sample population of ten individuals. It comprised nine adults of male and female biological sex, ranging between the thirty-fifth and sixtieth years of life, and of one SubAdult female individual age assessed between the fourteenth and seventeenth years of age. One of the four graves, grave No. 1, contained four interments (involving three male individuals between thirty-five and fifty five years of age and the adolescent female), while the remaining three contained two interments respectively, ranging between thirty-five and sixty years of age at the occurrence of death (Table 1).

Based on evaluations of the photographic documentation taken during the excavation process, the excavation log records, and personal communications with the excavator, it was possible to verify that the individuals interred in graves No. 1 and 3, had been laid in the graves in supine and extended positions (Figure 10), oriented in western-eastern orientations and facing east with the forearms

¹³ Agelarakis, A. P., (2019), *Executed by Styx in Ancient Thasos*, Archaeopress Archaeology, Oxford; (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', *British Annals of Archaeology*, 96, pp. 355–364; Agelarakis, A. P., Serpanos, Y. C., Papadopoloulos, E., Tsoutsoubi, S., and Sgourou, M. (†), (2014), 'Markers of Occupational Stress in Maritime Activities of Ancient Thasos Island: An Exercise in Ethno-Archaeology', in (Ed.) A.-C. Gillis, *Corps, travail et statut social. L'apport de la paléanthropologie funéraire aux sciences historiques*, *Collection Archaiologia*, Presses Universitaires du Septentrion, Lille, pp. 153–174; Agelarakis, A. P., and Serpanos, Y. C., (2010), 'Auditory Exostoses, Infracranial Skeleto-Muscular Changes and Maritime Activities in Classical Period Thasos Island', *Mediterranean Archaeology and Archaeometry*, 10:2, pp. 45–57.

¹⁴ From any activities that were to have generated smoke by the use of fire, particularly as a heating source during the cold months of the year.

¹⁵ See footnote 11, *supra*.



Figure 9. Thasos archaeological Museum laboratory; Adelphi student assistants during the skeletal analysis.

Table 1. Basic archaeological proveniences and demographic profile of Paliokastro population sample.

Proveniences and Basic Demographics of Paliokastro Population Sample				
Grave No.	Lab-Homo No.	Biological Sex	Age in Years	Age Subgroup
Τάφος 1	125	Male	~49 - 55 years	<i>Maturus</i>
Τάφος 1	125 A	Male	42-50 years	Late Adult-Maturus
Τάφος 1	125 B	Male	35-40 years	Late Adult-Maturus
Τάφος 1	125 C	Female	14-17 years	SubAdult
Τάφος 3	127	Male	35-40 years	Late Adult
Τάφος 3	127 A	Male	35-40 years	Late Adult
Τάφος 2	129	Female	45+ - 50 years	<i>Maturus</i>
Τάφος 2	129 A	Male	45+ - 60 years	<i>Maturus-Senilis (Older)</i>
Τάφος 4	131	Female	35+ years	Late Adult
Τάφος 4	131 A	Female	~45 years	Late Adult-Maturus

crossing over the thoracico-abdominal region, a pattern indicative of burial customs and practices conforming to the Christian faith.¹⁶ Further, contextual data on the intra-grave stratigraphic positioning

¹⁶ While it seemed as most probable that the same pattern of burial custom would have been applied for the individuals buried in graves No. 2 and 4, effects of taphonomic bioturbation had afforded changes in their skeleto-anatomic articulations whereby obstructing the drawing of substantiated conclusions on the precise anatomical positioning of the interments in those graves, except of the west-eastern orientation of the skeletal bodies.



Figure 10. Anthropological remains *in situ*.

of the two Late Adult male individuals interred in grave No. 3, based on *in situ* spatial relatedness of their cranio-infracranial anatomic associations with emphasis on their axial skeletal structures, it is assessed were indicative of their conterminous interment; with cranial structures positioned in close latero-lateral proximity to each other, with contiguous thoracic regions and partial overlap from the pelvic girdles and distally to their lower extremities. Whereas the slightly superimposing individual would be considered in the domain of archaeological forensics the main interment of said grave, the underlying individual¹⁷ must have had retained if not all then at least a considerable number of corporeal soft and connective tissues and/or with the unspoiled preservation of a congealed shroud, and had not been moved from its original interment position, as for example has otherwise been the experience of the author in cemeteries of coeval and later Byzantine periods in Thasos¹⁸ and in the proximal mainland opposite to Thasos, at the site of Polystylon,¹⁹ where earlier interments that had been buried in family graves and had evidently skeletonized had been anatomically disassociated and carefully repositioned to the sides of the graves²⁰ when a new interment had to take place.

¹⁷ In the case that the two individuals had not been interred at a conterminous juncture.

¹⁸ Agelarakis, A. P., (2000), 'Anthropological Report on the Roman-PaleoChristian Human Skeletal Remains Excavated from the Ancient Theater Site of Thasos', Archival Archaeological Reports, Prehistoric and Classical Museum of Thasos, IH' Ephoreia of the Greek Archaeological Service, Kavala.

¹⁹ Agelarakis, A. P., and Agelarakis, A. (2015), 'Abdera/ Polystylon: A Byzantine Town in Western Thrace in the Context of Historical Developments during the 6th – 14th Centuries as Depicted by its Archaeo-Anthropological Record', *Byzantina Symmeikta*, V25, p. 11-56; Agelarakis, A. P., (1997), 'Excavations at Polystylon (Abdera) Greece: Aspects of Mortuary Practices and Skeletal Biology', *Archaïologiko Deltio*, V: 47, p. 293-308; Agelarakis, A. P., and Bakitzis, Ch., (1998) 'Cemeteries of Polystylon, Abdera: On Burial Customs and Practices', *Rhodopica*, Smolyan, p. 57-68.

²⁰ Cranial remains were always placed at the short western side of the grave, adjacent to the head of the latest interment, while infracranial axial and appendicular remains were carefully placed toward one of the long sides of the grave, some of which based on spatial intra-grave limitations could have been placed at its eastern short side.

Taphonomy and Skeletal Preservation

During the inspectional component of the osteological examination it was verified that the condition of skeletal preservation of the ten individuals was not uniform due to taphonomic effects,²¹ thus affecting the ability to carry out anatomical diagnostic evaluations, especially in reference to macroscopic examinations on patterns of dento-skeletal epigenetic discrete traits, which could provide morpho-anatomical evidentiary data for the investigation on intra-population biodistance relationships. Nonetheless, the osteological-forensic research provided the ability for the retrieval of both relevant and tangential data.

Analysis of Anthropological Material

Dental Anthropology

Dental anthropological analyses revealed no significant differences among the individuals involved in the population sample in regards to the scope of the dietary baseline and the good quality of meal preparation, apart from the palaeopathological consequences (Figure 11) of degenerative processes conducive to the aging process. These were mostly evident ranging from moderate to extensive wear of dental surfaces, some of which had advanced to the level of the pulp chambers, subsequent to the lytic effects of cariogenic lesions which had initiated particularly afflicting cervical interdental and buccal cemento-enamel junction regions, periodontal disease with alveolar bone resorption with associated anatomic root surfaces' slight hypercementosis and a minor degree of tooth mobility, as well as *ante mortem* tooth loss, predominantly of buccal teeth with consequent mesio-distal migration effects of adjacent teeth. Non-masticatory discrete, mechanical-in nature, wear imprints on buccal crown surfaces, across counterpart bucco-lingual and bucco-palatal diameters, as well as notched incisal surfaces of labial teeth were also observed, indicative of distinct hallmarks of the use of teeth in

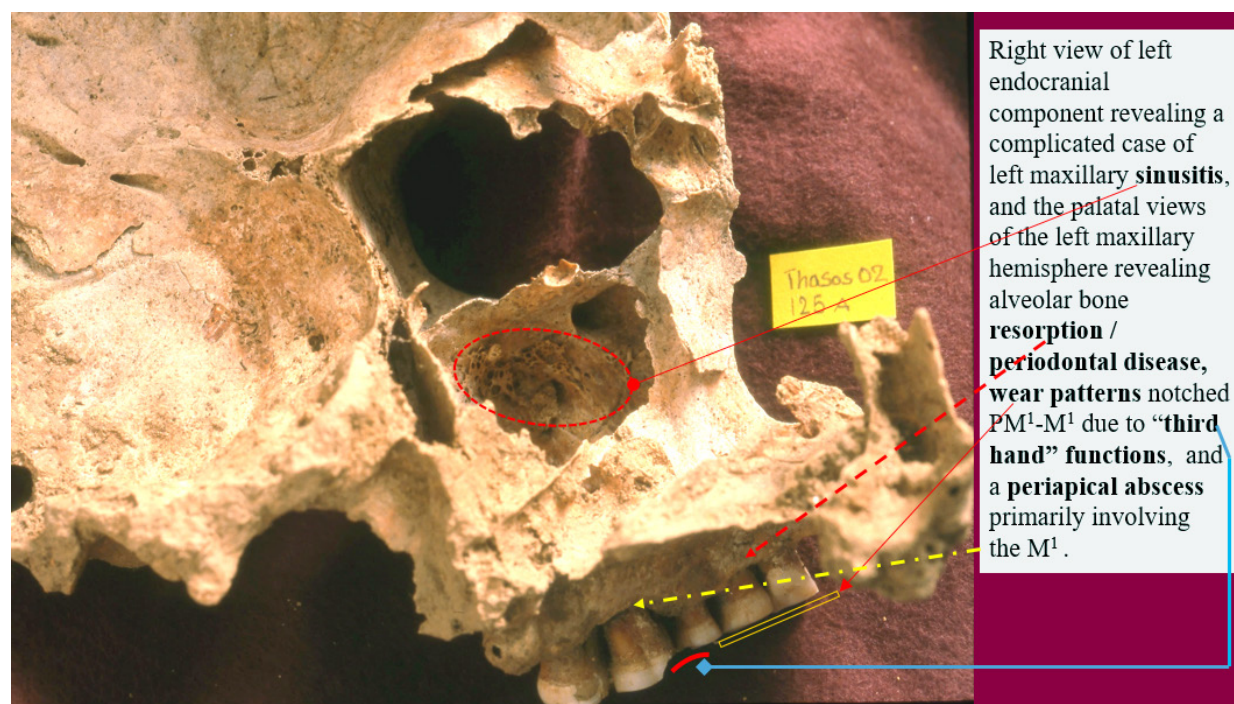


Figure 11. Sample case on dental anthropology.

²¹ Caused by bioturbation mainly afforded by root activities and soil fauna.

specialized ‘third hand’ functions; with greater prevalence and severity of wear effect among the male compared to female individuals.

Reconstructions of ante mortem kinetics indicative of habitual/occupational tasks

Subsequent examinations of skeleto-anatomic features of the ten individuals revealed that, indiscriminately of intra-population age subgroups, with the exception of the SubAdult female, were involved without exception, yet with variability according to the biological sex subcategorization, in physically demanding corporeal activities for a long duration during their life span. Further, while there was observable variability relevant to what may be considered matters of labor diversity, it was also apparent that, at least as it were provided by the evidentiary lines retrieved from the skeleto-muscular systems, there must not have been in effect an intra-group cultural regulatory mechanism implemented for the buffering or sheltering of a specific post- SubAdult individual from participating and/or contributing to tasks accomplished through demanding physical activities; requisite expectations that had been allocated according to a division by biological sex subgroups.

In-depth analysis of the skeleto-muscular features documented, specifically of the lower extremities of all ten individuals, revealed skeleto-anatomical changes, manifestations of acquired characteristics, which had resulted from required modes of bipedality over substrates of precipitous environments rather than of locomotory behavior on flat surfaces. It might, therefore, be stated that the population members, regardless of biological sex or age subgroup, were not ephemeral visitors in settings such as the steep geomorphological milieu of the site. Consequently, this would not lend support to the hypothesis arguing that these ten individuals might have lived somewhere else, e.g., at the low elevation meadows below and coastal plain of Rachoni and that at the occurrence of death they had been moved and buried at upland Paliokastro for a variety of cultural reasons or norms.

While the adult female individuals showed through forensically assessed kinetic activities of their upper extremities a predilection in the frequent extension/abduction of the elbow joints and forearms in pronation-supination with wrist joints and hands in *dexto-sino* rotatory actions,²² the male individuals exhibited robustly built skeletal physiques, yet with exceptional emphasis on the skeletomuscular anatomy of their upper extremity bones. Idiosyncratic as it initially appeared to be, it was nevertheless unique to document a distinctly perspicuous analogy, with comparatively similar correlations, of skeleto-anatomical and skeleto-muscular acquired changes on their upper extremities, indicative of their *in vivo* implication in long-term repetitive specialized and, physically demanding kinetic pursuits.

There were changes of significantly increased robustness in the regions of skeleto-muscular origin and insertion *loci*, traced from the occipital dorso-inferior squamous regions of their cranial skeletons, the dorsal upper third of the necks, and dorso-inferiorly through the rest of the cervico-thoracic spine, the shoulder bones with emphasis on the *scapulae*, the *humeri*, the forearm bones, the carpals, and the bones of the hands. Reconstructive assessments based on those skeletomuscular manifestations,²³ aiming to

²² Indicative of a plethora of manual tasks, inclusive of the weaving of textiles.

²³ Specific muscles traced: a) superficial of head/neck support-extension-rotatory-flexion Ms. *semispinalis capitis*, *splenius capitis*, *levator scapulae*, and *sternocleidomastoideus*; b) deeper of head/neck support-extension-rotatory-flexion Ms. *rectus capitis posterioris minor/major*, *obliquus capitis superioris/inferioris*, *interspinalis cervicis*, *spinalis cervicis*, *semispinalis cervicis*, *splenius cervicis*, *longissimus cervicis*, and *iliocostalis* (cervical); c) for the superior rotation, retraction, elevation-depression of the scapula Ms. *trapezius*, *serratus anterior*, and *pectoralis minor*; d) for the shoulder muscles in arm abduction, extension, adduction, rotation, flexion Ms. *pectoralis major*, *deltoideus*, *supraspinatus*, *infraspinatus*, *teres minor/major*, and *latissimus dorsi*; e) for the extension/flexion of elbow, and for forearm pronation/supination/rotation, abduction/extension/flexion Ms. *biceps brachii caput longum/breve*, *brachialis*, *triceps brachii caput longum / medialis/lateralis*, *brachioradialis*, *anconaeus*, and *pronator teres*, and for the abduction/extension of the shoulder joint M. *triceps brachii caput longum*; f) for the stabilization, support and abduction/adduction of the wrist, weak action on elbow joint, and abduction/adduction of hand Ms. *flexor carpi ulnaris/radialis*, *extensor carpi ulnaris/radialis longus*, and *pronator quadratus*; and g) for the hand in actions of abduction/adduction, extension/flexion, of meta/inter/carpo-

derive elucidating prisms on basic kinesiological actions performed *ante mortem* were apocalyptic of the male individuals' vigorously repeated engagement in forceful extensions and flexions of the upper extremities; inclusive of synergistic and antagonistic functions.²⁴ These actions had been combined and/or assisted by ipsilateral and contralateral flexions of the neck, the elevation-depression, retraction-protraction and rotatory movements of the shoulders, with a gamut of extension-adduction with internal-external rotatory tendencies of the upper extremities, with extension and flexion of the elbow, and combined with significantly powerful handgrips.

Such prevalent activities, in their specificity and long-term task oriented implementation *in vivo*, were to condition the components of the skeletomuscular system involved effecting responses which were to be permanently recorded as most emphasized bone robustness manifestations coupled by significant osseous traces of relevant muscular origin and insertion *loci*. The above aforementioned morphoanatomic evidentiary data were also reflecting on matters of stamina and enhanced anti-fatigue abilities which must have been required during the carrying out of considerably load-bearing and repetitive *ante mortem* physical actions performed, the nature and specificity of which were suggestive of long term training and association with the military arts, particularly it is assessed in the use of the bow, among all five male individuals who had retained upper extremities,²⁵ the wilding of the spear and/or sword. Additional lines of evidence derived from the palaeopathological record were lending support to the skeleto-muscular valuations on *ante mortem* long-term engagement of the male individuals in recurrent physically demanding activities of the upper extremities as indicated by osteopathic conditions and advanced osteoarthropathic changes of varied unilateral severity on involved joints, but also based on infracranial axial assessments on matters of considerable, corporeal, load-bearing stress as revealed by vertebral column changes sustained through axially oriented compression forces.

Palaeopathology of trauma cases and the footprint of an experienced physician-surgeon

Compression forces had caused intervertebral traumatism, herniations in the form of Schmorl's nodes, revealed particularly at the body surfaces of thoracic and lumbar vertebrae for example due to fall incidents from a height and/or falling in the course of horseback riding. Consequent to those traumatism were early onsets of spondyloarthropathic changes on affected vertebral articular facets, in addition to manifestations conducive to degenerative processes observed among the older male individuals.

It was noteworthy that the small population sample, inclusive of both male and female cohorts, with the exception of the SubAdult female (and given the limited preservation of her skeleton), had suffered additional injuries such as ruptured or pulled muscles, minor injuries beyond abrasions, thus having reached bone surfaces,²⁶ and mechanical trauma, while some cases of sustained trauma impact had resulted to serious fractures of upper and lower extremities.²⁷ Though potentially life threatening as they

phalangeal and phalangeal joints Ms. *palmaris longus*, *flexor digitorum superficialis*, *extensor digitorum*, *extensor digitorum*, *flexor pollicis longus*, *abductor pollicis brevis*, *opponens pollicis*, *interosseous dorsalis*, and the *interossei palmares* and *dorsalis*.

²⁴ Assessed on a holistic approach considering aspects of axial asymmetry and dexterity issues (all males it appears were right-handed), skeleto-muscular manifestations of bone responses at *loci* of muscular origin and insertion (e.g. as between the potential antagonists M. *biceps brachii* versus M. *triceps brachii*), combined with the type, specificity of *locus* and severity within e.g. synovial joints which had sustained acquired pathologies particularly of unilateral expressions of osteoarthropathic changes due to repetitive load bearing at the joints of the upper extremities (e.g. of the shoulder and elbow).

²⁵ In comparison, in the sample population of 21 individuals from the ProtoByzantine cemetery of Limenas in Thasos, only one male individual, of approximately 65 years of age (the only male among the cohort of eight post SubAdults) presented comparative skeleto-muscular changes in the upper extremities, see Agelarakis, A. P., (2000), 'Anthropological Report on the Roman-PaleoChristian Human Skeletal Remains Excavated from the Ancient Theater Site of Thasos', Archival Archaeological Reports, Prehistoric and Classical Museum of Thasos, IH' Ephoreia of the Greek Archaeological Service, Kavala.

²⁶ Of open and cut wounds below the dermis.

²⁷ On the contrary, in the sample population of 21 individuals from the ProtoByzantine cemetery of Limenas in Thasos, there was only one case of skeletal trauma, specifically in the thoracic region, of a healed rib fracture; afforded on the male

may have been, all fractures had nevertheless been treated medically with subsequent healing regimens, long before the incidence of death, yet without the avoidance in some cases of traced inflammatory and secondary, infectious complications. Representative of the nature and severity of sustained injuries were: a) the case of a Colles extra-articular displaced fracture,^{28,29} on the distal radial bone in the peri-articular region with the ulna, the scaphoid and lunate carpal bones, of a non-osteoporotic 42–50 years old male, indicative of a high impact traumatism which had been caused by a violent fall with an outstretched forearm and wrist and extended hand in pronation, a defensive reaction to buffer and protect from the impact the head and neck, b) the serious cases of bilateral tibial diaphyseal fractures documented among a female and a male individual, both within the range of 35–40 years of age, c) the right unilateral fracture of tibia and fibula of a ca. 45 year old female, and d) the unilateral fracture of the right fibula of a 35–40 year old male.

In the osteological evaluation of those trauma cases, the healed Colles fracture (Figure 12), long before the incidence of death, of the 42–50 years old male individual, displayed a smooth yet distinct angulation of dorsal displacement, characteristic as it were of the compressive consequences of the trauma impact, with a reduced comminuted effect, however lacking any traces of malunion or serious subsidence of displaced bone fragments involved. Characteristic was also the absence of active periosteal reaction,³⁰ infectious complications, or the development of a pseudarthrosis at the distal radio-ulnar articulation, but of a consequent partial dysfunction of said joint, as assessed palaeopathologically, which in combination with the subtle effects of the radial *facies articularis carpea* dorsal angulation in its articulation with the lunate and scaphoid carpal bones had resulted to considerable osteoarthropathic³¹ changes. It appears therefore that the post-recovery conditions did not obstruct the male individual from a rather continued involvement and use of the upper extremity in demanding, and ostensibly specialized activities; indicative of adequately restored muscular strength, despite the presumed constrained restriction on the range of wrist and hand movement and of relevant dexterity issues. Furthermore, based on the osteological record it was possible to glean understandings that a diligent orthopedic intervention had taken place, unveiling the attentive involvement of an experienced physician-surgeon with training in traumatic injury, who possibly also tended to the patient during the recovery process, yet also of surmised aspects on the patient's obedience and patience in pain management and the enduring of the demanding as well as laborious process of maintaining wrist-hand immobility for a considerable period, in retrospect of current medical recommendations of a minimum of ca. six weeks, for the gradual subsiding of associated edema and in conjunction with a closed reduction³² through the osteoreparative process. It is also deemed as most probable that the injured male individual must have been supported and monitored by the members of his immediate sociocultural milieu.

individual of approximately 65 years of age (see footnote 22, *supra*), who had exhibited skeleto-muscular changes of the upper extremities relevant to archery. See Agelarakis, A. P., (2000), 'Anthropological Report on the Roman-Paleo-Christian Human Skeletal Remains Excavated from the Ancient Theater Site of Thasos', Archival Archaeological Reports, Prehistoric and Classical Museum of Thasos, 18th Ephorate of Prehistoric and Classical Antiquities.

²⁸ Colles, A., (1814), 'On the Fracture of the Carpal Extremity of the Radius', *Edinburgh Med Surg J.*, 10:181, *Clinical Orthopaedics and Related Research*, 2006, 445, p. 5–7; Fernandez, D. L., and Jupiter J.B., (2002), *Fractures of the Distal Radius: A Practical Approach to Management*, Springer-Verlage, New York.

²⁹ During differential diagnosis, the osteological data presented did not lend support toward a tangential linkage with the typology of a Galeazzi fracture. Cf. Atesok, K. I., Jupiter, J. B., and Weiss, A. P., (2001), 'Galeazzi Fracture', *Journal of the American Academy of Orthopaedic Surgeons*, 19:10, pp. 623–633; Giannoulis, F.S., and Sotereanos, D. G., (2007), 'Galeazzi Fractures and Dislocations', *Hand Clinics*, 23:2, p. 153–163.

³⁰ The three distal radial diaphyseal quadrants showed a healed, mild, form of periostitis.

³¹ While preservation limitations didn't allow for palaeopathological assessments on the condition of the distal ulnar diaphyseal-metaphyseal loci, and particularly at the *circumferentia articularis caput ulnae* and styloid process, the ipsilateral ulnar *incisurae radialis* and *trochlearis* were showing moderate to advanced osteoarthropathic changes mainly in the form of peripheral lipping.

³² It is suggested as rather improbable that an open reduction would have taken place for the orthopedic alignment of displaced metaphyseal/distal diaphyseal bone fragments; based not purely on an inductive assessment but through the absence of any forensically substantiated palaeopathological traces that could have suggested the opposite.



Figure 12. Colles fracture healed, palaeopathological manifestations, and matters of skeletal preservation.

Further indications regarding the intervention of a very experienced physician with broad experience in treating wounds and injuries were derived from the medico-surgical intervention and orthopaedic rehabilitation of serious bilateral tibial diaphyseal fractures documented on one of the male individuals, 35–40 years of age at the incidence of death, and of one of the female individuals, 35–40 years old, the fractures of the right tibia and fibula of an additional female individual, ca. 45 years old, as well as the fracture of the right fibular diaphysis of a 35–40 year old male. Focusing on the bilateral tibial manifestations, they had combined stable to mildly displaced spiral/oblique fracture types with a pattern of sustained injury at the relative centers of the diaphyses.³³ Bearing in mind that the individuals involved, as revealed through palaeopathological examination, were not displaying osteoporotic cranio-infracranial bone tendencies, it was considered that causative agents for the bilateral tibial diaphyseal fractures must have involved high-energy impact mechanisms, suggesting that collateral polytrauma involving at least soft tissues would have been sustained.³⁴ During the palaeopathological examination of the tibio-fibular injuries, and considering their relevant prevalence within the small population sample, one of the study objectives was aspiring, if possible at all, to uncover any facets of the circumstances of sustained trauma impact,³⁵ the synchronicity or not of injurious events that might

³³ Rockwood and Green's *Fractures in Adults*, (2019), (Eds. P. Tornetta III et al.), Ninth Edition, Volumes I and II, Walters Kluwer, New York; Court-Brown, C. M., McBirnie, J., (1995), 'The epidemiology of tibial fractures', *Journal of Bone & Joint Surgery British volume*, 77:417, p. 417–421. On the anatomic location and type of limb fractures Celsus indicates, '...there is least danger when the middle of the bone is fractured. The nearer the fracture is to either the upper or the lower end the worse it is; for they are at once more painful and more difficult to treat. The least troublesome is the simple transverse fracture; the multiple and the oblique are worse; the worst are those where the fragments are pointed.', Celsus, *On Medicine*, (2002), in (Ed.) J. Henderson, (Transl.) W. G. Spencer, Loeb Classical Library, Harvard University Press, Cambridge, Massachusetts, VIII. 10.1., A-B, p. 536–537.

³⁴ Cui, S., Bauer, M. J., Mir, H., Cannada, K. L., (2017), 'Bilateral tibial shaft fractures: a multicenter analysis', *Current Orthopaedic Practice*, 28:4, p. 365–370.

³⁵ Given the considerable subcutaneous length of the tibia and the inquiry if there had been open or closed fractures.

have caused particularly the bilateral cases, and as importantly a better understanding of any aspects of the method and procedure of medical treatment that would have been performed by the physician-surgeon.

Regarding the bilateral tibial fractures, it was contemplated that each case might not have been caused during a single traumatic event. Yet, the specificity of the trauma locations at the approximate centers of the diaphyseal components could lend support to a competing explanatory hypothesis proposing that a single traumatic event of an acute torsional or bending impact could have resulted to bilateral tibial fractures, for each of the two individuals involved. Further, although by no means deterministic, it appeared as more likely that this could have been the case for the female individual if such a contemplation could be based upon the compatible levels of well healed conditions, while the osteoreparative manifestations of the male individual involved were presenting, at least inspectionally, a variance in the healing process between his tibial counterparts. Nevertheless, it was surmised, this could have been a matter relevant to the type and severity of fracture impact sustained by each of his tibial components; for example of the considerable differences that could have risen in the necessary treatment and the subsequent healing process required between a closed versus an open fracture.³⁶

Hence, among the tibial conditions that were providing diagnostic palaeopathological manifestations, of notable interest were the right diaphyseal morphocharacteristics of the male individual, presenting a robustly formed, elongated, well-healed callus³⁷ (Figure 13). It extended mainly along the contour of the anterior tibial crest and incorporated towards its distal *terminus* an elevated platform of an ovoidal in shape *corpus*, simulating an osseous plateau³⁸ (Figure 14). It was therefore considered that during the medical intervention, and as part of the rather overall successful, as assessed palaeopathologically, reduction processes of the tibial fractures, bandaging of the fractures would have taken place as an integral practice of a necessary procedure. Yet, this could have remained an inductive assessment, while there was a multitude of questions that could remain unanswered pertaining to the utility and modality of bandaging applications in the treatment of leg fractures. Further, both inspectional morphoanatomic evaluations and X-ray imaging (Figures 15, and 16) of the callus formation described above clearly revealed that it had been shaped by administering persisting and considerable in effect pressure which must have been afforded by the combined application of bandaging and a splinter(s), most clearly delineated by the flattened surface contour of the callus and particularly at its elevated ovoidally plateaued component, at the anterior crest and most subcutaneous region of the tibia. There, a securely affixed flat in shape splint must have been placed by the physician-surgeon to afford through proper pressure, assumed via straps and/or bandaging, stability to the properly aligned (through reduction) fractured bones. Additional questions were thus generated in seeking to elucidate if any preparatory procedures were to have taken place for the potential use of splinters, particularly in treating fractures of the leg bones, and of the probable mode and timing of their application in the healing process.

³⁶ Courtney, P. M., Bernstein, J., and Ahn, J., (2011), In Brief: Closed Tibial Shaft Fractures, *Clinical Orthopaedics and Related Research*, 469:12, p. 3518-3521.

³⁷ It measured a disto-proximal length of ca 93.75 mm

³⁸ Its long axis oriented at a disto-proximal anatomic direction measured 63.00 mm, its width 34.89 mm. This was reminiscent of Celsus reference: 'But occasionally, though the fragments [of broken limbs] are in a correct apposition, too much callus develops and there is a swelling over the fracture. When this happens the limb should be gently rubbed for a while with oil containing salt and soda, and then fomented freely with hot water and salt; and a poultice should be applied as a dispersive, besides firmer bandages; use a diet of green vegetables, and an emetic besides. Which reduces the callus together with the flesh. And it is of advantage in this condition to apply mustard mixed with a fig to the corresponding limb until it causes irritation and draws away the diseased matter.', Celsus, *On Medicine*, (2002), in (Ed.) J. Henderson, (Transl.) W. G. Spencer, Loeb Classical Library, Harvard University Press, Cambridge, Massachusetts, VIII. 10. 7 O, p. 556-557. It appears, however, that the effectiveness of this remedy may not have been applied to the specific case under investigation at Paliokastro.



Figure 13. Anterior view of bilateral tibial diaphyseal healed fractures.

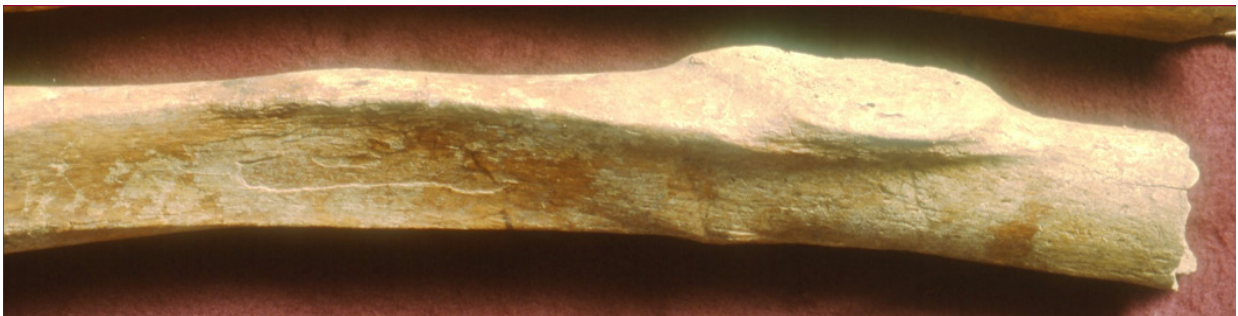


Figure 14. Length of tibial callus on its anterior crest.

Precedents in early Greek, and Roman medical history for the treatment on limb fractures

Henceforth, in an inquiry searching for medical historical references whereby a methodology of bandaging and of splint applications on fractured leg bone diaphyses following orthopaedical reduction could have been recommended, it appeared that the earliest medical records detailed for such cases comprised an important segment of the Hippocratic *corpus On Fractures*, while relevant medico-surgical information recorded in a comprehensive way for the reader of Latin was also contained in Celsus' treatise *On Medicine*.³⁹ The undertaking of such a task it was estimated could provide the author not only

³⁹ Hippocrates, Volume III, *On Fractures*, (1999), (Ed.) G. P. Goold, (Transl.) E. T. Withington, Loeb Classical Library, Harvard University Press, Cambridge, Massachusetts, p. 94-199; Celsus, *On Medicine*, (2002), (Ed.) J. Henderson, (Transl.) W. G. Spencer, Loeb Classical Library, Harvard University Press, Cambridge, Massachusetts, VIII. 10.1-7 O. It should be underlined however, that the purpose of this task was not aiming to carry out a diachronic and holistic in nature review on the treatment of limb fractures in the writings of medical practitioners and compilers of relevant information up to the 5th/6th – 7th centuries (the relative dating of the Paliokastro site). The objective was rather to identify early records on the matter at hand in the

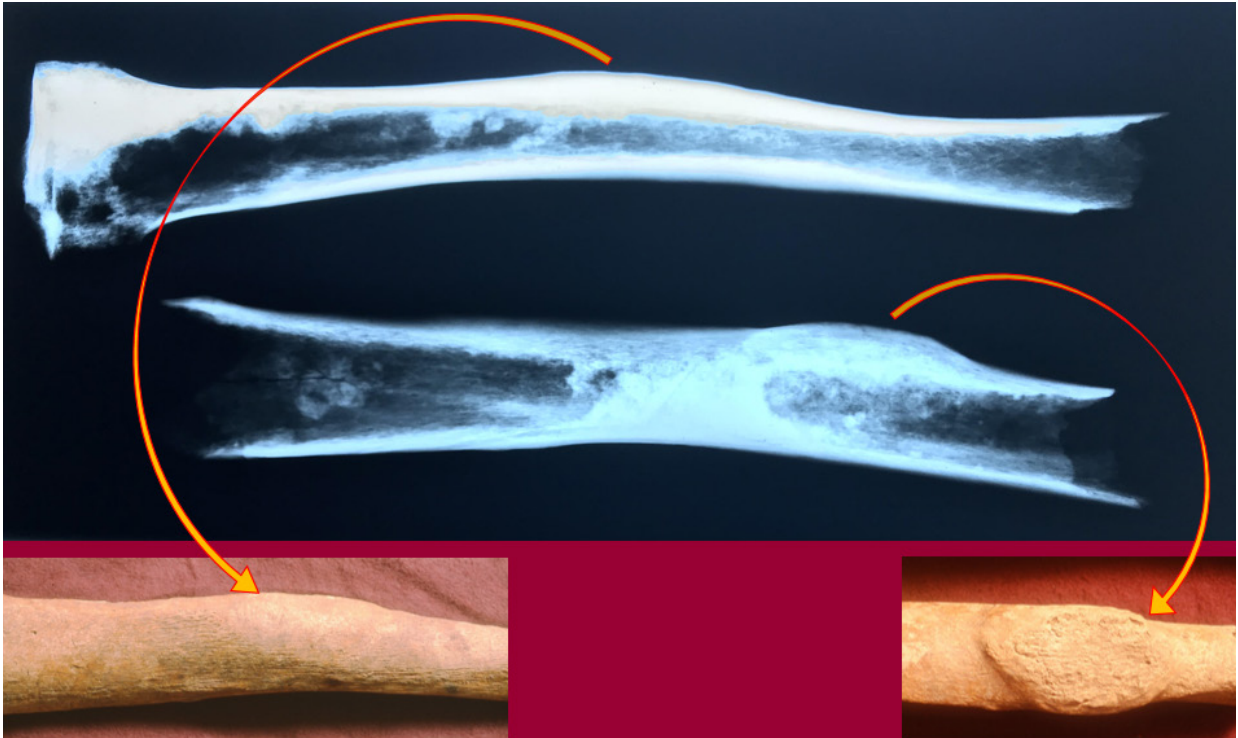


Figure 15. X-ray imaging of bilateral healed tibial fractures with corresponding loci of the skeletal samples.



Figure 16. X-ray imaging of bilateral healed tibial fractures focusing on the right tibial callus formation.

Greek and subsequently Roman medicine; which would indicate the availability of certain shared denominators of knowledge and practice within the domain of the medical arts up to the time period relevant to Paliokastro. Nonetheless, for the reader who may seek at this opportunity a concise mention on the use of bandages and splints since the Hippocratic *corpus* to the early 5th century--through Oreibasius' *Medical Collection* (Ιατρικά Συγγραφαί), see the General Introduction in Hippocrates, Volume III, *On Fractures*, (1999), (Ed.) G. P. Goold, (Transl.) E. T. Withington, Loeb Classical Library, Harvard University Press,

the opportunity to seek answers on matters at hand, but to also evaluate potential differences in aspects of the medico-surgical intervention and healing outcomes of comparable trauma cases which had been documented by the author among inter-site skeletal collections in Thasos and the proximal mainland region at a diachronic range which predated the 5th century BC relative dating of the Hippocratic treatise through to the Late Byzantine period of the 14th century AD.⁴⁰

Indeed, the Hippocratic *corpus* was strongly recommending that following any required reduction treatment of a closed fracture,⁴¹ making particular references to the leg bones and further with specific recommendations and cautions for the tibia,⁴² by either the manual power of two strong male assistants if not by means of mechanisms,⁴³ during the second in sequence dressing of the injury by bandaging,⁴⁴ as bandages would be changed every third day,⁴⁵ the first turns of the bandage, rolled clockwise or counterclockwise,⁴⁶ should be made with increased tightness in covering the precise *locus* of the fracture⁴⁷ while gradually reducing the pressure of the bandage turns continuing proximally on the tibial diaphysis,⁴⁸ further away from the fracture epicenter.⁴⁹ This type of bandaging application would be carried out in concert with and according to the patient's sensation responses on the degree of tightness,⁵⁰ while the aim was not only to provide stability to the orthopaedically adjusted fractured

Cambridge, Massachusetts, p. xi-xxvii (in its page xviii, footnote 2, on Galen's *Method of Medicine* should rather refer to Book VI.6, 455K). For the 7th century, the terminal century of the ProtoByzantine period, Paulus' of Aegina *Medical Compendium of Seven Books* (Επιτομή Ιατρικής βιβλία επτά) is recommended: a) Paulus Aegineta, (1921, 1924), in (Ed) I. L. Heiberg, *Libri I-VII, Corpus Medicorum Graecorum*, Leipzig and Berlin (in Greek), and b) *The Seven Books of Paulus Aegineta*, (1847), (Translated and with a Commentary) F. Adams, London. Additionally, for a more extensive review of references on the treatment of trauma during the Greco-Roman time periods, see Salazar, A. F., (2000), *The Treatment of War Wounds in Graeco-Roman Antiquity*, Volume 21, Studies in Ancient Medicine, J. Scarborough (Ed.), Brill, Boston.

⁴⁰ Agelarakis, A. P., (2015), 'Klazomenaeans of Three Continents: Emphasis on the 7th c. BC', in (Eds.) N. Ch. Stampolidis, Ç. Manner, and K. Kopanias, *Nostoi: Indigenous Culture, Migration and Integration in the Aegean Islands and Western Anatolia during the Late Bronze and Early Iron Age*, KUP, Istanbul, Ch. 43, p. 923-981; (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', *BAR International Series* 1031, Oxford, Archaeopress, p. 12-19; (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', *British Annals of Archaeology*, 96, p. 355-364; (2000), 'Aspects of Demography and Palaeopathology among the Hellenistic *Abderetes* in Thrace, Greece', *Eulimene, Int. J. Mediterranean Archaeological & Anthropological Society*, Rethymnon, Greece, V:1, pp:13-24; (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 premières et Technologie de la Préhistoire à nos jours*, Limenaria, Thasos, French Archaeological Institute in Greece, Athens, pp. 447-468; (1997), 'Physical Anthropology and Palaeopathology at the Classical Necropolis of Thasos', in Koukouli-Chrysanthaki, Ch., Sgourou, M., and Agelarakis, P. A., 'Investigations of Archaeo-Anthropological Nature at the Classical Necropolis of the Island of Thasos between 1979-1996', *Archaiologiko Ergo sti Makedonia kai Thraki*, 10: B, p. 770-794. Agelarakis, A. P., and Agelarakis Argiro, (1989), 'The Palaeopathological Evidence, Indicators of Stress and Dietary Evaluations from two Skeletal Populations, a Middle and a Late Byzantine, from Polystylon Abdera, Greece', *Byzantinische Forschungen* XIV, p. 9-26.

⁴¹ Hippocrates, Volume III, *On Fractures* (1999), (Ed.) G. P. Goold, (Transl.) E. T. Withington, Loeb Classical Library, Harvard University Press, Cambridge, Massachusetts, XV. 2, p. 132, and 36-37, p. 132, addressing closed fractures of both leg bones (tibia and fibula), XXVI. 4-5, p. 154.

⁴² Ibid. XVIII. 1-28, p.140-142, with an added description of trajectory stressors sustain by the tibia from the upper body and the knock-kneed anatomic relations between the femur and tibia, at the knee joint.

⁴³ Ibid. XV. 3-10, p. 132-134, 36-41, p. 134-136.

⁴⁴ Ibid. IV. 20 -V. 24, p. 104-108.

⁴⁵ Ibid. VIII. 32, p. 116, XVI. 43, p. 138.

⁴⁶ Ibid. XVI. 2-4, p. 136.

⁴⁷ The width of the bandages to be used, especially of the first one to be placed on top of the injury, was recommended should not be narrower but wider than the wound *locus* itself, *ibid.* XXVI. 10-16, p. 154. A similar recommendation is made by Celsus: 'The bandages should be somewhat wider than the wound...' Celsus, *On Medicine*, (2002), (Ed.) J. Henderson, (Transl.) W. G. Spencer, Loeb Classical Library, Harvard University Press, Cambridge, Massachusetts, VIII. 10. D., p. 550-551.

⁴⁸ Hippocrates, Volume III, *On Fractures* (1999), (Ed.) G. P. Goold, (Transl.) E. T. Withington, Loeb Classical Library, Harvard University Press, Cambridge, Massachusetts, XVI. 4-7, p. 136.

⁴⁹ Particular mention is made in *locus ibid.* XVI. 8-10, p. 136, that the bandages for the leg should be broader and more numerous than those for fractures of the arm (humerus).

⁵⁰ Ibid. in XVI. 39-40, as far as patient responses on tightness of leg bandaging should be similar as explained in *ibid.* V. 1-6, p. 106 ff.

bone components,⁵¹ but to also prevent the congregation of fluids specifically over the fracture site, by measured adjustments of increased pressure applications through the subsequent bandaging changes, at three day intervals, affording the dwindling of the swelling, and the avoidance of a dangerously lingering edema.⁵² This would have been in favor of the healing process and the proper aesthetic and functional recovery of the patient while at the *interim* it would have gradually allowed the physician a better tactile diagnostic ability for the continuation of reduction treatments, given the shrinking of the swelling throughout the process, for fine-tuning adjustments of bone alignments. Apropos, clear mention is made in the contextual account *On Fractures* that the experienced physician would not fail during initial diagnosis to identify the fracture by carefully touching the wounded area,⁵³ and similarly that the hands of the experienced physician were to be used for bone alignment adjustments before subsequent re-bandaging processes.⁵⁴

Addressing matters of next steps to be taken by the physician, the treatise cautions using wooden tubular type casts that were to be fitted under the leg,⁵⁵ for as experience had it they could not offer the stability and immobility that was needed in favor of the aligned diaphyseal bone fragments, resulting to new misalignments by the body moves of a non-careful patient.⁵⁶ Instead it was recommended that the properly bandaged leg should be placed in an extended position comfortably supported on a soft cushion of linen or wool, purposefully arranged in mirroring the posterior (dorsal) anatomic contour of the leg.⁵⁷ Subsequently, either on the seventh, ninth, or eleventh day following the fracture incidence

⁵¹ Ibid. XVI. 11-16, p. 136; 35-39, p. 138.

⁵² Ibid. V. 25-26, p. 108, XVI. 49-50, p. 138.

⁵³ Ibid. III. 52-54, p. 102.

⁵⁴ Ibid. VIII. 25-28, p. 116, XV. 43-45, p. 136. In comparison, the bandaging process of the orthopaedically reduced limb recorded by Celsus indicates: 'Generally six bandages are needed. The first, a very short one, is to make three turns over the fracture in the form of a spiral carried upwards; three such turns are sufficient. The second bandage, half as long again, should begin over any projection if there is one; if the bone is quite smooth it may begin anywhere over the fracture, in an opposite direction to the first bandage, and go downwards, then back over the fracture to end above the first bandage. Over these two bandages is spread a cerate on a broader layer of lint in order to hold the bandages in place; and if at any point bone projects, a triple layer of wool, soaked in wine and oil, is put over it. The foregoing are surrounded by a third bandage, and then a fourth, the turns always following a direction the reverse of the bandage underneath....It is better to make the turns of the bandage numerous rather than tight, for a part which is constricted is damaged and disposed to gangrene...'. At the third day the bandaging should not be very tight and it would need to be 'bandaged again, and a fifth bandage added to the others; on the fifth day the bandaging should be undone, and the limb wrapped in six bandages...And, whenever the limb is uncovered, it is to be fomented with hot water...and the same treatment is continued until the inflammation has subsided or the limb has become even a little smaller than ordinary. This occurs by the seventh, or certainly the ninth day; then the bones are easily manipulated. Therefore if not yet in place, they should be put back; if any fragments project, they must be pushed back into position; then the limb is to be bandaged as before, and over the fracture splints are arranged above so as to hold the fragments firmly in position...', Celsus, *On Medicine*, (2002), (Ed.) J. Henderson, (Transl.) W. G. Spencer, Loeb Classical Library, Harvard University Press, Cambridge, Massachusetts, VIII. 10. E-K, p. 538-541. Hence, the importance of the proper bandaging and attentive care of the fractured and inflamed limb for a period up to the seventh and ninth day, in order for orthopaedic reduction to take place and for the application of splints, is remarkably similar to the recommendations of the Hippocratic corpus. Yet, a distinctness may be perceived on the cautionary note on bandaging tightly in Celsus about gangrene: 'the more easily a wound can be harmed and attacked by gangrene, the less tight it should be bandaged. Rather by having a number of bandages we must arrange that, although loose, they afford equal support. This will be the treatment for the thighbone or upper arm if the fragments are in good line; but if they are not so, the bandaging is applied only so far as to keep the medicaments in place.', *ibid.* 10. D-E., p. 550-551. And yet, Celsus was addressing in this case limb fractures with wounds that had not yet been reduced orthopaedically, and without making references to edema issues.

⁵⁵ At the posterior (dorsal) anatomic surfaces of the leg.

⁵⁶ Hippocrates, Volume III, *On Fractures* (1999), (Ed.) G. P. Goold, (Transl.) E. T. Withington, Loeb Classical Library, Harvard University Press, Cambridge, Massachusetts, XVI. 17-35, p. 136-138 (where mention is made that wooden tubular splints may be useful for the easier changing of bed sheets and for when the patient may use the bathroom). On the contrary, in Celsus it appears that 'One thing is common to fractures of the leg and thigh, that after being bandaged the limb is laid in a gutter-splint. This splint should have two holes near the lower end, by which any fluid that has formed may run off; and there should be a stay for the sole of the foot both to support it and stop it from slipping backwards; and at the sides are so that when straps are passed through these, a kind of stay holds the leg and thigh as they have been set. If the leg is fractured, the splint should start from the sole...', Celsus, *On Medicine*, (2002), (Ed.) J. Henderson, (Transl.) W. G. Spencer, Loeb Classical Library, Harvard University Press, Cambridge, Massachusetts, VIII. 10. 5 B, p. 546-547 (Hence, indicative of the common use of gutter-splints in such cases, unlike the reservations recorded in the Hippocratic corpus; yet see also footnote No. 66 *infra*).

⁵⁷ Hippocrates, Volume III, *On Fractures* (1999), (Ed.) G. P. Goold, (Transl.) E. T. Withington, Loeb Classical Library, Harvard University Press, Cambridge, Massachusetts, XVI. 11-16, p. 136.

the application of carefully fitted splints should take place on the leg, cautioning for their careful placement to be positioned in a good alignment with the crural region.⁵⁸ Thereafter, with continued care an anticipated osteoreparative strengthening of the leg bones would take place within forty days should the medical treatment be followed properly.⁵⁹ However, caution was begged that on matters of aesthetic outlook and functional recovery a tibial fracture would have been more cumbersome to treat, requiring a lengthier healing process compared to a fibular fracture, and therefore in a tibial fracture the patient would have taken longer time to stand and use the leg.⁶⁰

It was thus possible to shed adequate light pertaining to multifaceted aspects on the medico-orthopaedic intervention methodology⁶¹ on matters of limb fractures that had to be undertaken by the attentive care of an experienced physician, from the initial diagnostic process to the preferred techniques and the specific mode, tempo, and duration of subsequent practical applications throughout the procedures of the healing regimen; inclusive of action plans in the emergence of potential difficulties. Despite the chronological divide between the Classical period when the Hippocratic *corpus* was compiled and any medico-surgical advances that had transpired up to the ProtoByzantine period, the particular treatise *On Fractures*,⁶² written in an erudite yet didactic way, delivered nevertheless with discernible authority as a result of experiential legacy, had clearly introduced in the medico-surgical praxis in the region, already since the 5th century BC, comprehensive intervention protocols, principles, recommendations, and cautionary notes on the subject matter. These were to be widely known and to comprise reference materials among medical practitioners throughout antiquity.⁶³ Regarding our inquiry it provided meaningful information in the treatment of fractured limbs with specificity on the timing, the particularities of the scope, and aims of dressing the fractures after initial and continued reduction⁶⁴ by bandaging,⁶⁵ along with the frequency and modality of their application, and further of the recommendations and cautions in the use of splints for fractured legs and indeed even explicitly for the *tibiae*.

As such, it was reckoned prudent to consider in aiming to retrieve tesserae of the medical intervention processes on the tibial fractures recovered at Paliokastro that the medical practitioner would have under most probabilities used bandaging following the reduction process, while a flat splint(s) would have been used at the anterior anatomic side of the tibia, and not just a tubular type of cast that would have just wrapped under or over the leg; as deciphered by the contour of the male individual's callus

⁵⁸ Ibid. XVI. 52-57, p. 138.

⁵⁹ Ibid. XVI. 49-59, p. 138-140.

⁶⁰ Ibid. XVIII. 1-28, p. 140-142.

⁶¹ And, as importantly of the thought process revealed behind the adoption of a certain method or technique long before the ProtoByzantine period.

⁶² Particular care was taken by the author in regards to the meanings of the words, the word sequence, syntax and grammar of the particular passages of the ancient Greek text.

⁶³ As for example in the recordings of Celsus on matters of medico-surgical knowledge up to his time, e.g. for treating limb fractures, and on matters of cranial surgical intervention which is addressed below, and even in the cases of criticism by other medical practitioners who postdated the compilation of the Hippocratic *corpus*.

⁶⁴ A necessary task as explained above that had to be undertaken by the physician given the absence of other means for diagnostic purposes, as for example of X-rays, or e.g. the surgical treatment by fixation through nailing for bone fragment orthopaedic alignment, cf. Trafton, P. G., (1988), 'Closed unstable fractures of the tibia', *Clinical Orthopaedics and Related Research*, 230, p. 58-67. Personal communications, in 2002, with Dr. Ellinas Dimitrios, general medical director, and Ms. Sevastou Sotiria, x-ray technician of Prinos Hospital in Thasos island indicated that current cases of fractured *tibiae*, following reduction and the application of a long cast, and based on the severity of trauma and the health circumstances of the patient would routinely require several follow up examinations by the orthopaedist, aided by X-ray imaging.

⁶⁵ Without exception, throughout the treatise *On Fractures* the bandages are referred to as made of thin linen fabric. Hippocrates, Volume III, *On Fractures* (Ed.) G. P. Goold, (Trans.) E. T. Withington, Loeb Classical Library, Harvard University Press, Cambridge, Massachusetts, (1999), IV. 20, p. 104. Linen bandages after orthopaedic limb reduction are also preferred as recorded by Celsus, 'Then cloths folded over two or three times and dipped in both wine and oil are wrapped round the part, and it is best for these to be of linen.', Celsus, *On Medicine*, (2002), (Ed.) J. Henderson, (Transl.) W. G. Spencer, Loeb Classical Library, Harvard University Press, Cambridge, Massachusetts, VIII. 10.1.E, p. 538-539.

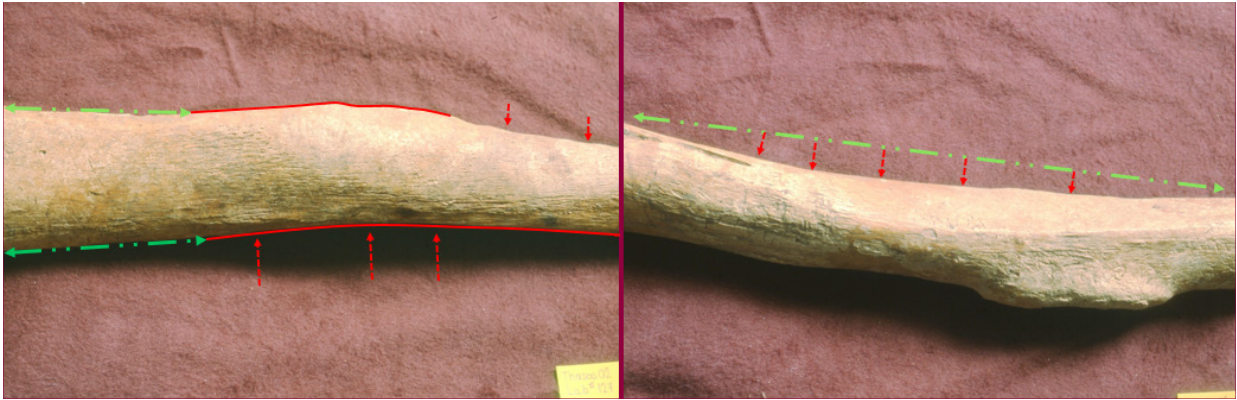


Figure 17. Degrees of bilateral tibial diaphyseal posterior angulation on the sagittal plane.

formation at a most subcutaneous region of the tibial diaphysis (Figures 13-16). It was additionally conceived that the flat splint which would have been wrapped tightly for stability with additional bandaging around the *locus* of trauma would have been placed in superimposing an underlying layer(s) of bandaging; an application clearly recommended already in *On Fractures*, as decoded from a criticism about the discomfort that was causing to the patient the direct contact of a wooden tubular cast under the bare leg.⁶⁶

Pursuant to the elusive scheme of deriving as much as possible a *nexus* of sorts with bearings of the experiences and endeavors of the ancients through elements that could be deciphered from the medico-surgical interventions, additional palaeopathological observations were enlisted in the process, considered as they may be tangible evidentiary data for coaxing out of the skeletal record ingrained whispers from the past. It is therefore noteworthy to document that none of the healed tibial shafts had rotational changes or angulation distortions on their long axes that exceeded the standards of modern norms⁶⁷ particularly for closed treatments. In fact comparing the range of post-healing deformities to the deduced metrics *ante* between the *tibiae* of the individuals involved, it was the male individual's right tibial shaft that exhibited the greatest degree of a posteriorly directed angulation-deformity on the sagittal plane, at 7.5° (below the modern tolerable of 10°) compared to 4.0° of its left counterpart (Figure 17). It is thus assessed that the orthopaedic reduction processes carried out by the physician-surgeon had been in all cases quite successful;⁶⁸ a pattern that was clearly reflecting both on deep knowledge, significant experience and attentive care that was instrumental during the therapeutic rehabilitation period on the side of the physician, and on the side of the patients of a restrain in the undue initiation of premature orthostatic weight bearing.

⁶⁶ Hippocrates, Volume III, *On Fractures*, (1999), (Ed.) G. P. Goold, (Trans.) E. T. Withington, Loeb Classical Library, Harvard University Press, Cambridge, Massachusetts, XVI. 26-28, p. 136-138. A cautionary note against the use of gutter-splints is also made by Celsus in cases of wounds in fractured limbs, such as the thigh bone or upper arm, '*under which it is impossible for the wound to heal, but only plenty of bandages...*', Celsus, *On Medicine*, (2002), (Ed.) J. Henderson, (Transl.) W. G. Spencer, Loeb Classical Library, Harvard University Press, Cambridge, Massachusetts, VIII. 10. 7E-F, p. 550-551 (the latter is suggested may offer an *addendum* to Celsus' reference in footnote No. 56, registering an underpinning of sorts to the Hippocratic view for the use of such splints).

⁶⁷ Courtney, P. M., Bernstein, J., and Ahn, J., (2011), In Brief: Closed Tibial Shaft Fractures, *Clinical Orthopaedics and Related Research*, 469:12, p. 3518-3521; Schmidt, A. H., Finkemeier, C. G., and Tornetta, P. III, (2003), 'Treatment of closed tibial fractures', *Instructional Course Lectures, Pub. Med.*, 52:607-622.

⁶⁸ The author considered the potential of diachronic taphonomic effects on the skeletal materials since the interment process; as those could have afforded a slightly increased angulation due to the drying of the bones. The latter would in fact place the recorded *indicia* at an even lower gradation to the proportional relation of the modern acceptable norms.

Palaeopathological assessments of infectious complications

There were, however palaeopathological manifestations observed on the tibial diaphyses which were revealing of osseous responses to complications that had transpired, consequential to the traumatic injuries. In brief, there were tibial traces of both healed and in the healing process periosteal reactions, with emphasis on the female individuals involved (Figure 18). Out of the two female individuals involved, the ca. 45 year old who had sustained right unilateral tibio-fibular fractures was revealing in addition fibular diaphyseal manifestations simulating chronic in nature, however well contained, symptomatic conditions of periosteal remodeling in the region of the trauma impact. The smoothened yet uneven contour of the peroneal diaphyseal surface presented healed periosteal traces, longitudinal to the trauma impact as a reaction to post-traumatic infection. This could have been the result of tibio-fibular interosseous ligamentary rupture at the incidence of trauma with considerable hemorrhage and subsequent periosteal complications, thus resembling the effects of a compartment syndrome in a closed fracture particularly of the tibial diaphyses,⁶⁹ yet also affecting the fibular counterparts. Nonetheless, the potential of an open fracture at the fibular epicenter could not be dismissed given the suspicion that a focal lesion on the fibular diaphysis which was communicating with the endosteal component, based on differential diagnosis to an ulcerating superficial lesion that could have afforded a periosteal reaction and modification to the periostitic remodeling, was assessed as a *cloaca* of an exudative process relevant to intramedullary osteomyelitic complications, caused by infectious agents through the penetrating nature of the wound. Further, the smooth nature of its margin was lending support to the assessment that it had not been of chronic nature and that it had healed (Figure 19). Somewhat comparable conditions were also observed on both peroneal diaphyses of an additional male



Figure 18. Active, in the healing process, and healed periosteal tibial diaphyseal reactions.

⁶⁹ Blair, J. A., Stoops, T. K., Doarn, M. C., Kemper, D., Erdogan, M., Griffing, R., and Sagi, H. C., (2016), 'Infection and Nonunion After Fasciotomy for Compartment Syndrome Associated With Tibia Fractures: A Matched Cohort Comparison', *Journal of Orthopaedic Trauma*, 30:7, p. 392-396; Reverte, M. M., Dimitriou, R., Kanakaris, N. K., Giannoudis, P. V., (2011), 'What is the effect of compartment syndrome and fasciotomies on fracture healing in tibial fractures?', *Injury*, 42:12, p. 1402-1407; Park, S., Ahn, J., Gee, A. O., Kuntz, A. F., Esterhai, J. L., (2009), 'Compartment syndrome in tibial fractures', *Journal of Orthopaedic Trauma*, 23:7, p. 514-518.

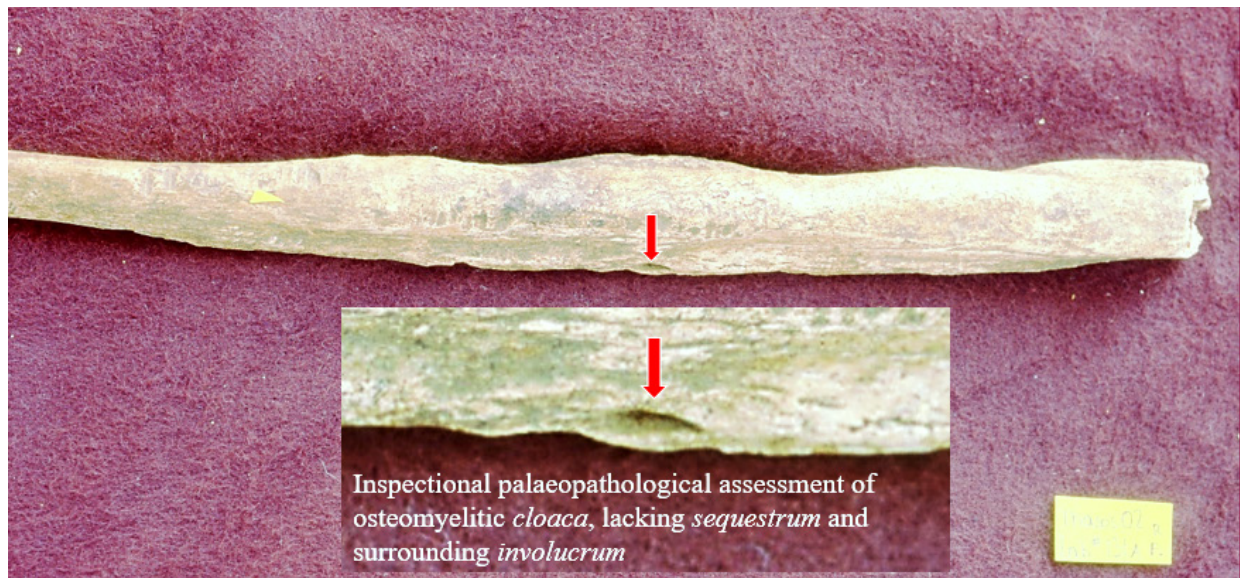


Figure 19. Fibular diaphysis showing manifestations of infectious complications.

individual, of 35–40 years of age at the occurrence of death. While lacking tibial fractures, the right fibular diaphysis at the distal component of its proximal third was revealing a slightly postero-lateral angulation of a healed comminuted fracture (Figure 20, arrows) with severe periosteal bone changes compared to its left non-fractured counterpart yet not unaffected by considerably milder in nature periosteal changes. The presence of sclerosing periosteal reactions along with a *cloaca*, however with smooth margins, and without any traces of *sequestrum* or *involucrum* at the right peroneal diaphysis is suggested was indicative of infectious in nature, non-chronic, osteomyelitic conditions, possibly secondary to an open wound at the incidence of trauma impact. Correspondingly, the region of the left peroneal diaphysis is assessed could have been affected by a traumatic event that had not caused fracture. Noticeably, the tibial diaphyses were clear of palaeopathological changes observed with the fibulae. Additional aspects on the palaeopathology of this male individual will be addressed as a unique case study below, designated for this purpose as the ‘Wounded *Caballarius*’.

About the physician-surgeon, the *ἰητρείον*, and the context of Paliokastro

Considering in retrospect of ca. 16 centuries the circumstances of morbidity and the dangers of comorbidity which could have resulted of such serious long bone fractures, particularly in the cases of the lower extremities, compounding the individuals involved with debilitating conditions of mobility, the palaeopathologist was to wonder if the trauma intervention could have taken place locally, at the relative proximity of Paliokastro, or elsewhere possibly in an ‘*ἰητρείον*,⁷⁰ located at a more central and easily accessible station in the regional domain. The former would have offered the opportunity to the attending physician to provide the most effectual surgico-orthopaedic care e.g. with diagnostic procedures, the prompt cleaning of the wounded tissues—particularly in open wound cases, the antiseptic care, the attempted hemostasis, and even preparations for the subsequent treatment. Such a case would have avoided the daunting if not dangerous for the patient(s) pre-, and post-treatment transportations to/from a presumed ‘*ἰητρείον*’ from the upland site of Paliokastro. Otherwise, delayed medical care or a delay caused by the time-consuming process to recover the wounded, to rudimentary prepare and

⁷⁰ ‘*ἰητρείον*’ [borrowing the early term from Hippocrates, V. III, *In The Surgery*, (1999), (Ed.) G. P. Goold, (Transl.) E. T. Withington, Harvard University Press, Cambridge MA, I. p.58], construed in this context by the present author to mean the designated place and space where the physician would have carried out his profession, inclusive of surgery.



Figure 20. Bilateral fibular diaphyseal infectious complications, with healed fracture locus (red arrows).

to transport them to the more distant location of a physician, or, in the case of the notification of an itinerant physician to arrive for attending to the patient after one, two, or even more days, could have provided sufficient time for the injuries, particularly of open fractures to become infected, and/or in cases of closed fractures for the development of compartment syndrome. Regardless, any delay in medical treatment would have had grave consequences.

Although evidentiary data that would have discerned considerable complications of palaeopathological nature were rather lacking from the Colles and reasonably even from the tibial fractures, conversely they were manifested on the fibular diaphyses of one of the females and especially of the Wounded *Caballarius* addressed above. It could not be concluded however if those complications were the direct result of a delay in medical intervention,⁷¹ or that the wounds had been exposed to contamination because of an open wound with or without a penetrating object. Given nonetheless that the fibular palaeopathological manifestations had been healed, provides indications that the patients had undergone a thorough wound debridement by the physician. In the case of a delayed medical intervention it would have been more probable that the patient could have undergone through a more cumbersome and painful process, for the extraction of any foreign particles from the wound, the possible handling of post-germinal infection stages and the prevention of its spread, the draining of a possible abscess, or even attending to the suppuration, necrosis and removal of tissues in the traumatized area. These conditions could have consequences, that were to remain detectable in the skeletal record as serious manifestations of problematic healing and infectious complications, as is suggested could have been the fibular cases.

Pondering these issues the question seemed to recur if in fact the physician-surgeon had been available locally, possibly stationed and thus present at Paliokastro. Should that had been a possibility additional

⁷¹ Whether because the physician was far away, or that there had been some obstacle for their timely transportation to the physician, or even because of the delayed arrival of an itinerant physician.

questions were emerging. Why would or should a very erudite and experienced physician(s) be stationed at such a remote, upland and difficult to reach site as Paliokastro? Should that have been the case what were his mission and the particular population he were supposed to attend to with his medical arts? Seen from within the lens of the reasons mentioned above, the distance, the ragged and precipitous geomorphology at Paliokastro, and the delay to reach a patient would work against the timely ability of the physician to serve other inhabitants in the region. Nevertheless, based on the grounds of archaeological investigations so far there have been no discoveries of any coeval settlements or cemeteries established peripherally in the lower elevations of the valley; those easily to reach from the shores rolling meadows in the regional domain, or across the peri-coastal plain of Rachoni in Thasos. On the contrary, in addition to the archaeologically recovered *naiskos* building and funerary features our investigation and site exploration⁷² at Paliokastro identified, particularly in the relative spatial proximity to the burial site, an aggregate of multiple well-built stone foundations of housing and auxiliary utilitarian structures; settlement components integral to the site of Paliokastro. It appeared therefore as possible that the so-called ‘other inhabitants’ to have been served by the abilities of the physician could have been indeed those that were occupants of the Paliokastro site; lending support to the concept that the physician could have been stationed in the same area rather than at a supposed more easily accessible location in the peri-coastal plains. Further support on the perception that settlements in the region of Rachoni, even those postdating the ProtoByzantine period, had been retracted from the shorelines is derived from vestiges of the oral tradition, incorporated in the ethnographic work carried out by the author with local interlocutors since the late 1970s, and most importantly through long term archaeologico-historical investigations.⁷³ As such, it should be of interest to note that the historic village of Rachoni emanated from a long predating village, that of St. George, which had been situated at the southern slopes of mountain Fanos, relatively hidden from the shoreline as a safety measure against opportunistic seagoing marauders and the recurring pirate incursions.⁷⁴ It was founded at approximately an isometric distance of ca. 4.5 km from the shore and comparable elevation heights ranging in its spatial allocation between 100 to 220 m from sea level⁷⁵ as the historic village of Rachoni, compared to ca. 7.5 km and 460 m respectively to the site of Paliokastro.

⁷² Of archaeo-historical research, ethnographic investigation aided by testimonials of local interlocutors, and site survey-visits.

⁷³ Since the 1970s, when the author was serving as archaeologist in seasonal archaeological excavations in Limenas of Thasos with local personnel of the Antiquities Authority in Thasos, and since the early 1990s with personal communications with Antiquities Authority archaeologists Dr. Marina Sgourou (†), Dr. Eustratios Papadopoulos, and architect Dr. Sappho Ageloudi-Zarkada, a native of Rachoni, and a renowned scholar on the historical landmarks in Thasos; Ageloudi, S., (2017), ‘The position and development of Thasian settlements during the Ottoman occupation and the typology of the traditional home in the island’, *Ktitor*, Thessaloniki, p. 15-35 (in Greek); (2014), ‘The holly church of St. Demetrios in Kallirachi of Thasos’, *Thasiaka*, 16, p. 37-51; (2005), ‘Property of Zografou Convent at Rachoni in Thasos’, *Thasiaka*, 12, p. 33-53; (2001), ‘A Thasian Byzantine Church in Service’, *Thasiaka*, 10, p. 23-50; Sodini, J. P., (1995), ‘La ville de Thasos a l’époque protobyzantine: les lacunes de topographie’, *Byzantine Macedonia 324-1430 AD*, Thessaloniki, p. 279-294; Vakalopoulos, A. E., (1984), *The History of Thasos 1453-1912*, Thessaloniki (in Greek); Ageloudi, S., (1984), ‘The traditional home of Thasos’, *Thasiaka*, 1, 117-121 (in Greek); Ageloudi, S., and Velenis, G., (1983), ‘The traditional settlement of Kastro on Thassos’, *Balkan Studies*, 24, p. 19-28; Archaeological Guide of Thasos, (1974), French Archaeological School of Athens, Athens.

⁷⁴ Ageloudi, S., (2018), ‘The consequences of piracy and loot in Thasos and Kavala during the Ottoman occupation’, in (Ephorate of Antiquities of Lesbos), *Fortifications of the Ottoman Period in the Aegean*, (in press); (2009), ‘Thasos during the Venetian-Ottoman wars’, *Thasiaka*, 14, p. 15-32 (in Greek); (2008), ‘Ottoman-Venetian wars, Ottoman censuses, travelers and piracy’, in (Ed.) G. K. Papazoglou, *Eastern Macedonia*, p. 164-177; Bonias, Z, and Dadaki, A. S., (2002), *Thasos, Antiquities of Kavala Prefecture*, IH’ Ephorate of Prehistoric and Classical Antiquities of Kavala, 12th Ephorate of Byzantine Antiquities of Kavala, Kavala, p. 90; Kontogiannis, P., (1915) *The Pirates and Thasos*, Photographic Reprint of 1995, Athens (in Greek).

⁷⁵ At an approximate distance of 4.5 km from the shore, and between a spatial range of 110 to 220 meters elevations from sea level.

Paliokastro (the old fort) and the aim for the prosopography of its female and male riders

In contemplating those matters presented above, and considering the imposing, strategically conspicuous, yet uniquely defensible geomorphological context of Paliokastro in the region, along with the evidentiary data provided by its archaeological and anthropological records there were additional questions to canvass, pivotal to the function of the site and of the type and kind of its social organizational structure. What could have been the nature of its demographic dynamics, and the logistical capacities of such a community which despite its isolated and not easily accessible location would nevertheless have in its immediate services a very seasoned physician, apparently most competent in the treatment of acute trauma?

In addition to the rest of the data derived from the skeletal record on matters of biological growth and the palaeopathological profile of the population sample involved with emphasis on the serious limb fractures, prevalent among the adult membership of Paliokastro along with their diligent medico-surgical treatment, the palaeopathologist was seeking to derive from the anthropological record clues through the identification of distinct skeletal traits which accessory to long term utilitarian, habitual and/or occupational activities could elucidate aspects of behavioral modes of the individuals involved; in the hope of deriving some identifiers, representative of their experiences and life conditions lived at ProtoByzantine Paliokastro. Hence, of the nine adult individuals of the population sample and out of seven of them⁷⁶ who had retained their lower extremities, four males and two females presented skeletal acquired changes and skeletomuscular modifications relevant to long term horseback riding; notably the habitual riding position among the women as well was the straddling of the horse.⁷⁷ The case of the female riders was indicative of their higher social standing, experiential abilities, and their non-home bound, 'extramural', involvement and participation in a variety of common enough functions during their lives which obliged or required of them the riding of horses under their capacity as actively committed, yet exceptional members in their socio-cultural contexts at Paliokastro. Overall, the occurrence of the riding manifestations comprised a very high outcome, with an observation ratio of ca. 86.0% among both males and females, however with a 100% observation ratio among the females. Furthermore, horse-riding relative skeletal changes were documented on all adult male and female individuals who had sustained upper and lower limb injuries,⁷⁸ scoring in this particular cluster a 100.0% observation ratio;⁷⁹ suggestive of the possibility that the fractures could have been traumatic incidences relevant to the riding of horses. This was possibly offering an interesting explanatory scenario for the serious palaeopathological complications of the fibular diaphyses as well, as documented among four of those male and female adults who had sustained leg traumatism, given that the peroneal diaphyses are usually vulnerably exposed, most lateralward on the flanks of the horse while riding, especially when the horse is commanded to trot through rugged, rocky, and densely wooded environments.

⁷⁶ The remaining adults involved a female and a male individual.

⁷⁷ Substantiated by comparable hip join (of acetabular and femoral head/neck regions) skeletal changes and lower extremities' skeletomuscular modifications as those observed among the male riders. Straddling the horse would enable the female rider to maintain a stable balance while riding, particularly when through the rugged, sloping and steep uplands of Paliokastro's densely wooded regional environment.

⁷⁸ The palaeopathological cases of three adult males and two adult females evaluated above.

⁷⁹ In comparison, of the sample population of 21 individuals from the ProtoByzantine cemetery in Limenas of Thasos, only a ca. 65 year old male individual (see footnote 25, *supra*: who also presented skeletomuscular changes of the upper extremities consistent with archery), discerned comparable skeletomuscular modifications associated with horseback riding, coupled by infectious periosteal complications of the tibial diaphyses (on their anterior and interosseous crests), as well as distinct traces of unilateral traumatic injuries on the plantar surface of the right calcaneus; as a result of long term habitual dismounting from the right, cf. Agelarakis, A. P., (2000), 'Anthropological Report on the Roman-Paleo-Christian Human Skeletal Remains Excavated from the Ancient Theater Site of Thasos', Archival Archaeological Reports, Prehistoric and Classical Museum of Thasos, 18th Ephorate of Prehistoric and Classical Antiquities.

Mounted archers of Paliokastro

Having established the high prevalence of riders within the male and female adult membership of the population sample it was of great interest to substantiate that all five (a 100% observation ratio) out of the six male individuals that had retained their upper extremities were clearly revealing most comparable patterns of significant skeletal robustness, skeleto-muscular modifications, and skeletal acquired changes inclusive of degenerative osteoarthropathic manifestations relevant to the long term effects caused by the stretching of heavy bows.⁸⁰

In seeking to decipher echoes of the human condition experienced at Paliokastro, as an essential project objective, the correlation of the unique parallels documented among the majority of the adult individuals involved and particularly of the males, as provided by the archaeo-anthropological record, relevant to their *intra vitam* long term riding of horses and their specialization in archery, inclusive of the medical intervention traces corroborating the sustained presence and attentive care of a physician(s) with broad experience in treating traumatic injuries, seemed to recite a narration of sorts; one that was to be reiterated as utterances chronicled in the skeletal record, recovered in fact from a site named as 'the old fort'.⁸¹ Could those deciphered site reflections compile an adequate ensemble of elemental dynamics proclaiming military hues in the contextual nature and function of the site? What would have been the role of women under such bearings? Could it just be a coincidence that all riding males happened to have also been archers of heavy bows? If indeed deployed in a military context at Paliokastro would they have been serving in infantry with great abilities in archery, or given the traces of their long term riding capacities as most probabilities could have it in the cavalry as mounted archers? If so, what was the role and position of mounted archers in the Roman army? Could available historical records provide references elucidating matters on the state of the Eastern Roman army and the theater of war in the region during the course of the 5th/6th centuries of the ProtoByzantine period?

Historical references on the Roman army and the ProtoByzantine mounted archer/lancer

In an explicitly symbolic manner and rather in a celebratory style, the 6th century historian Procopius, a seasoned veteran of wars against the Persians in Mesopotamia, the Vandals in north Africa, and the Goths in Italy, during the momentous years of Emperor Justinian I's reign, selected to initiate, already from the second paragraph, his eight volume treatise on *History of the Wars* addressing the paramount importance of the mounted archers in the Eastern Roman army, exalting their abilities and effectiveness

⁸⁰ In seeking for clues that could possibly indicate traces of the earlier in life onset of rigorous kinetic modes required for the training and skillful honing in stretching the bow it is suggested (however with caution in relating exclusively to kinetics for said task) that support may be offered on the long term involvement of the upper extremities in demanding and repetitive physical activities, since the SubAdult years, of four out of the five male individuals involved in archery, by the still traceable yet most shallow cortical defects on the humeral proximal third diaphyseal insertions *loci* of *M. latissimus dorsi*, *pectoralis major*, and *teres majoris*; in brief relevant for the extension of the arm and its adduction with an internal rotatory tendency, cf. Murphy, S. P., and Mann, R. W., (1990), 'Cortical defects of the proximal humerus: An indicator of physical stress', *American Journal of Physical Anthropology*, 81: 2, p. 273; Brower, A. C., (1977), 'Cortical defects of the humerus at the insertion of the pectoralis major', *American Journal of Roentgenology*, 128, p. 677-678.

⁸¹ In the local nomenclature *Palio-kastro*, as the name is transferred from oral tradition, is a toponymal reference describing a very old and usually ruined fort, unlike *Kastro* which is describing a recognizable in recent historic times fortified settlement site in Thasos, e.g. Ageloudi, S., and Velenis, G., (1983), 'The traditional settlement of Kastro on Thassos', *Balkan Studies*, 24, p. 19-28. Rachoni village interlocutors had shared with this author and colleague Dr. Sappho Ageloudi-Zarkada, also a native of Rachoni, that the catastrophic forestland fires in Thasos [particularly of 1984, 1985, 1989, and 2000, cf. Filiadis, F., (2016), 'Forest Fires Distribution in the Continental Area of Kavala', *Journal of Engineering Science and Review*, 9:1, p. 99-102] had exposed, previously unknown to them foundations of fortification type walls and structure(s), about 150 to 200 meters westward from the *naiskos* at Paliokastro, unavailable for observation in the summer of 2019 due to the thick growth of thorny bushes and trees. However, their accounts resonated of a stronghold description, possibly with a tower, in some ways as portrayed in Procopius, *Buildings*, (2002), (Ed.) J. Henderson, (Transl.) H.B. Dewing, Loeb Classical Library, Harvard University Press, Cambridge, Massachusetts, IV. v. 4-5, p. 266.

at the theater of war; contrasting them to the contemptuous place⁸² and predicament of the archer in Homeric times, who entered the battlefield on foot without a horse, spear, or the protection of a shield, with an insufficient stretch of the bow just up to their breast and a feeble efficacy of their arrow, while always lurking somewhere behind unable to honorably face the opponent in the open.⁸³ Further, in mocking those of his contemporaries who fixated on dated concepts of the ancient warrior were failing to appreciate the valor and admirable achievements of the soldier of his time,⁸⁴ Procopius provides a basic description of preparedness, armaments, skill and mobility of the mounted archers in the battlefield during the 6th century of the ProtoByzantine period through the following: ‘...the archers of the present times enter the battle protected by body panoply and fitted with greaves up to the knee. Hanging from their right side are the arrows and from the other the sword. There are indeed those of them with a hitched-on spear, and a kind of a small-scaled shield, lacking a handle, on their shoulders to cover the neck and peripherally to the face. Riding perfectly and at full speed on the horse without hardship powerfully shoot with the bows to either side the enemy while pursuing them and as they are flying. They pull the bowstring toward the forehead and particularly next to the right ear, loading the arrow with such deterring power-potential so as to kill anyone standing in the way, no shield and possibly no breast protection able to fend off its impetus.’⁸⁵

Such a strong promulgation on behalf of the mounted archers and their prominent place and role in the army of Justinian I’s period should not come as a surprise given the slowly but gradually implemented changes in favor of the cavalry⁸⁶ that had occurred since the bitter lessons taught during the battles preceding, in 376 AD, the final defeat of the Roman army in Hadrianopolis on August 9, 378;⁸⁷ where in addition to other military parameters that weigh on the Roman defeat was also that the key element of the army had been the heavily armored infantry of the legions against the hordes of the ‘barbarian’ opponents charging in the battlefield with flexibility spearheaded by their numerous, highly mobile, cavalry forces.⁸⁸ Changes that occurred in the troop synthesis of the Roman army following the Hadrianopolis defeat to the early 5th century provided for a considerable increase in the proportionality⁸⁹ of both light and heavily mounted cavalry to the infantry.⁹⁰ While on the organization of the Roman army, as presented in the *Notitia Dignitatum*,⁹¹ a larger proportion of cavalry was allocated in the 4th century to frontier divisions (*limites*)⁹² for the patrolling and safeguarding from enemy incursions, raids, and for policing the borders,⁹³ the *Strategikon* provides ample evidence that the Roman army in the 6th

⁸² Diomedes’ most scornful ridicule of Paris, Homer, *Iliad*, (2001), (Ed.) J. Henderson, (Transl.) A. T. Murray, and W. F. Wyatt, Loeb Classical Library, Harvard University Press, Cambridge, Massachusetts, 11, p. 384-395.

⁸³ Procopius, *History of the Wars*, (2001), (Ed.) J. Henderson, (Transl.) H.B. Dewing, Loeb Classical Library, Harvard University Press, Cambridge, Massachusetts, I. i. 8-12, p. 4-6.

⁸⁴ *Ibid.* I. i. 6-8, p. 4.

⁸⁵ Procopius, *History of the Wars*, (2001), (Ed.) J. Henderson, (Transl.) H.B. Dewing, Loeb Classical Library, Harvard University Press, Cambridge, Massachusetts, I. i. 12-16, p. 6-8 (Fragment translated by the author.); *The Anonymous Byzantine Treatise on Strategy*, (2008), in (Ed.) A. Verdit, (Transl.) G. T. Dennis, Three Military Treatises, Dumbarton Oaks, Washington, D.C., 44, p. 128-129.

⁸⁶ Elton, H., (1997), *Warfare in Roman Europe AD 350-424*, Oxford University Press, Oxford, p. 105-106.

⁸⁷ Delbruck, H., (Transl.) W. J. Renfro Jr., (1990), *The Barbarian Invasions: History of the Art of War, Volume II*, University of Nebraska Press, Lincoln, p. 269-284.

⁸⁸ Ammianus Marcellinus, *History*, (2001), (Ed.) J. Henderson, (Transl.) J. C. Rolfe, Loeb Classical Library, Harvard University Press, Cambridge, Massachusetts, XXXI. 6-9, p. 419-505.

⁸⁹ Cf. Treadgold, W., (1995), *Byzantium and Its Army 284-1081*, Chapter: ‘The Problem of the *Notitia Dignitatum*’, Stanford University Press, California, Stanford, p. 44-86.

⁹⁰ Eadie, W. J., (1967), ‘The Development of Roman Mailed Cavalry’, *Journal of Roman Studies*, 57, 1-2, p. 161-173; Plutarch, *Lives: Crassus*, (2001), (Ed.) J. Henderson, (Transl.) B. Perrin, Loeb Classical Library, Harvard University Press, Cambridge, Massachusetts, XXXV. 4-10, p. 392-394 (The events of the battle at Carrhae, in 53 BC, clearly show the effectiveness of the mounted archers in collaboration with the heavily armed *katafraktoi* of the Partians, as well as the desperate contrivance against the latter by the Gaulic contingent of the Roman army).

⁹¹ See footnote No. 89, *supra*.

⁹² And *limitanei* as individual members of such cohorts, see Benjamin, I., (1988), ‘The Meaning of ‘Limes’ and ‘Limitanei’ in Ancient Sources’, *Journal of Roman Studies*, 78, pp. 125-147.

⁹³ Treadgold, W., (1995), *Byzantium and Its Army 284-1081*, Chapter: ‘The Problem of the *Notitia Dignitatum*’, Stanford University Press, California, Stanford, p. 93, and Table No. 1, p. 51-53.

century was dominated by the cavalry, in fact with great capabilities as mounted archers;⁹⁴ also clearly provided through Procopius that already during Justinian I's time it was usual for the Roman soldier to enter the battlefield fighting on horseback.

Such was the importance and efficacy of the mounted archer in the Roman army of the 6th century that in the very first lines of Book 1, Chapter 1, in the *Strategikon*, on 'The Training and Drilling of the Individual Soldier' we read: *'..He should also shoot rapidly mounted on his horse at a run, to the front, the rear, the right, the left. He should practice leaping onto the horse. On horseback at the run he should fire one or two arrows rapidly and put the strung bow in its case, if it is wide enough, or in a half-case designed for this purpose, and then he should grab the spear which he has carrying on his back. With the strung bow in its case, he should hold the spear in his hand, then quickly replace it on his back, and grab the bow. It is a good idea for the soldiers to practice all this while mounted, on the march in their own country. For such exercises do not interfere with marching and do not wear out the horses.'*⁹⁵

Reflections on archery, and the type and capacity of bows and arrows used by the Roman mounted archer in battle versus these of the 'barbarian' enemies

Putting Procopius' description in a rather animated mode, the *Strategikon* allows through its recommendations the gleaning on aspects of the intensive drilling and discipline that were required for the training and acute preparation of the mounted archer; apparently recommended as an ongoing process in order to keep up their conditioning and for constantly honing their skills. How similar or different could have been some of the conditions on relevant matters experienced by the Paliokastro mounted archers? Particularly, as it was determined through skeleto-anatomic changes and morpho-anatomic manifestations of their upper extremities that they had been actively stretching heavy bows over long periods of their lives; as suggested above having been heavily involved in physical activities since their early SubAdult years in upper extremity kinetics, not unlike those required for training in archery. The *Strategikon*, which put on record the wisdom of preferred military operations and practices tested in the battle field, may indeed provide some clues on this matter. In its second chapter on 'The Armament of the Cavalryman and the Basic Equipment to Be Furnished' of book 1, recommendations, nearly resembling maxims of the period, clearly state, *'...all the younger Romans up to age of forty must definitely be required to possess bow and quiver, whether they are expert archers or just average. They should possess two lances so as to have a spare one at hand in case the first one misses. Unskilled men should use lighter bows. Given enough time, even those who do not know how to shoot will learn, for it is essential that they do.'*⁹⁶ Further, in clearly recognizing and distinguishing matters on the strength ability between individual mounted archers it makes recommendations on the strength of the bow to be used: *'...bows suited to the strength of each man, and not above it, more in fact on the weaker side...'*⁹⁷ indicative of the scale variability in the draw weight of available bows during the period. Given the significant energy possessed by the discharged arrow and its piercing ability, as clearly described by Procopius,⁹⁸ it is possible to reckon of the substantial draw weight of the bows used by the mounted archers; demanding through long term training (preferably since their SubAdult years) and constant drilling for the upkeep of their conditioning

⁹⁴ Maurice's *Strategikon*, Handbook of Byzantine Military Strategy, (1984), (Transl.) G. T. Dennis, University of Pennsylvania Press, Philadelphia; Haldon, J., (1999), *Warfare, State and Society in the Byzantine World 565-1204*, Routledge, London, p. 193-197.

⁹⁵ Ibid. p.11.

⁹⁶ Ibid. p. 12-13.

⁹⁷ Ibid, p. 12.

⁹⁸ See footnote No. 85, *supra*. Further, regarding the piercing ability of the arrow through shield and even body armor, such as mail, it is suggested that the tip of the arrow should have preferably been narrower, pointed like a dagger, with hardened sides, different from the broadheads. Such an arrow tip, despite its multifold penetrating ability, would lose the efficacy of the broadheads to cause significant tissue damage and the difficulty to extract them, being widely barbed. Nevertheless, the consideration should be made that the speed of the galloping horse would add to the kinetic energy of the dislodged arrow, hence providing greater penetration ability even to broadheads.

for battle actions great requirements of skeleto-muscular power.⁹⁹ It is therefore not surprising that the upper extremities of the Paliokastro archers were revealing such uniquely emphasized manifestations of skeletal/skeleto-muscular *loci* robustness, from the shoulders to the distal phalanges of the hands; for the latter particularly on the right counterparts as would have also been conditioned by the required stretching of powerful bows.¹⁰⁰

Noting the differences in the types of arrows used by the ProtoByzantine adversaries of the period,¹⁰¹ the *Strategikon*, states: ‘...they use wooden bows with short arrows smeared with a poisonous drug which is very effective. If a wounded man has not drunk an antidote beforehand to check the poison or made use of other remedies which experienced doctors might know about, he should immediately cut around the wound to keep the poison from spreading to the rest of the body.’¹⁰² While the reference made is indicative of an intimate experiential knowledge on the potency of the poisonous arrows, along with measures to be taken in the prophylactic or unprotected encounter with the enemy archers, it is derived that short arrows could only be used with an analogous short draw length; the bowstring by no means would be stretched from the riser held by the extended left upper extremity back to the level of the shooter’s right ear, as would be expected at full draw for a composite or recurve bow. Whereas this would further infer that the brace height of the enemy bows would have preferably been on the shorter side in order to accommodate the shorter length of the arrows, it could also be surmised that the draw weight, in stretching the wooden bow, would have been lighter under those circumstances compared to ones of the Romans. As such, it is suggested that the shorter in length-poisoned arrows of the enemies would under good probabilities also be thinner, as the main intention of their efficacy it is assumed was not for them to necessarily pierce through shield, or mail combined with hide-felt, scale, or lamellar-clad panoply, but to just scratch or superficially wound the victim; as the poison itself would proceed to carry out its morbid mission. This would have a significant psychological impact on their opponents, given that without antidote, the intervention of an experienced field physician, or the immediate aciurgy action by the wounded himself, death would be certain. Furthermore, tactical advantages of shooting shorter¹⁰³ and lighter arrows would be their

⁹⁹ In the case of delayed discharges of the arrows, which is clearly not recommended by the *Strategikon* (see footnote No. 95, *supra*), e.g. thought of as providing for better aiming results through a lingering inspection of the target while at a full draw of the bow, additional muscular antifatigue requirements were to be incrementally needed, taxing the energy of the archer (as assessed through the long term experience of the author in archery with both composite and recurve bows). Further, it would possibly impede the chance to achieve target in the turmoil of the battle, increasing the chances of being hit instead by an enemy projectile, while as importantly it would hamper the efficacy of the archer(s), member(s) of the cavalry cohort, in their shock attack charge against the enemy, cf. *The Anonymous Byzantine Treatise on Strategy*, (2008), in (Ed.) A. Verdit, (Transl.) G. T. Dennis, *Three Military Treatises*, Dumbarton Oaks, Washington, D.C., 46-47, p. 132-135.

¹⁰⁰ Assessing that a most powerful hand grip ability would have been required so that without thumb rings to draw the bow string with the thumb and forefinger, the Roman way of locking the bowstring; although the Persian locking is also recommended, see *Maurice’s Strategikon*, *Handbook of Byzantine Military Strategy*, (1984), (Transl.) G. T. Dennis, University of Pennsylvania Press, Philadelphia, p. 11, particularly footnote 2; cf. Bivar, A. D. H., (1972), ‘Cavalry Equipment and Tactics on the Euphrates Frontier’, *Dumbarton Oaks Papers*, 26, p. 271-291, and particularly p. 285. In fact, as experience has it and with the author’s personal experience, the draw weight would gradually increase in both composite and recurve bows the further back a consummate archer would pull back the bowstring (increasing the draw length), promoting thus through a cumulative process of skeleto-muscular responses an even greater degree of focal robustness. Furthermore, through continued training, archers gradually gain more experience, master the technique of using the bow and increase their draw weight ability, e.g. from ca. 45-50 lb. in their youth to 70+ lb. as seasoned archers. A set of explicit recommendations for archery during the 6th century, regarding training, in aiming and firing are recorded in *The Anonymous Byzantine Treatise on Strategy*, (2008), in (Ed.) A. Verdit, (Transl.) G. T. Dennis, *Three Military Treatises*, Dumbarton Oaks, Washington, D.C., 44-47, p. 128-135.

¹⁰¹ Clear references are made of the Avars, the Sclaveni, and the Antes among others throughout the treatise and as exemplified by the title of chapter 4 in book X, ‘Dealing with the Slavs, the Antes and the Like’, *Maurice’s Strategikon*, *Handbook of Byzantine Military Strategy*, (1984), (Transl.) G. T. Dennis, University of Pennsylvania Press, Philadelphia, 4. p. 121. The Bulgars were also enemies engaging during the ProtoByzantine period the Romans since 493-530, as for example in river Tzurta in 499, defeating the Roman army that was headed by *Magister Militum Illiricum*, Aristus, see Croke, B., (2001), *Count Marcellinus and his Chronicle*, Oxford University Press, p. 53, 68-69.

¹⁰² *Maurice’s Strategikon*, *Handbook of Byzantine Military Strategy*, (1984), (Transl.) G. T. Dennis, University of Pennsylvania Press, Philadelphia, 4. p.121.

¹⁰³ Shorter arrows usually have the tendency to be more rigid compared to the longer and thus more flexible arrows while they are discharged and as they fly toward their target.

faster flight than the heavier, longer and thicker, arrows of the ProtoByzantines,¹⁰⁴ providing if all other parameters were equal for a lengthier trajectory of flight distance yet with curtailed demands of energy expenditure for the archer.

Historical references on Roman enemies and their invasions in the region of Thasos: Antae, Avars, Bulgars, Huns, Sclaveni, Kutrigurs

Evaluating just a fraction of such archery relative matters, focusing on the ways and elemental attributes, as well as the weaponized potential of the arrows used by the Roman enemies clearly reflected on the seasoned and sophisticated aspects of their war apparatus. But were such enemies of the Romans seaworthy, able to cross the waters of the Macedonian and Thracian mainland for the shores of the other side during the ProtoByzantine period? Providing a predating historical context, Ammianus Marcellinus indicates that ‘*Swarms of the Skythian peoples with two hundred ships broke through the Bosphorus and the shores of Propontis, and after crossing inflicted bitter losses by land and sea...The cities of Pamphylia were beleaguered, very many island laid waste, all Macedonia was given to the flames; for a long time the horde laid siege to Thessalonica and to Cyzicus as well...Foreign foes roamed at will over Epirus, Thessaly and whole of Greece;...they were driven out by Aurelian*¹⁰⁵ a vigorous man and a severe avenger of their sins, and remained quiet for long ages, except that afterwards single bands or robbers made raids into the neighboring regions, but very rarely and to their own destruction.’¹⁰⁶ Further, Procopius describing similar calamities, in 539,¹⁰⁷ stated that, ‘*...a mighty Hunnic army crossing the Danube River fell as a scourge upon all Europe, a thing that happened many times before, but which had never brought such a multitude of woes nor such dreadful ones to the people of that land. From the Ionian Gulf these barbarians plundered everything in order as far as the suburbs of Byzantium. And they captured thirty-two fortresses in Illyricum, and they carried by storm the city of Cassandria (which the ancients called Potidaea as far as we know)...In later times too they often came there and brought upon the Romans irreparable calamity. This same people also assailed the wall of the Chersonesus...and approaching through the surf of the sea, scaled the fortifications...Some few of them also crossed the strait between Sestus and Abydos, and after plundering the Asiatic country, they returned again to the Chersonesus, and with the rest of the army and all the booty betook themselves to their homes.*’¹⁰⁸ Hence, the means and ways of Roman enemies, traditional occupants of inland regions, to cross opens seas, some widely open, was very possible as provided by the cases of the pillaging of Rhodes, Crete and

¹⁰⁴ For the length of a bowshot c.f. Maurice’s *Strategikon*, Handbook of Byzantine Military Strategy, (1984), (Transl.) G. T. Dennis, University of Pennsylvania Press, Philadelphia, II. 13, and footnote 3, p. 31.

¹⁰⁵ Emperor (270-275) Lucius Domitius Aurelianus, declared *Restitutor Orbis* given his victories against the ‘barbarians’ and for his restoration of the Empire from the third century calamities.

¹⁰⁶ Ammianus Marcellinus, *History*, (2001), (Ed.) J. Henderson, (Transl.) J. C. Rolfe, Loeb Classical Library, Harvard University Press, Cambridge, Massachusetts, XXXI. 5. 15. p. 416-419.

¹⁰⁷ During the reign of Emperor Justinian I (527-565). However, preceding events of year 539 Procopius provides that: ‘*...Illyricum and Thrace in its entirety, comprising the whole expanse of country from the Ionian Gulf to the outskirts of Byzantium, including Greece and the Thracian Chersonese, was overrun practically every year by Huns, Sclaveni and Antae, from the time when Justinian took over the Roman Empire, and they wrought frightful havoc among the inhabitants of that region.*’, Procopius, *Anecdota*, (2004), (Ed.) J. Henderson, (Transl.) H. B. Dewing, Loeb Classical Library, Harvard University Press, Cambridge, Massachusetts, xviii. 20-21, p. 216-217; Further, in 531, ‘*...Chilbudius was appointed by the emperor, in the fourth year of his reign, to be General of Thrace, and was assigned to guard the river Ister, being ordered to keep watch so that the barbarians of that region could no longer cross the river, since the Huns and Antae and Sclaveni had already made the crossings many times and done irreparable harm to the Romans. And Chilbudius became such an object of terror to the barbarians that for the space of three year, not only did no one succeed in crossing the Ister, but the Romans actually crossed over the opposite side many times with Chilbudius and killed and enslaved the barbarians there. But three years later, when Chilbudius crossed the river, as was his custom, with a small force...many Romans fell and among them Chilbudius. Thereafter the river became free for the barbarians to cross at all times just as they wished, and the possessions of the Romans were rendered easily accessible...At about this time the Antae descended upon the land of Thrace and plundered and enslaved many of the Roman inhabitants; and they led these captives with them as they returned to their native abode.*’, Procopius, *History of the Wars*, (1924), (Eds.) E. Capps, T. E. Page, and W. H. D. Rouse, (Transl.) H. B. Dewing, w. Heinemann, London, VII. xiv. 2-11, p. 262-265.

¹⁰⁸ Procopius, *History of the Wars*, (2001), (Ed.) J. Henderson, (Transl.) H.B. Dewing, Loeb Classical Library, Harvard University Press, Cambridge, Massachusetts, II. IV. 4-9, p. 286-289.

Cyprus during the third century,¹⁰⁹ and of the crossings of the Dardanelles and the pillaging of Abydos and its region.¹¹⁰ Assuming that the *hippotoxotai* interred at Paliokastro had possibly been in active service¹¹¹ and/or some were serving as veterans in Thasos, particularly during the late 5th and mainly the 6th centuries¹¹² when mounted archers were prominent in the military synthesis and dominant in the operations of the Roman army,¹¹³ were there any historical references describing that any of the recurrent enemy incursions of the period could have crossed the Aegean shores of Thraco-Macedonia over to the island?

Historical references on barbarian raids and their consequences in Thrace and Macedonia

Indeed, Procopius mentions that an army of Sclaveni of not more than three thousand crossed the Ister and afterwards the Hebrus,¹¹⁴ then divided into two parties and subsequently proceeding to plunder they defeated the Roman army in Thrace and Illiricum respectively. He continues by stating that ‘...they turned to plunder all towns, both of Thrace and of Illiricum...captured many fortresses by siege...plundered everything in order as far as the sea and captured by storm a city on the coast named Topirus,¹¹⁵ though it had a garrison of soldiers; this is the first of the coast towns of Thrace and is twelve days’ journey distant from Byzantium.’¹¹⁶ ‘Then they slew all the men immediately, to the number of fifteen thousand, took all the valuables as plunder, and reduced the children and women to slavery. Before this, however, they had spared no age...had been killing all who fell in their way, young and old alike, so that the whole land inhabited by the Illyrians and Thracians came to be everywhere filled with unburied corpses. Now they killed their victims, not with sword nor spear, nor in any other accustomed manner, but by planting very firmly in the earth stakes which they had made exceedingly sharp, and seating the poor wretches upon these with great violence, driving the

¹⁰⁹ Ammianus Marcellinus, *History*, (2001), (Ed.) J. Henderson, (Transl.) J. C. Rolfe, Loeb Classical Library, Harvard University Press, Cambridge, Massachusetts, XXXI. 5. 15. p. 416-419, and footnote No. 3.

¹¹⁰ See footnote No. 108, *supra*. Regarding the aspects of the political organization of the ‘barbarian’ enemies of the Romans in the region see Sarantis, A., (2016), ‘Eastern Roman management of barbarian states in the Lower-Middle Danube frontier zones, AD 332-610’, in (Eds.) I. Bugarski, O. Heinrich-Tamaska, V. Ivanisevic, and D. Syrbe, *Late Roman, Early Christian, Early Byzantine as categories in historical-archaeological research on the middle Danube*, B. A. Greiner Verlag, Remshalden, p. 41-65; Karadras, G., (2015), ‘The Nomadic Art of War. The Case of the Avars’, *Acta Militaria Mediaevalia*, XI., p. 7-25; Sarantis, A., (2013), ‘Waging War in Late Antiquity’, in (Eds.) Sarantis, A., and Christie, N., *War and Warfare in Late Antiquity: Current Perspectives*, Leiden, Vol. 8.1;.

¹¹¹ Although unable to suggest any matters of military or administrative rank for the individuals involved, the author proposes nevertheless their high standing given the privileges of their funerary contexts. For hierarchy in a cavalry regiment, also analogous among the membership of bureaucracy, of the period, see Treadgold, W., (1995), *Byzantium and Its Army 284-1081*, Chapter: ‘The Problem of the *Notitia Dignitatum*’, Stanford University Press, California Stanford, p. 89-91.

¹¹² As provided by the relative dating of the site’s cultural materials, addressed above.

¹¹³ Curta, F., (2016), ‘Avar *Blitzkrieg*, Slavic and Bulgar raiders, and Roman special ops: mobile warriors in the 6th-century Balkans’, in (Eds.) I. Zimonyi, and O. Karatay, *Eurasia in the Middle Ages. Studies in Honour of Peter B. Golden*, Harrassowitz Verlag, Wiesbaden, p. 69-90; Haldon, J., (1999), *Warfare, State and Society in the Byzantine World 565-1204*, Routledge, London, p. 193-197; Elton, H., (1997), *Warfare in Roman Europe AD 350-424*, Oxford University Press, Oxford, p. 105-106, and its footnote 3, that Topiros is just opposite the straight to Thasos.

¹¹⁴ Procopius presents the Sclaveni invasion within the approximate temporal context of when Totila led his army against Rome, in 549, see Procopius, *History of the Wars*, (2001), (Ed.) J. Henderson, (Transl.) H.B. Dewing, Loeb Classical Library, Harvard University Press, Cambridge, Massachusetts, VII. xxxvi. 1, p. 2-3.

¹¹⁵ *Ibid.* VII. xxxviii. 7-9, p. 22-23.

¹¹⁶ Following the killing of the military guard by a stratagem implemented by the Sclaveni, the citizens defended the city for some time, but were overwhelmed by the multitude of missiles and were forced to abandon the battlements, subsequently the Sclaveni using ladders stormed the city (*ibid.* VII. xxxvi. 9, p. 22-23). In the *Buildings*, Procopius explains that restorations of the fortifications by Justinian I, raised the walls to overtop a steep hill so much higher as it previously fell below its crest, a major culprit for the fall of the city by the overwhelming number missiles, and even erected a vaulted roof on the wall for the protection of the defenders fighting from the wall against future attacks [(Procopius, *Buildings*, (2002), (Ed.) J. Henderson, (Transl.) H.B. Dewing, Loeb Classical Library, Harvard University Press, Cambridge, Massachusetts, IV. xi. 14-16, p.306-307)]. Hence, it can be deduced that the Sclaveni missiles could have easily been javelins, without excluding arrows, hurled from a higher elevation toward the battlements. This may serve as an explanation to a relevant question posed by F. Curta, in Curta, F., (2016), ‘Avar *Blitzkrieg*, Slavic and Bulgar raiders, and Roman special ops: mobile warriors in the 6th-century Balkans’, in (Eds.) I. Zimonyi, and O. Karatay, *Eurasia in the Middle Ages. Studies in Honour of Peter B. Golden*, Harrassowitz Verlag, Wiesbaden, p. 80.

point of the stake between the buttocks and forcing it up into the intestines; thus did they see fit to destroy them. These barbarians also had a way of planting four thick stakes very deep in the ground, and after binding the feet and hands of the captives to these they would then assiduously beat them over the head with clubs, killing them like dogs, or snakes or any other animal. Others again they would imprison in their huts together with their cattle and sheep...and then they would set fire to the huts without mercy. Thus did the Sclaveni consistently destroy those who fell in their way.’¹¹⁷ Whereas the historical record does not mention any crossing over of the relatively narrow straight to Thasos island, it remains ambivalent although possible to consider that such a crossing of just 10 km, with the islet of Thasopoula in-between, could easily have taken place. Nonetheless, the horrific description of the ravages, tortures, and executions of the Roman civilians by the Sclaveni, is copied here only at the behest of elucidating the predicament that the inhabitants of Thasos and particularly the men in arms had to consider in preparing to face the enemy. If indeed the inhabitants of Thasos had not been violated at the juncture of Topirus’ destruction, the terrifying misfortunes of its inhabitants would have easily reached them, not only from the visible fires burning over the narrow straight but perhaps even more directly from some lucky seafaring escapees from the mainland (Figure 21). These then were the calamitous conditions that pertained in the very proximity of Thasos, and had to be confronted by analogous preparations and plans of action by those who were to defend and safeguard the territory, their posts, their comrades, their loved ones, and whatever could have been saved from their available resources and belongings. Fortunately for the Thasians, the barrier of the sea would have provided enough respite under some circumstances, allowing the detection and appraisal of a flotilla of approaching raiders from the mainland. And, the rather steeply mountainous, thickly wooded, terrain of Thasos would have provided good advantages to the locals having an intimate knowledge of their island’s topography. These latter matters, it is postulated would have been reasonable parameters to expect of the Thasians when an adjacent city to Topirus¹¹⁸ as Procopius states in the *Buildings*, namely Anastasiopolis, ‘...lay along the shore and the beach was unprotected.’¹¹⁹ Consequently the boats putting in there often fell suddenly into the hands of barbarian Huns, who by means of them also harassed the islands lying off the coast there.’¹²⁰ Here therefore we derive a historical reference from which we decode that Thasos, spatially the closest island to the shore of Anastasiopolis,¹²¹ would have been invaded by the Huns abducting boats (and possibly with their crew members) and thus seagoing: ‘...harassed the islands lying off the coast there.’ Whereas a particular date is not immediately apparent for the Hunnic harassment of Thasos, the publication of the *Buildings*, estimated to have been published at, or, just after 560,¹²² during the later years of Emperor Justinian I’s reign, provides a relative *terminus ante quem*. Further, Procopius describes in the particular segment of the *Buildings* consequent undertakings taken in Anastasiopolis by Emperor Justinian I, in order to protect not only the city but also the islanders: ‘Emperor Justinian walled in the whole seafront by means

¹¹⁷ Procopius, *History of the Wars*, (2001), (Ed.) J. Henderson, (Transl.) H.B. Dewing, Loeb Classical Library, Harvard University Press, Cambridge, Massachusetts, VII. xxxviii. 18-23, p. 24-27.

¹¹⁸ In the *History of Wars* Procopius spells the name of the city as Τόπηρον (in the Loeb translation as Topirus), in the *Buildings* as Τόπερος (in the Loeb translation as Toperus); hence the variability in the spelling of the name in the text above. The current spelling is Τόπειρος, spelled as Τόπειρά by Stabo (in the Loeb translation as Topeira), Strabo, *Geography*, (2001), (Ed.) J. Henderson, (Transl.) H. L. Jones, Fragments of Book VII. 44 (45), p. 366.

¹¹⁹ Within the domain of the Bistonis coastal lagoon which Strabo describes as a lake that had been opened to the sea by Herakles, see Strabo, *Geography*, (2001), (Ed.) J. Henderson, (Transl.) H. L. Jones, Fragments of Book VII. 43 (44), p. 364, 46 (47), p. 366.

¹²⁰ Procopius, *Buildings*, (2002), (Ed.) J. Henderson, (Transl.) H.B. Dewing, Loeb Classical Library, Harvard University Press, Cambridge, Massachusetts, IV. xi. 11, p. 306-307.

¹²¹ Another island could possibly have been Samothrace, although at a considerably greater distance from Anastasiopolis, however Strabo designates Thasos and Lemnos as the two islands at the seaboard of the specific region, see Strabo, *Geography*, (2001), (Ed.) J. Henderson, (Transl.) H. L. Jones, Fragments of Book VII. 43 (44), p. 364, and for a comparison of distance between Thasos, Samothrace and Imbros islands 47 (48), p. 368.

¹²² Relevant assessment made in the prologue of Procopius, *Buildings*, (2002), (Ed.) J. Henderson, (Transl.) H.B. Dewing, Loeb Classical Library, Harvard University Press, Cambridge, Massachusetts, Introduction, ix.



Figure 21. Map of the northern Aegean shores and mainland regional to Thasos island [Excerpt from Weigel, C., (1720), *Descriptio Orbis Antiquae*, XLIV Tabulis, *Graeciae Septentrionalis Pars*, Nuremberg]: (1) Thasos island, (2) Ulpia Topirus (Topirus), (3) Anastasioupolis (Stabulo Diomedis at its earlier Roman phase, and Peritheorion in the Late Byzantine Period), (4) Neapolis (later Christopolis, and subsequently Kavala), and (5) Philippi.

of a connecting wall and thus restored safety both for the ships and for the islanders.’¹²³ This would clearly indicate not only the severity of the effects sustained by the enemy invasions and pillaging, but also the fear and grave dangers from the expectation of new offences as to require the prompt actions taken by the central administration in Constantinopolis.

As provided by Procopius in the *Buildings*, an extensive list of new fort constructions, along with repairs and enhancements of existing protective walls and fortifications had been undertaken by Justinian I, over the vast network of strong holds and cities in the Byzantine territory. Forty six such forts (suggested here as only repaired) are mentioned in this context for Macedonia, one of them, numbering fourteenth in sequence is Neapolis¹²⁴ (the ancient colony of the Thasians in the opposite mainland shores of their island, later renamed Christopolis,¹²⁵ and subsequently Kavala), a stronghold¹²⁶ built on a promontory on *via Egnatia*. It is thus possible that a phase of fortification repairs could have taken place in Thasos as well, but the author is unable to recognize any of the fort names around or most probably subsequent to Neapolis as provided in the list of said text, which could possibly relate to Thasian *loci*, and per chance Paliokastro.¹²⁷

¹²³ Procopius, *Buildings*, (2002), (Ed.) J. Henderson, (Transl.) H.B. Dewing, Loeb Classical Library, Harvard University Press, Cambridge, Massachusetts, IV. xi. 12, p. 306-307.

¹²⁴ Strabo, *Geography*, (2001), (Ed.) J. Henderson, (Transl.) H. L. Jones, Fragments of Book VII. 36. P. 358; Appian, *Roman History*, (2000), (Ed.) J. Henderson, (Transl.) H. White, Loeb Classical Library, Harvard University Press, ‘The Civil Wars’, IV. xii. 106, p. 318 (where the triremes of Cassius and Brutus were anchored during the battle of Philippi, while their depot was at the island of Thasos).

¹²⁵ Acts of Apostles, XVI, 11; cf. Matthews, C. R., (2011), ‘Acts of the Apostles’, In (Ed.) Coogan, M. D., *The Oxford Encyclopedia of the Books of the Bible*, Oxford University Press, Oxford.

¹²⁶ For a most comprehensive diachronic study of the fortifications in Neapolis-Kavala see Tsouris, K., (1998), ‘Neapolis, Christopolis, Kavala: Corrections-Additions-Remarks, and Comments on the Fortification and Water Supply’, *Archaiologikon Deltion*, Volume 53, p. 337-440; Cf. (1998), ‘The Defense System of the Thracian and Macedonian Coasts from the 9th to 15th Century’, In the International Conference Proceedings on *Defense Architecture in the Aegean and the Medieval Settlement of Anavatos in Chios*, p. 561-588.

¹²⁷ Procopius, *Buildings*, (2002), (Ed.) J. Henderson, (Transl.) H.B. Dewing, Loeb Classical Library, Harvard University Press, Cambridge, Massachusetts, IV. iv. B279-280, p. 252-254.

Towards a chronology of events for the harassment of Thasos by enemy incursions

Immediately following the lines on Anastasiopolis, Procopius continues his references by describing in detail the restorations and fortification enhancements that had taken place in neighboring Toperus, since it had been sacked ‘not long before’ (approximately around 549)¹²⁸ by the Sclaveni. This may provide a relative dating of sorts, of when the restoration works could have taken place in Toperus, considering the ca. 549 year as a *terminus post quem* and the year 560, or soon thereafter of the publication of the *Buildings* as a *terminus ante quem*; providing for a range of chronological space for the restoration of the fortifications, between a date postdating ca. 549 for the commencing of the restoration to its completion earlier of ca. 560; providing roughly for the span of a decade. Through an inductive approach it could be proposed that the geographic proximity of Toperus to Anastasiopolis, as also recounted in the *Buildings*, could indicate a tangentially related period for the enhancement of fortifications in Anastasiopolis, and thus an approximate date for the Hunnic pillaging endeavors in Thasos. Within this proposed time frame there seems to also range the mention by Procopius, in the *History of the Wars*, of ‘...an army of Huns had made descent upon the Roman domain and were plundering and pillaging everything with no man to stand in their way. But after some of them had advanced against Thessalonice and the rest took the road to Byzantium Narces¹²⁹ finally departed thence and marched forward.’¹³⁰ This would place the specific Hunnic pillaging in 552, based on Procopius’ stipulation that those events took place the following of the sixteenth year of the Gothic war.¹³¹ The latter Hunnic invasion is considered here, based on Procopius’ records, different from that of the Sclaveni and the sack of Topirus, as prior to that they had defeated a superior in numbers Roman army which must have included cavalry commanded by Asbadus who was captured, flayed and burned.¹³²

A subsequent invasion through the regional domain of Thraco-Macedonia during the reign of Justinian I, suggested to have trespassed through the proximal mainland shores¹³³ opposite to Thasos, took place in 558, as recorded by Agathias, during the second plague outbreak that was ravaging the already decimated region and the Imperial City. The Kutrigurs led by Zabergan after crossing the frozen Danube invaded Thrace with a huge force of cavalry facing no Roman resistance, and dividing into two contingents endeavored to raid towards Greece and Chersonese respectively. Having caused innumerable horrors of destruction, pillage, rape, and enslavement, daring to even encamp at the outskirts of Constantinople, at Melantias, they withdrew after all defeated by the efforts of the aging Belisarius, and Germanus.¹³⁴ Although the possibility that Thasos could have been raided under the circumstances could not be disproved, it is aporetic if such an endeavor would have been effectively essential for the cohort of mounted Kutrigurs who were roaming in Thrace, given the ample and long unchallenged profane and marauding opportunities they have had in the mainland, particularly in the region of Chersonese and even in the suburbs of Constantinople. Further, there is no historical reference that could allude to any seagoing of the other Kutrigur cavalry cohort that had endeavored toward southern Greece.

¹²⁸ See footnote No. 114.

¹²⁹ General who expedited against Totila of the Goths (Ostrogothic Kingdom in Italy) during the reign of Justinian I.

¹³⁰ Procopius, *History of the Wars*, (2001), (Ed.) J. Henderson, (Transl.) H.B. Dewing, Loeb Classical Library, Harvard University Press, Cambridge, Massachusetts, VII. xxi. 22, p. 276-277.

¹³¹ Ibid. VII. xxi. 4-5, p. 272-273; and possibly in 552/3 as Narces was delayed for ‘some time at Philippopolis’ due to the Hunnic incursion.

¹³² Procopius, *History of the Wars*, (2001), (Ed.) J. Henderson, (Transl.) H.B. Dewing, Loeb Classical Library, Harvard University Press, Cambridge, Massachusetts, VII. xxxviii. 3-7, p. 20-23 (Asbadus was commander of the cavalry cohorts stationed in the fortress of Tzurulum).

¹³³ Given the convenient passage provided by *via Egnatia* towards the Chersonesus and Constantinopolis.

¹³⁴ Agathias, *The Histories, Corpus Fontium Historiae Byzantinae, Volumen II A*, (1975), (Eds.) H. G. Beck, A. Kambylis, and R. Keydel, (Transl.) J. D. Frendo, Walter de Gruyter and Co., Berlin, Book V. 11.6-23, p. 146-160. For Belisarius cf. Hughes, I., (2009), *Belisarius The Last Roman General*, Westholme, Yardley, Pennsylvania.

Archaeological evidence of catastrophic events in Thasos during the ProtoByzantine period

Solid archaeological traces of destruction, with catastrophic consequences and subsequent site abandonment have been documented in Limenas, the capital of Thasos, around 575, coeval to the archaeological findings of a major destruction event at the site of Philippi,¹³⁵ at the proximal mainland region nearly opposite to the shores Thasos.¹³⁶ Thasian archaeological traces of catastrophic destruction were also documented, through long term research of the archaeological record, within the chronological range between 567-578 as ‘...it appears that the island suffered a disaster, as is proved by a destruction layer which is encountered at several monuments....’¹³⁷ Both archaeological relative dates provided above from the Thasian sites fall within the chronological reign of Emperor Justin II (565-578). However, his adopted son Tiberius Constantine, having been proclaimed in 574 as Caesar, by Justin II, had to assume power for the administration of the empire in 574, following the mental collapse of the incumbent emperor.¹³⁸ As such Tiberius Constantine’s reign, as Caesar (and not as Imperator) since 574, would in essence conform with the following statement by Menander Protector that: ‘...in the fourth year of reign of Tiberius Constantine Caesar it happened in Thrace that the nation of the Slavs to the number of 1000,000 devastated Thrace and many other areas.’¹³⁹ hence dating the event within year 578, indeed within the particular range of the dates provided by the archaeological layers of catastrophic destruction in Thasos. It should not then be improbable to suggest that the specific Slavic incursion could have devastated the island. Although the possibility cannot be excluded that the devastation could have been caused by a regionally ruinous earthquake,¹⁴⁰ the likelihood cannot be dismissed that the latter, if it were, could have been coincidental with the Slavic onslaught, and/or that the earthquake had offered an opportunistic incentive for the Slavs to descent into the lands of the Romans for plunder given the anticipation, or through informants, under such circumstances of partially demolished or defective fortification walls and the expected disarray of defenses. In any event, post destruction archaeological data indicate only of a spatially partial and brief reoccupation of the specific sites in Thasos, while at the site of Philippi the absence of the vast majority of the population is documented.¹⁴¹

Archaeological data of later and superimposing site-specific strata in Limenas of Thasos, during the first decades of the 7th century, dated to 619, or immediately afterwards, during the reign of Emperor Heraklius (610-641),¹⁴² clearly indicate a final phase of destruction with such ruinous effects as to have caused the abandonment of the city; it were to be reoccupied based on archaeological evidence not sooner than the 11th century if not at the beginning of 13th century.¹⁴³ Further, Bakirtzis based

¹³⁵ Strabo, *Geography*, (2001), (Ed.) J. Henderson, (Transl.) H. L. Jones, Fragments of Book VII. 34. P. 354, 41. p. 362, 42 (43), p. 364; Appian, *Roman History: The Civil Wars*, (2000), (Ed.) J. Henderson, (Transl.) H. White, Loeb Classical Library, Harvard University Press, IV. xii. 105, p. 314-315 for its names and location, 106-107, p. 316-319 for Philippi comprising with Neapolis and Thasos the three sites involved in Macedonia during the last decisive homonymous Philippi battle of the Roman civil wars, in 42 BC, between Cassius and Brutus versus the avengers of Caesar’s murder, namely Antony and Octavian

¹³⁶ Bakirtzis, Ch., (1989), ‘The Day after the Catastrophe in Philippi’ (in Greek), *Daily Life in Byzantium* Center of Byzantine Studies, Athens, p. 695-710, with footnotes No. 18 (p. 706) referring to Limenas in Thasos, and footnote No. 9 (p. 700) for Philippi.

¹³⁷ Bonias, Z., and Dadaki, A. S., (2002), Thasos, Antiquities of Kavala Prefecture, IH’ Ephorate of Prehistoric and Classical Antiquities of Kavala, 12th Ephorate of Byzantine Antiquities of Kavala, Kavala, p. 67.

¹³⁸ Treadgold, W., (1997), *A History of the Byzantine State and Society*, Stanford University Press, Stanford, California, p. 219-226.

¹³⁹ *The History of Menander the Guardsman*, (1985), (Introductory Essay, Text, Translation, and Historiographical Notes) R. C. Blockley, Francis Cairns, Redwood Burn, Trowbridge, Wiltshire, Fr. 20.2. 152-155, p. 191.

¹⁴⁰ Coeval ruinous archaeological traces have also been documented at the site of Philippi, see footnote No. 136, *supra*.

¹⁴¹ Bakirtzis, Ch., (1989), ‘What Happened in Thasos at the Beginnings of the 7th century AD’ (in Greek), *Filia Epi Eis Georgion E. Mylonan*, Archaeological Society at Athens, 103. Volume 3, p. 339-341, with footnote No. 5 (p. 340) whereby it is suggested that the population would have relocated in higher and possibly better protected grounds.

¹⁴² Treadgold, W., (1997), *A History of the Byzantine State and Society*, Stanford University Press, Stanford, California, p. 287-300.

¹⁴³ Bakirtzis, Ch., (1989), ‘What Happened in Thasos at the Beginnings of the 7th century AD’ (in Greek), *Filia Epi Eis Georgion E. Mylonan*, Archaeological Society in Athens, 103. 3, p. 340-341, whereby archaeological data document roughly repaired peripheral encampments and population relocations in more remote from the shores and of higher elevation sites compared

on careful analyses of the archaeological record in Limenas of Thasos, as in Philippi of this period, generates good arguments that earthquakes may have been a significant parameter in the causative agents of the catastrophic circumstances, connected to the historical events that also affected the city of Thessalonika around 620.¹⁴⁴

Aiming towards concluding remarks on the ProtoByzantine 'Paliokastrétes'

In light of the above, reflecting on the conditions that would have transpired at the site of Paliokastro based on the archaeological evidence unearthed, it was apparent that the works for constructing the four graves within the floor of the *naiskos* preceded the funerary activity of interring the first of the ten individuals involved. Reviewing the most orderly ways of architectural planning on the spatial relations of the positioning, the orientation, the nearly isometric external and internal dimensions-even of those of the three shared, intergrave, walls¹⁴⁵ with functional stepping stones embedded in their sides respectively,¹⁴⁶ the significant isometric depth¹⁴⁷ along with an elaborate construction resembling the tendency of pseudo-isodomic¹⁴⁸ characteristics for the four graves convey in retrospect not only the foresight of a well thought out, prearranged scheme, but also of an exacting task implementation which must have been initiated and completed by expert stone mason hands. Without exception, all four graves had been built with masonry walls using full depth block shaped stone units,¹⁴⁹ mainly of gneiss, chiefly laid as stretchers on the wall faces, in intra-wall complementary and somewhat overlapping courses of stone units with intermediate to narrow sized joints between them,¹⁵⁰ with intermittent stone pegs where needed and bonded with mortar in a masterful, as ornamental a pattern as it would rather be expected for the finishing of an exterior-visible architectural component. It is also of importance to note that there were no traces of any *spolia* used in the construction of the graves as could be expected under good probabilities in the case that an earthquake had damaged the region and particularly the *naiskos*, rendering it beyond repair and denigrating its purpose just to a funerary function. Therefore, it is proposed that the punctilious construction of four graves had been conducted at a period in time whereby the site of Paliokastro could not have been daunted by grave circumstances in need of all available hands for the protecting and deterring actions against the potential of raiding attacks and/or the potential of a siege by marauding enemies, nor even during the aftershock of catastrophic events such as ruinous

to Limenas; (1989), 'The Day after the Catastrophe in Philippi' (in Greek), *Daily Life in Byzantium*, Center of Byzantine Studies, Athens, footnote No. 9, p. 700ff.

¹⁴⁴ Bakirtzis, Ch., (1984), 'The Agora of Thessaloniki in the PalaioChristian Years', *Proceedings of 10th International Conference of Christian Archaeology*, Thessaloniki, p. 18; (1977), 'On the Cluster of the Agora of Thessaloniki', *Ancient Macedonia II*, Thessaloniki, p. 266-269; (1975) *The Shoreline Fortification of Thessaloniki*, *Byzantina*, 7, p. 327; *The Miracles of Saint Demetrius* (1979), (Ed.) P. Lemerle, *Les plus anciens recueils des miracles de saint Démétrius*, Paris, I, 193;

¹⁴⁵ Their width measuring a standard 0.30-0.32 m, offering support to the 'isodomic' construction design of the four graves, and despite any suspected diachronic geological and taphonomic in nature impacts.

¹⁴⁶ For easing the process of the more careful deposit and maneuvering of the placement of the interments within the intra-grave dimensions without having to step on the floor of the grave; to not disturb the remains e.g. in the case of a most recently deposited or for the placement of conterminous interments; in any case without having been covered with adequate layers of earth that would have reached near or at the level of the stepping stones (apropos, the stepping stones ranged in width between 20.0-32.0 cm). No iron nails were found to indicate the possible use of wooden coffins. For the introduction of wooden coffins in the region, documented archaeologically, see Agelarakis, A. P., (1997), 'Excavations at Polystylon (Abdera) Greece: Aspects of Mortuary Practices and Skeletal Biology', *Archaiologiko Deltio*, V: 47, p. 293-308; Agelarakis, A. P., and Bakirtzis, Ch., (1998) 'Cemeteries of Polystylon, Abdera: On Burial Customs and Practices', *Rhodopica*, Smolyan, p. 57-68.

¹⁴⁷ Maximum height dimensions of grave walls from surface to the level of their respective floors where the skeletal remains were resting, Grave No.1: 1.03 m, Grave No. 2: 0.98 m. Grave No. 3: 1.03 m, and Grave No. 4: 1.00 m.

¹⁴⁸ Used here to indicate only a tangential reference to *opus pseudoisodorum* (see Vitruvius, *de Architectura*, <penelope.uchicago.edu>, II. viii. 5) e.g. for the 'equal height' of the four graves and the well-cut stone blocks; and not to mean that their construction was carried out by the use of nearly equally sized stone blocks.

¹⁴⁹ There were no fired bricks used in the construction of the graves.

¹⁵⁰ Reflective of the expert hands that had constructed the graves was also the fact that despite the passage of time and an innumerate ensemble of taphonomic impacts over the centuries there was no buckling of the main walls to be observed from neither superior nor lateral pressure forces, not even at the relatively thin, shared, inter-grave walls.

earthquakes whereby the surviving members of Paliokastro would have to either disperse in other locations for safety and/or for a labored acquisition of needed resources. Furthermore, the four slab stones that were covering each of the four graves were integral floor units¹⁵¹ of the *naiskos*, on the same plane with the rest of the floor surface; connotative of the post-interment continuous use for some time, and function of the *naiskos* for liturgical and/or ceremonial rites. This provides isochronal evidential traces which could suggest the uninterrupted Roman sovereignty of Paliokastro¹⁵² during the period.

Yet, while the interment of two individuals placed within grave No. 3 was assessed as of a conterminous process, such a precise relatedness between the use of the four graves for burial processes could not be substantiated with accuracy, although the cluster of the archaeological features and ensemble of the funerary activities within the context of the *naiskos* were coeval.¹⁵³ Further, the question on the causative agents of death for nine of the ten individuals of the population sample, remained uncertain. Their palaeopathological record could not reveal undisputed evidence, with specificity derived through processes of differential diagnosis, other than to recognize conditions which were to aggregate within the realm of potential morbidity and possibly compounded by comorbidity parameters. Certainly the nine individuals in question were lacking skeletally discernible *perimortem* physiological trauma of accidental nature, or consequential to the anthropology of conflict.¹⁵⁴ However, although not of *perimortem* nature, the possibility could not be dismissed that the serious limb fractures that had been sustained by a number of the male and female adult individuals had been caused in direct or indirect association to enemy incursions. Further, on the undisputed matter that the Justinian I pestilence would have reached Thasos, it was not possible to derive inspectionally diagnostic clues of its perilous consequences which according to Procopius ‘...left [untouched] *neither island nor cave nor mountain ridge which had human inhabitants; and if it had passed by any land, either not affecting the men [sic]*¹⁵⁵ *there or touching them in indifferent fashion, still at a later time it came back.*’¹⁵⁶ Supplementary data on the plague are provided by Agathias: ‘...a second outbreak of the plague [caused by *Yersinia pestis*] swept the capital [in 558], destroying a vast number of people. From the fifteenth year of the reign of the Emperor Justinian [in 541/42] when the plague first spread to our part of the world it had never really stopped, but had simply moved on from one place to another, giving in this way something of a respite to those who had survived its ravages...People died ...as though seized by a violent and sudden attack of apoplexy. Those who stood up to the disease longest barely lasted five days. The form the epidemic took was not unlike that of the earlier outbreak.’¹⁵⁷ Hence, although the possibility could not be dismissed that the individuals from Paliokastro could have been affected by enemy incursions, as far as their skeletal record could reveal there had not been any diagnostic manifestations to designate for example that they had been slaughtered at the hands of invaders. Further, although the spread and recurring, since 541/2, outbreaks of the bubonic plague and its pernicious consequences would have affected the inhabitants of Thasos, suspected to have also reached Paliokastro, it was not possible to detect it skeletally, yet, it could be neither dismissed. Bubonic plague traces may be detected molecularly through destructive analysis of preferably well preserved dental samples, as the virulent nature of the disease causes

¹⁵¹ Stone units of the same materials, shape and thickness as of the rest of the floor; see also footnote No. 2, *supra*.

¹⁵² Even in the case that they would have been challenged militarily by enemy raids (e.g. Hunnic, or Sclavonic).

¹⁵³ Within a period between the post 5/6th to before the end of the 7th century relative dating of the site.

¹⁵⁴ As allowed by skeletal preservation.

¹⁵⁵ ‘ἀνθρώπων’ of the original text translates as ‘humans’.

¹⁵⁶ Excerpt, at II. Xxii. 8, p. 454-455, of Procopius’ comprehensive report on the epidemiologic spread, the symptomatic nature on the bubonic manifestations, the efforts of the physicians, morbidity effects, the magnitude of human loss and the consequences of the plague, Procopius, *History of the Wars*, (2001), (Ed.) J. Henderson, (Transl.) H.B. Dewing, Loeb Classical Library, Harvard University Press, Cambridge, Massachusetts, II. Xxii-xxiii, p. 450-472.

¹⁵⁷ Agathias, *The Histories, Corpus Fontium Historiae Byzantinae, Volumen II A*, (1975), (Eds.) H. G. Beck, A. Kambylis, and R. Keydel, (Transl.) J. D. Frendo, Walter de Gruyter and Co., Berlin, Book V. 10, 1-3, p. 145, and for the causes, course, and effects of the disease 4-7, p. 145.

acute host mortality and does not allow for a persistent or chronic enough course of pathogenic activity, which could afford skeletal changes. Hence, should this be a parameter to consider under some circumstances of palaeopathological evaluations, the possibility that bubonic plague could have been the cause of mortality may not be negated; particularly in the non-urban context of Paliokastro where a mass grave(s) should not be expected as the only true archaeological evidence for the severe impact of the plague according to some recent commentators, broadly dismissing the descriptions of eye witnesses as exaggerated historical claims.¹⁵⁸ In fact, aspects of the archaeological record of Paliokastro, reflecting as they may at a rather austere functional discontinuity of the site may have reasonably had as its cause the depopulation and the sharp economic decline wrought by the pandemic.¹⁵⁹

As such, and considering not only the anthropologically derived traces of their life experiences but also these of the ostentatious symbolism derived from elemental components of the burial practices, namely of the selective, yet cryptic, location of the graves along with their most careful construction, exclusively allocated within a small Christian church (*naiskos*), were to be considered as evidentiary data lending adequate support in recognizing the unique *intra vitam* status¹⁶⁰ inherited and/or acquired of the membership of individuals¹⁶¹ interred in the graves. These would not have been, it is proposed, the graves of low ranking individuals in the military contingent of a border regimen (from what *limes once* were to *militia* by the later years of Justinian I),¹⁶² but rather those of top ranking hierarchy members, privileged to rest *post mortem* with kin members in the dedicated sanctuary of their own shrine.

The case study of the *Wounded Caballarius*' head/neck pathology, the ways of the cranial surgery and trephination, and few palaeopathological reflections

Among the wealth of evidentiary data provided by the skeletal record allowing the decipherment and elucidation of ProtoByzantine experiences at Paliokastro, as if slated by the ancient fates, a unique account could be reiterated, ingrained in the skeletal record, relating personal circumstances on the

¹⁵⁸ Durliat, J., (1989), 'La peste du Vie siècle: Pour un nouvel examen des sources byzantines', in (Eds.) V. Kravani, C. Morrison, and J. Lefort, *Hommes et richesses dans l'empire byzantine*, Paris, p. 107-119; for a discussion on such matters, see Kennedy, H. N., (2009), 'Justinian Plague in Syria and the Archaeological Evidence', in (Ed.) L. K. Little, *Plague and the End of Antiquity, The Pandemic of 541-750*, Cambridge University Press, New York, p. 87-95; for a discussion of relevant non-literary records, see Sarris, P., (2009), 'Bubonic Plague in Byzantium, The Evidence of Non-Literary Sources', in (Ed.) L. K. Little, *Plague and the End of Antiquity, The Pandemic of 541-750*, Cambridge University Press, New York, p. 119-132.

¹⁵⁹ Contra the claims for a robust Byzantine economic growth during the 6th century as postulated by Whittow, M., (1996), *The Making of Orthodox Byzantium 600-1025*, London; in support of the statements by Stathakopoulos, D., (2009), 'Crime and Punishment The Plague in the Byzantine Empire, 541-749', in (Ed.) L. K. Little, *Plague and the End of Antiquity, The Pandemic of 541-750*, Cambridge University Press, New York, p. 99-118.

¹⁶⁰ Of social, political, and/or military nature.

¹⁶¹ For some of them by kinship and/or other associations.

¹⁶² Already during the later years of Justinian I's reign the military forces of the Romans had diminished in numbers (from 600,045 men previously to 150,000), some dispersed in Italy, in Africa, in Spain, in Lariza, in Alexandria and in Egyptian Thebes, see Agathias, *The Histories, Corpus Fontium Historiae Byzantinae, Volumen II A*, (1975), (Eds.) H. G. Beck, A. Kambylis, and R. Keydel, (Transl.) J. D. Frendo, Walter de Gruyter and Co., Berlin, Book V. 13.5-14.5, p. 148-150), and thus also the strength of what the frontier regiments once used to present. Meanwhile, the incremental cuts in soldier pay had compelled them to seek additional subsidiary means inclusive of their right to cultivate lands regional to their posts. Apropos, while Treadgold mentions that despite the complete loss of their salary in 545, under Justinian I, frontier cohorts would still have received horses and rations for their fodder, arms and uniform, [Treadgold, W., (1995), *Byzantium and Its Army 284-1081*, Chapter: 'The Problem of the *Notitia Dignitatum*', Stanford University Press, California Stanford, p. 97, 150-151, and for the pay of infantry and cavalry salaries per rank in 534, see table 78, p. 150] it should be of interest to note that colleague Dr. S. Ageloudi-Zarkada informed the author that she knew of the existence of small terraces in the uplands of Rachoni, around the area of Paliokastro, that were still used as small gardens by old-timers during the years of her youth.

plight of the Wounded *Caballarius*¹⁶³ and the remarkable abilities and efforts of the physician-surgeon to implement the life-saving medical arts.

It pertained to complex base of head and upper third of neck surgical interventions on the left temporal bone and the ipsilateral component of the occipital bone (Figure 22). As allowed by skeletal preservation the cranial component under investigation comprised the left temporal bone in anatomic association with ipsilateral fragments of the parietal and occipital bones. Taphonomic conditions had impacted focal ectocranial areas of the parietal and occipital fragments.

On the ectocranial table, there was an (4.27 mm in supero-inferior and 2.33 mm in antero-posterior diameter) orifice on the mastoid process with sclerotic external infero-posterior margins (Figure 23, arrow). Morphologically, it was differential in type, in size and in anatomic location from the mastoid foramen which in the posterior mastoid region were to have been serving for the passage of the emissary vein. The latter foramen was in fact traced embedded into a most skillfully smoothed by surgical scraping¹⁶⁴ ovoid depressed preparation which having incorporated a relative component of the mastoido-occipital suture¹⁶⁵ had extended into the domain of the occipital bone measuring a supero-inferior diameter of 20.97 mm and 20.22 mm in antero-posterior diameter (Figure 23). Most prominent within what may be considered the core of the manifestation featured an ecto-endocranial



Figure 22. Ectocranial left latero-posterior view of cranial component showing surgical intervention.

¹⁶³ One of the most robust and physically active individuals within the male cohort of the site with all the manifestations relevant to horse riding and the arts of war as described above, who was assessed as of 35-40 years old at the incidence of death.

¹⁶⁴ A methodology in cranial surgical approaches recommended the earliest in the Hippocratic *corpus*, see Hippocrates, Vol. III, *On Wounds In The Head*, (Ed.) G. P. Goold, (Transl.) E. T. Withington, Loeb Classical Library, Harvard University Press, Cambridge MA, 1999, XIV, p. 28-36.

¹⁶⁵ Ibid. XII: 42-44, p. 28 (where the physician-surgeon is dictated to not trephine where there are sutures).

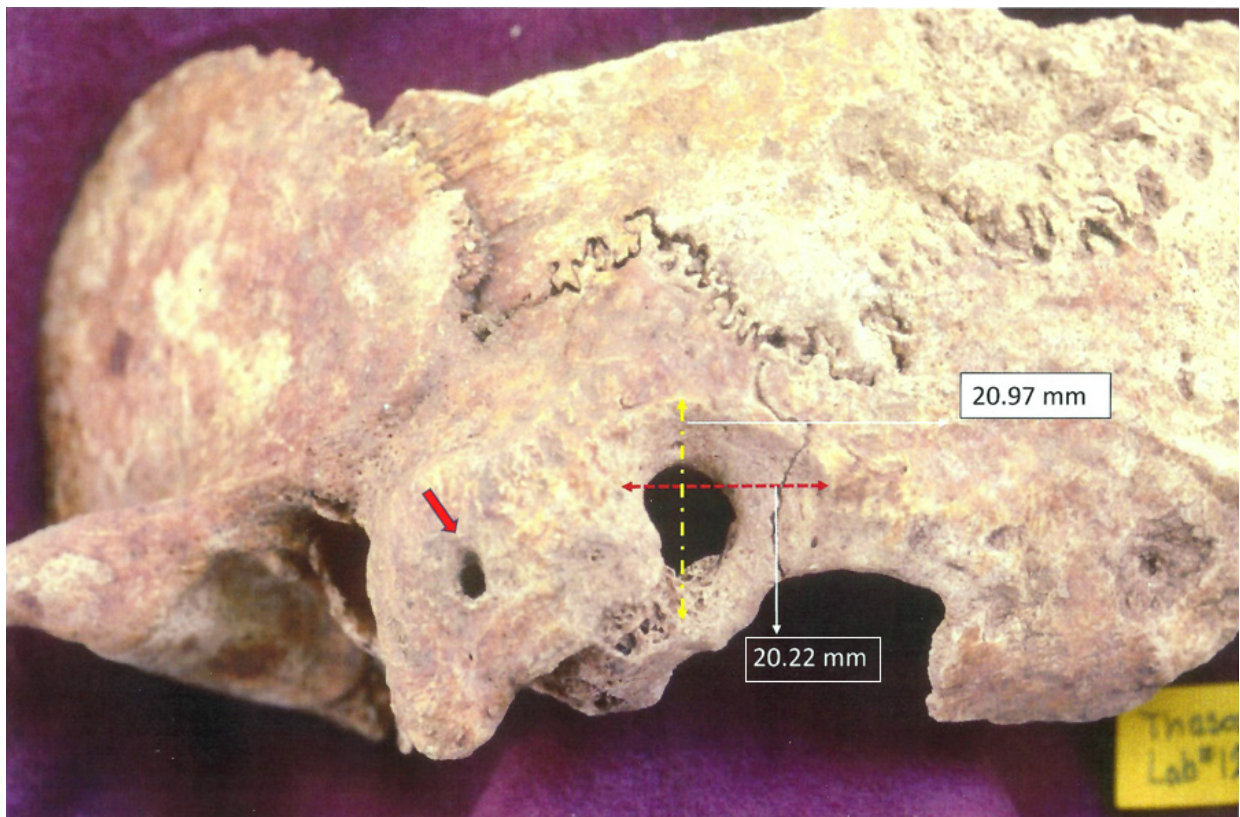


Figure 23. Ectocranial view of palaeopathological specimen: a) red arrow points to orifice on the mastoid process, and b) surgical preparation dimensions peripheral to trephination.

nearly ovoid in shape opening. Ectocranially it measured 8.37 mm in supero-inferior height and 9.50 mm in antero-posterior diameter (Figure 24), while endocranially 9.07 mm supero-inferiorly, and 8.88 mm antero-posteriorly (Figure 25).

The through and through preparation, it is suggested, may have only been trephined, if it were, up to a certain depth level within the diploic elemental components to avoid the prospect of surgical injury to components of the endocranium, yet subsequently scraped with raspatories, masterfully evened out to present both visually and to the touch a qualitatively most equalized peripheral, smoothed, contour while the margins of its lipping toward the endocranial table had been worked by scraping, graded to a beveled configuration where possible, but with a decreasing modality in the adjacency where the surgeon could have possibly endangered to damage the *dura mater*. Could a *dura mater* protector (*meningophylaca*)¹⁶⁶ have been used?

The carrying out of this surgical operation in addition to the cutaneous component and its innervation by the lesser occipital nerve would have fringed upon the origin of the occipital belly of the *M. occipitofrontalis*, while it would have interfered with the insertions of *Ms. sternocleidomastoideus* and *splenius capitis*, minimally requiring during the procedure complex and dexterous retraction actions for the muscle tissues involved, not to mention the efforts to not nick or cut the focal network of the occipital artery (*arteria occipitalis*) and vein (*vena occipitalis*).

¹⁶⁶ Recorded first by Celsus in Roman medicine, and for the Latin reader, as a prophylactic tool for the *dura mater* in cranial surgery which the Greeks called *μηνιγοφύλαξ*, see Celsus, *On Medicine*, (2002), (Ed.) J. Henderson, (Transl.) W. G. Spencer, Loeb Classical Library, Harvard University Press, Cambridge, Massachusetts, VIII. 3. 8, p. 500-501, and 4. 17, p. 514-515.

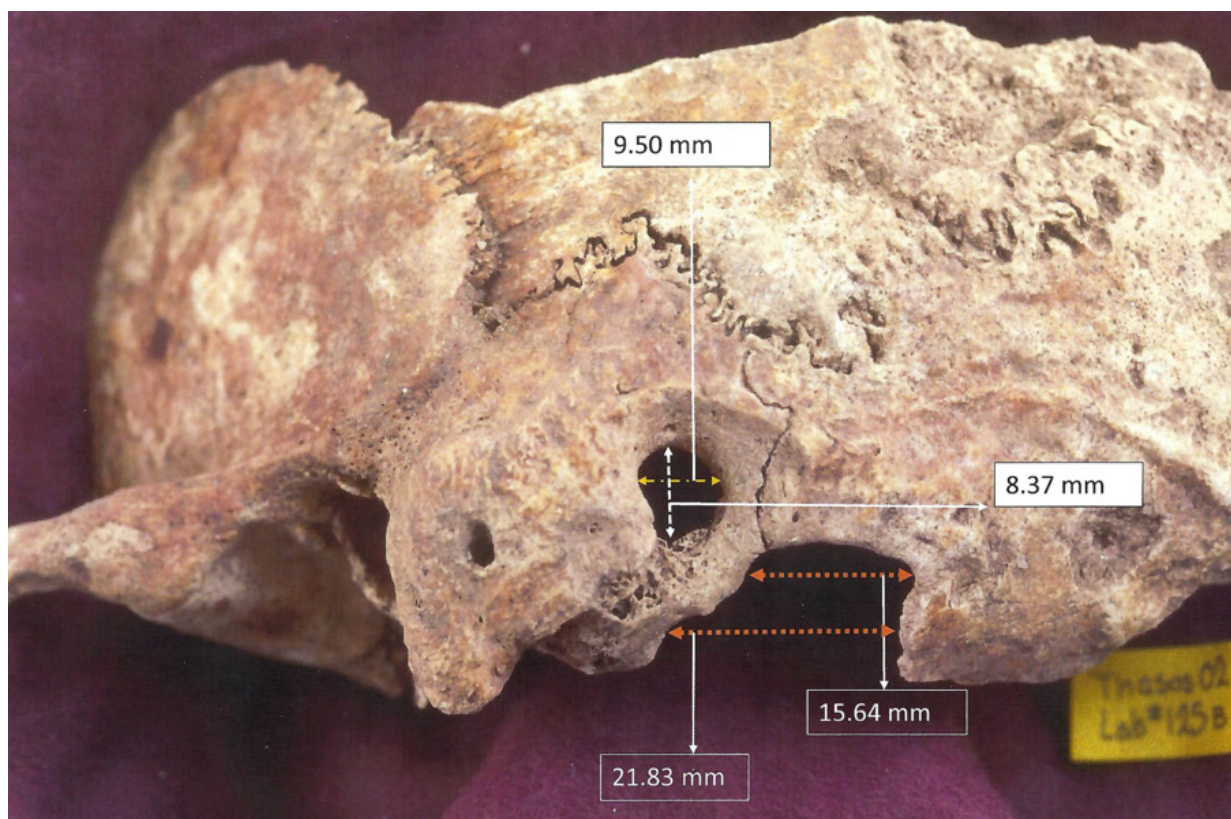


Figure 24. Cranial palaeopathological specimen with dimensions of two ectocranial *loci* showing surgical interventions.

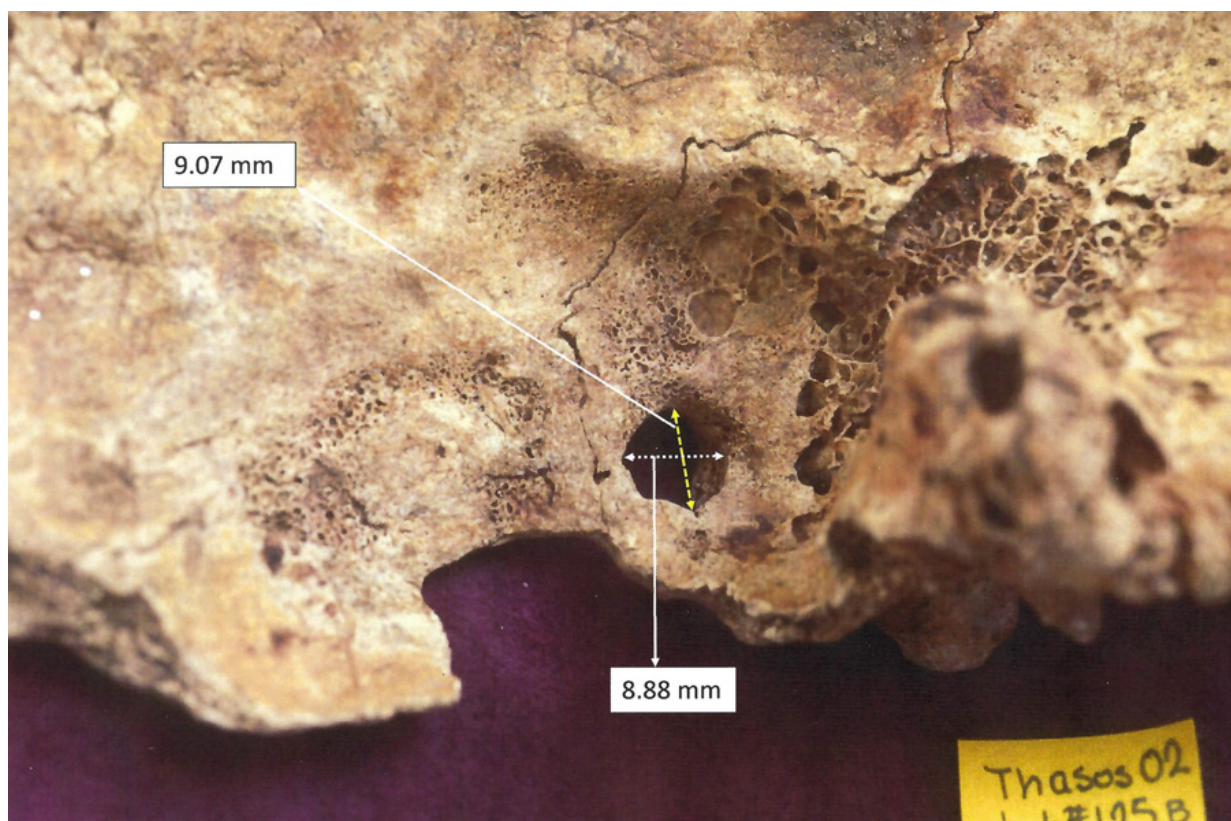


Figure 25. Cranial palaeopathological specimen showing surgical interventions, with dimensions of trephined *locus*.

Further surgical traces inferiorly-peripheral to the ipsilateral *locus* of the intervention described above, at the juncture of the postero-inferior mastoid region and inferior nuchal line extending toward the occipital base above the domain of the left occipital condyle, reflected on a partially conjoined and masterfully smoothed by scraping ectocranial region (Figure 24, see red arrows). The palaeopathologist would strongly suggest that the bone scraping by raspatories had been done by the same methodological process as documented in the case of the superiorly adjoined *locus*, asserting indirectly that this inferior component would have been carried out during a conterminous juncture of intervention by the same most experienced hands of a surgeon, assisted or not by a most trusted apprentice. Yet, considering the challenges that must have pertained for the surgical implementation at the latter anatomic *locus*, however relevant in scope and objectives there may have been with the intervention at the superior *locus*, it became clearly apparent that it would have fringed upon the descending from their origin left lateral muscle fibers of *M. trapezius*, the particular fibers of *M. sternocleidomastoideus* inserting at the superior nuchal line, the ascending fibers of *M. splenius capitis* originating from the spinous process of the third cervical vertebra toward the posterior region of the mastoid process and lateral domain of the superior nuchal line, and the insertion of *M. semispinalis capitis* below the superior nuchal line.¹⁶⁷

Furthermore, and in fact more severely as revealed by the traces of the surgical operation, the intervention would have permanently and completely removed the occipital insertion *locus* of *M. obliquus capitis superior* below the superior nuchal line, similarly of *M. rectus capitis posterior major* below the inferior nuchal line, and at best only partially of the lateral insertion *locus* of *M. rectus capitis posterior minor* also below the inferior nuchal line; moreover destabilizing their innervation of the dorsal branches of the first cervical nerve (the suboccipital nerve). Henceforth, once the surgical intervention would have been completed at the particular *locus*, the preserved component of the inferior postero-lateral base of the occipital bone would have been removed along an atypical yet distinctly ectocranially beveled contour, smoothed to a homogenous grade which had eliminated by scraping any potential presence of dentate bone projections at its marginal lipping. It would have been worked out that way with the aim to avoid the probability of damaging the undelaying *dura matter*¹⁶⁸ which under the circumstances would have nevertheless been focally exposed and while in the erect or supine head position of the patient would have been in a hazardous condition, by lacking its supportive and protective cranial bone anatomy, if it were not to have been minimally treated as recorded by Celsus.¹⁶⁹

Unavoidably, a number of consequential questions were considered. How could the Wounded *Caballarius* survive such a perilous condition? Why would such a surgical operation and overall medical intervention take place given the grim prognostics which would have pertained, particularly in the broad experiential range of such a skillful physician-surgeon? Possibly, as had been provided in the earliest of any written medical procedures on head surgery, in the Hippocratic *corpus*, patients with wounds at the back of the

¹⁶⁷ There is a possibility that the intervention would have also fringed upon the insertion of *M. longissimus capitis* at the infero-posterior domain of the mastoid process.

¹⁶⁸ Providing clues that the patient would have been alive and with at least some prospects for his post-operational survivorship, and as clearly recommended for such cases by Celsus: 'When all this bone has been removed, the margins of the opening must be filed down smooth, and if any bone dust is sticking to the membrane it is to be removed.' and/or 'When the outer table has been removed, and the inner table left, it is not only the margins but also all the bone which is to be smoothed down, in order that skin may grow over it subsequently without harm; for when it grows over rough bone there is never sound healing, but it causes new pains.', Celsus, *On Medicine*, (2002), (Ed.) J. Henderson, (Transl.) W. G. Spencer, Loeb Classical Library, Harvard University Press, Cambridge, Massachusetts, VIII. 3. 9-10, p. 500-503.

¹⁶⁹ With a cataplasma of plaster dissolved in vinegar, covered by an overlapping lint soaked with the cataplasma, over it a layer of unsoured wool sprinkled with vinegar, daily changes for five days, the wound steamed by a sponge the sixth day and dressed the same way as before, with subsequent plaster applications which would be infused with cerate of rose oil to entice a faster growth of flesh, Celsus, *On Medicine*, (2002), (Ed.) J. Henderson, (Transl.) W. G. Spencer, Loeb Classical Library, Harvard University Press, Cambridge, Massachusetts, VIII. 4. 10-11, p. 508-511, and for the same treatment along with additional aspects for the healing regime 18-22, p. 514-519. See also footnote No. 191, on Galen's reference, *infra*.

head were to survive more often than those with frontal wounds,¹⁷⁰ and in matters of seasonality winter was considered more favorable relative to survivorship,¹⁷¹ but was the surgical intervention intended to treat a wound? Further, what could have been the identity of the male patient and what could have been his social role and status for such a painstakingly by all counts medical intervention to have taken place and without omission of incessant surgical effort and care in trying to save his life; even under a despondent medical foreshadowing? Laden with those questions, yet with the impression that the patient must have been a very important individual within the membership of the population sample at Paliokastro, the palaeopathologist was seeking to derive additional clues by evaluating the condition of the retained endocranial table.

As it appeared, the endocranial table presented an aggregate of dreadful palaeopathological manifestations which surrounded the surgical opening. The latter presented a nearly ovoid perforation, traversing ecto-endocranially with nearly cylindrically smooth in contour internal walls, measuring 9.07 mm in supero-inferior height (proportional to 108.36% of the 8.37 mm ectocranial counterpart), and 8.88 mm in antero-posterior diameter (proportional to 93.47% of the 9.50 mm ectocranial counterpart). The perforation between the ectocranial and endocranial interstice was lacking undulations, and the mensurational variability between the ecto-endocranial surfaces was nearly imperceptible to the naked eye; it measured a 0.70 mm supero-inferior increase, versus a 0.62 mm antero-posterior decrease endocranially (Figure 25). These characteristics lent support to the inspectional assessment that the surgical perforation, could had been conducted through trephining,¹⁷² which abated before reaching the *terminus* of the endocranial table as revealed by the non-smoothed crest of cortical bone component along the lower half contour of the endocranial perforation; suggestive that the rest of the work performed at that *locus* had been carried out without a rotating tool but by a most judicious scraping of remaining bone components and their excising by forceps.¹⁷³ Evidence that scraping tools had been used to perform components of the surgical operation were documented, easily discerned through X-ray imaging of the cranial component,¹⁷⁴ particularly at the endocranial margin of the trephined area (Figure 26).

Considering as a point of reference the surgical endocranial opening, which had perforated ecto-endocranially with a slight ventro-left lateral inclination¹⁷⁵ into the middle of the temporal bone's *fossa* below the sigmoid sinus impression and over the region of the mastoid foramen, the entire upper half of its marginal contour was occupied by porous lesions which spreading superiorly in a prodigious trail of hyperporous, cribrotic in size, *foci* had afforded through the sigmoid sinus depression endocranial table lytic effects which traversed into the junction of the homonymous (or transverse) sinus of the parietal bone, below the posterior division depressions of its meningeal vessels (Figure 27). A similar aggregate of hyperporous, cribrotic in size, lesions, simulating the contour of a quasi-ovoid band¹⁷⁶ with a nearly

¹⁷⁰ Hippocrates, Vol. III, *On Wounds In The Head*, (Ed.) G. P. Goold, E. T. Withington, Loeb Classical Library, Harvard University Press, Cambridge MA, 1999, II: 39-48, p.10-12.

¹⁷¹ *Ibid*, II: 49-51, p. 12.

¹⁷² Suggested with the use of a *modiolo* crown trepan, with serrated drilling edges, which the Greeks called (χοινεικίς), and with '...a little rose oil or milk, so that it may rotate more smoothly;' as recorded by Celsus, *On Medicine*, (2002), (Ed.) J. Henderson, (Transl.) W. G. Spencer, Loeb Classical Library, Harvard University Press, Cambridge, Massachusetts, VIII. 3. 1-3, p. 496-499.

¹⁷³ As a meningophylax plate could not have been used at this narrow context, see footnote No. 166, *supra*.

¹⁷⁴ With traces of individual, linear in shape, scraping strokes which measured in width between 0.947 to 1.009 mm, while they were becoming shallower in depth outwards, the further away they were to be observed (under the microscope) from the endocranial surgical opening; assessed as indicative of the scraping effort with emphasis having been placed to smoothen the bone as proximal as it could be done around the immediate endocranial margins of the surgical opening. Unfortunately it was not easy nor possible under the circumstances to provide true metrics for the depth of those final scraping strokes on the bone surface other than that at their deepest (near the margin of the endocranial surgical opening) they seemed (inspectionally) somewhat shallower than the narrowest of their width measurements, recorded above.

¹⁷⁵ Hence, not exactly vertical, but slightly left-laterally oblique to the sagittal plane.

¹⁷⁶ A component of the ovoid contour was missing, thus simulating an incomplete loop, suggested by reason that it was removed by the surgical intervention on the occipital bone.

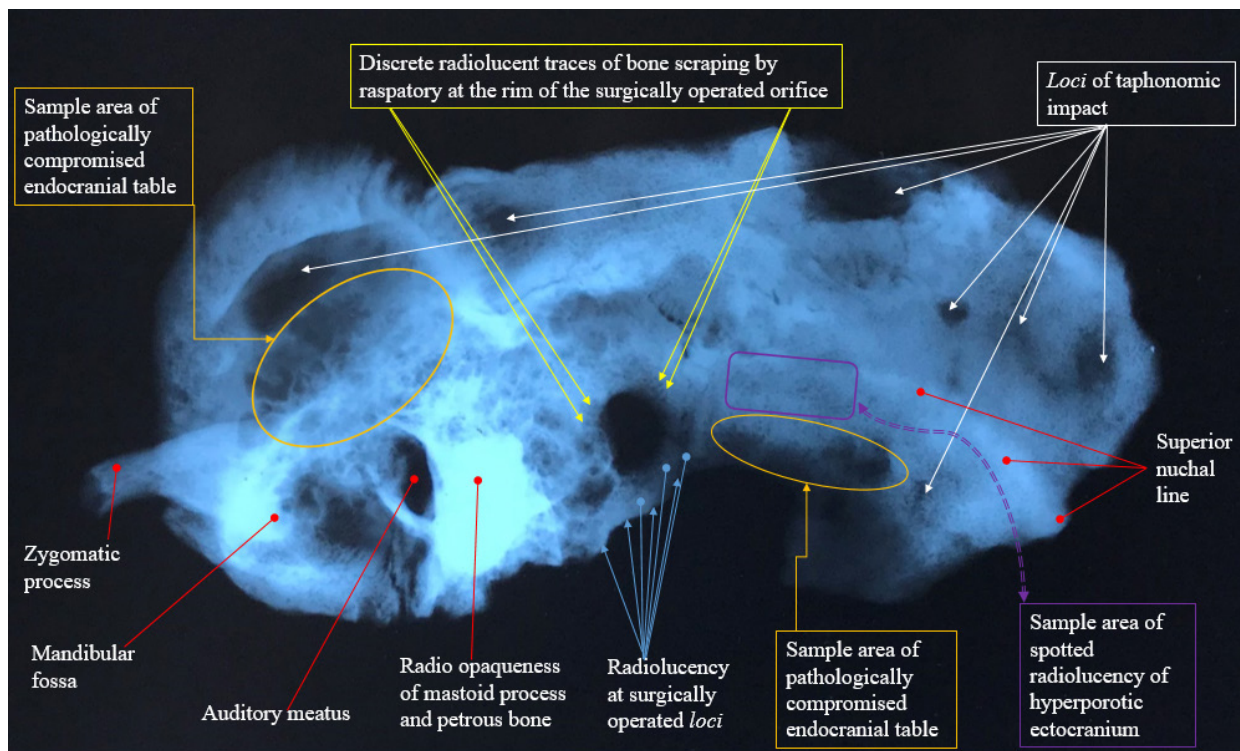


Figure 26. X-ray imaging of cranial palaeopathological specimen with samples of relevant identifiers.

unaffected center region, was clustering at the left cerebral fossa of the occipital bone, laterally to the internal occipital crest and below the level of the ipsilateral transverse sinus. Notably, there had not been any expansion of the diploe, while both the porous and hyperporous in size lesions had obliterated the endocranial compact table of the diploic elements with an apparent absence of bone formation nor any vascular imprints superimposing or infiltrating any bone fibers in the *loci* involved, indicative of an active pathological process with absence of healing at a *perimortem* juncture. Rapacious lytic effects of the endocranial table, however, were observed at the temporal bone's region of the sigmoid sinus impression in a cluster of exposed mastoid air cells through frank invasion of their endocranial cortical component which were retaining nonetheless their clearly defined boundaries and with an absence of reactive areas in their floors. However, destructive lesions surrounded the base of the petrous bone having caused gross changes of severe erosive effects by obliterating the cortical elements into the tympanic *antrum* behind the aqueduct of the vestibule, and further involving the arcuate eminence, the *tegmen tympani*, and extending further toward the impression of the superior petrosal sinus and through the area of the petrosquamous fissures had nearly invaded and penetrated the basal region of the temporal squama. There was a lack of any osteoblastic, osteoreparative, trace. Furthermore, on the ectocranial surfaces the occipital squama and parietal fragment were showing porotic hyperporotic manifestations while the right orbital roof showed hyperostosis with active *cribra orbitalia* (Figure 28). Were these two manifestations reactions to the same cause?

In aiming to carry out a palaeopathological assessment with a taphonomically incomplete skeletal preservation was compounding the daunting task of associating the symptomatic manifestations of disease with plausible causative agents, in order to carry out differential diagnosis. It was clear however, that up to the incidence of death the patient had been suffering from an active head infection (minimally), but was its cause of primary nature, or secondary to the pathogenic conditions that had prompted the surgical intervention, and/or was it caused by iatropathology?



Figure 27. Close up endocranial view of cranial palaeopathological specimen.

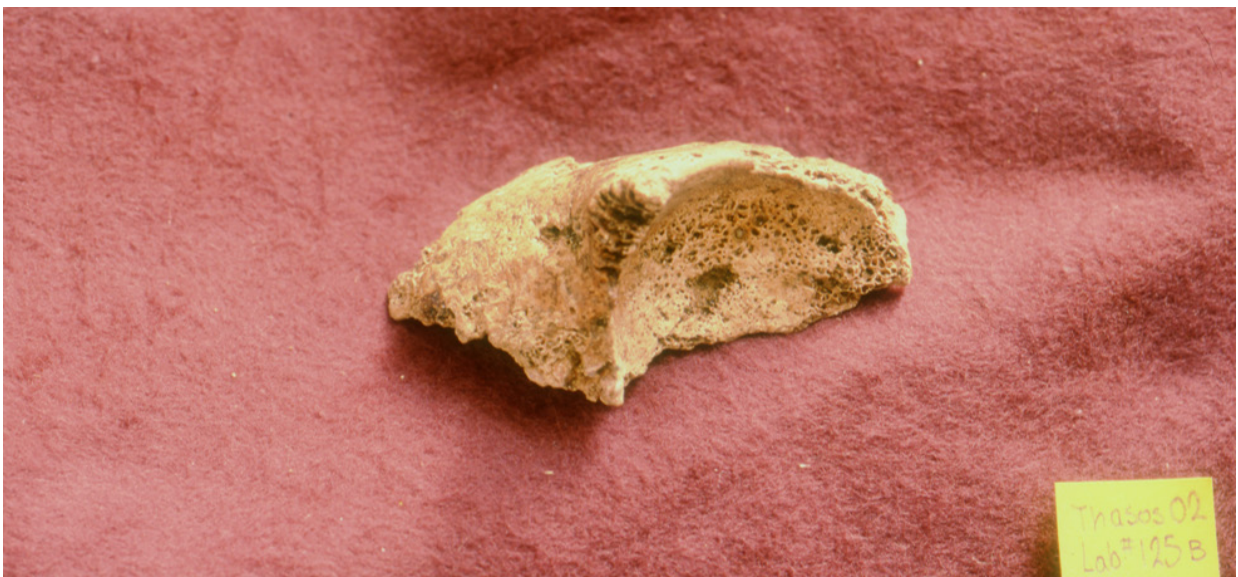


Figure 28. Right frontal bone fragment showing palaeopathological changes within the orbital roof.

As such, considering the ectocranial orifice at the mastoid process with smooth and sclerotic margins and the absence of reactive bone at its internal tubule, it appeared as if it could have been a *cloaca* associated with an exudative process that would have been initiated by a serious long term infection

of an adult case of purulent otitis media;¹⁷⁷ possibly having initiated as an acute version associated with trauma impact and ruptured eardrum compounded by lacerations¹⁷⁸ that would have allowed the hematogenous transfer and spread of pathogens causing serious infection possibly subverting to a chronic purulent otitis media.¹⁷⁹ Recurrent complications of the disease could under many probabilities, particularly during pre-antibiotic conditions, result to the formation of cholesteatoma¹⁸⁰ along with a chronic version of mastoiditis with destructive effects to the adjacent tissues of the brain, to nerves and blood vessels by increased physical pressure, infection, and erosion inclusive of the bone components of the middle ear region and mastoid cavity, causing morbidity and eventually mortality.¹⁸¹ This was possibly the reason for the trephination at the mastoid process, perceived at this context as a mastoidectomy,¹⁸² in order to alleviate if possible some of the most painful and debilitating consequences suffered by the patient, by aiming to drain middle ear and mastoid cell effusions.¹⁸³ While the palaeopathological manifestations are still under investigation, the possibility of a conclusive diagnosis, designating the exudative process to one among the different types of acute versus chronic otitis media seemed challenging, given the inability to conduct bacteriological analyses. Further, the possibility could not be dismissed that alternative pathological conditions had been in effect whereby differential diagnosis would require for example the consideration of acoustic neuroma, chondrosarcoma (although rarely affecting the head), and meningioma. The case of meningioma could have indeed affected the petrous region, although the cranial surgical manifestation would better correspond for the removal of such a tumor that would have been developing within the petroclival junction, and/or at the base of the *cranium* in the left occipital locus of the cerebellar fossa. And yet, the endocranial bone evidence did not show any form of hyperostosis as could be expected by the anticipated infiltration of the tumor into the histology of adjacent bone surfaces. Furthermore, the probability could not be rejected, in fact considered as quite possible, of the involvement of the non-malignant yet aggressively invasive to adjacent tissues, and specifically with erosive effects to bones, desmoid fibromatosis;¹⁸⁴ stemming from the domain of connective tissues in the base of head and neck.¹⁸⁵ As a benign tumor of locally recurrent tendencies,¹⁸⁶ it would have been resistant to surgical removal processes which would have

¹⁷⁷ Roland, P. S., (2008), 'Chronic suppurative otitis media: a clinical review', *Ear, Nose, Throat Journal*, 81:8 (Supplement 1), p. 8-10 ; Acuin, J., (2004), *Chronic suppurative otitis media. Burden of Illness and Management Options*, World Health Organization, Geneva, Switzerland; Acuin, J., (2002), 'Chronic Suppurative otitis media', *Clinical Evidence*, 7, p. 440-457; Schwartz, L. E., and Brown, R. B., (1992), 'Purulent Otitis Media in Adults', *Archives of Internal Medicine*, 152:11, p. 2301-2304.

¹⁷⁸ The possibility was considered that the bilateral fibular traumatism could have been one of the pathways for a hematogenous route transfer of pathogenic bacteria.

¹⁷⁹ For the particular infectious organisms, see Acuin, J., (2004), *Chronic suppurative otitis media. Burden of Illness and Management Options*, World Health Organization, Geneva, Switzerland, p. 10; Mawson, S., and Pollack, M., (1988), 'Special role of *Pseudomonas aeruginosa* in chronic suppurative otitis media', *Ann Otol Rhinol Laryngol Head Neck Surg*, 97: (Suppl. 130), p. 10-13.

¹⁸⁰ Lustig, L. R., Limb, C. J., Baden, R., and LaSalvia, M. T., (2018), 'Chronic otitis media, cholesteatoma, and mastoiditis in adults', www.UpToDate.com; Morris, P., (2012), 'Chronic suppurative otitis media', *Clinical Evidence-online*, www.bmj.com.

¹⁸¹ *Ibid.* p. 12.

¹⁸² Poulsen, L., (2012), 'Translabyrinthine Approach to Vestibular Schwannomas', in (Ed.) A. Quinones-Hinojosa, *Schmidke and Sweet Operative Neurosurgical Techniques: Introduction, Methods and Results*, Elsevier, p. 555-564; Arriaga, M. A., (2010), 'Mastoidectomy-Canal Wall Down Procedure', in (Eds.) D. E. Brackman, C. Shelton, and M. A. Arriaga, *Otologic Surgery*, Elsevier, p. 209-220; Syms, C. A., Syms, M. J., and Sheely, J. L., (2010), 'Mastoidectomy-Intact Canal Wall Procedure', in (Eds.) D. E. Brackman, C. Shelton, and M. A. Arriaga, *Otologic Surgery*, Elsevier, p. 195-207.

¹⁸³ Mawson, S., and Ludman, H., (1979), *Disease of the Ear: A Textbook of Otology*, Edward Arnold Publishing, London.

¹⁸⁴ Masson, J. K., and Soule, E. H., (1966), 'Desmoid tumors of the head and neck', 112:4, p. 615-622.

¹⁸⁵ Klonaris, D. A., Karatzanis, A. D., Velegrakis, S. G., Lagoudakis, E. D., Prokopakis, E. P., and Velegrakis, S. G., (2018), 'Recurrent Desmoid Tumor of the neck: A Case Report of a Benign Disease with Aggressive Behavior', *Case Reports in Otolaryngology-online*, Volume 2018, p.1-5.

¹⁸⁶ Personal communication with Dr. Odysseas Zoras, in the summer of 2019, Professor of Medicine, Department of General Surgery, University of Crete Medical School (then Rector of the University of Crete); Prabhu, R., Natarajan, A., Shenoy, R., and Vaidya, K., (2013), 'Aggressive fibromatosis (desmoid tumor) of the head and neck: a benign neoplasm with high recurrence', *British Medical Journal Case Reports-online*, p. 1-7.

been most challenging for the physician-surgeon given the anatomic complexity of the region and the encroachment as well as intrusion and entangling of vital structures by the tumorous desmofibers.¹⁸⁷

Despite the grim prognostication there might have been on the patient's grave condition, and the exceedingly complex and dangerous elements of the surgical intervention that were to take place, crucial if there were to be any chances of an optimistic survivorship potential for the Wounded *Caballarius*, the physician-surgeon was not discouraged from performing a most skillful soft tissue preparation and subsequently a Hippocratic-type trepanation and scraping¹⁸⁸ on the relevant cranial *loci*. Further, in retrospection, it is suggested as most probable that the surgical intervention took place locally at Paliokastro, as it would have been acutely dangerous to move the patient from elsewhere after such an operation. It is also suggested as very probable that it were the same hands that carried out the operation, while it was the same methodological approach that was implemented for the scraping of the bone in both the mastoid process and the occipital bone.¹⁸⁹ Though the gravely ill patient doesn't seem to have survived for long post-operatively, based on the absence of osteoreparative manifestations, it remains unanswered if any of the high morbidity potentials during surgery caused mortality, such as hemorrhage, or if the complications of the disease compounded by the trials and aftereffects of the surgery,¹⁹⁰ such as infection, proved at the end overwhelming for the Wounded *Caballarius*.

Yet, although many of the questions that emerge with every new *nexus* reached toward the circumstances of the ancients may remain unanswered, taking into consideration a fundamental objective of this project, namely the effort to decipher the whisperings of the human presence at the site, it was possible to derive through the study of the skeletal record, even though incompletely preserved, important tesserae of the larger mosaic of organizational abilities, the training and achievements as well as life dynamics and experiences at Paliokastro, within the context of the ProtoByzantine historical record. And, as for the case study on the condition and suffering of the Wounded *Caballarius* and the aspiration and efforts of the surgeon¹⁹¹ to save his life, it constitutes a unique ensemble of tangible evidentiary data elucidating matters of interest to medical history in the hitherto unknown folds of Cleo's parchments, indeed from the provincial Rachoni region in Thasos island of the Eastern Roman Empire.

¹⁸⁷ Personal communication with Dr. George Samonis, in 2018-2019, Oncologist and Infectious Disease Specialist, Professor of Pathology, University of Crete Medical School; deBree, E., Zoras, O., Hunt, J. L., Takes, R. P., Suarez, C., Mendenhall, W. M., Hinni, M. L., Rodrigo, J. P., Shaha, A. R., Rinaldo, A., Ferlito, A., and deBree, R., (2014), 'Desmoid tumors of the head and neck: a therapeutic challenge', *Head and Neck*, 36:10, p. 1517-1526.

¹⁸⁸ See Hippocrates, Volume III: *On Wounds in the Head*, (Ed.) G. P. Goold, (Transl.) E. T. Withington, Loeb Classical Library, Harvard University Press, Cambridge, Massachusetts, 1999, pp. 6-51. Further, on trephination and scraping methods in surgical application in bone injuries, see Celsus, *On Medicine*, (2002), (Ed.) J. Henderson, (Transl.) W. G. Spencer, Loeb Classical Library, Harvard University Press, Cambridge, Massachusetts, VIII. 1. 2-3.10, p. 492-503.

¹⁸⁹ Although it remains uncertain if the mastoid trephination and the occipital scraping were completed the same day, there is a plethora of additional questions, e.g. what was involved in planning for the operation, who assisted the surgeon, what was the condition of the patient during surgery, were there any crises that took place during surgery?

¹⁹⁰ Even if the surgical applications *per se* were successful under the circumstances.

¹⁹¹ Allocating to the physician-surgeon at Paliokastro the specificity of specialization within the medical profession carried out by the surgeons, '...τοῖς χειρουργοῖς...', as stipulated by Galen according to relevant onomastic norms used in Rome, Galen, *Method of Medicine*, (2011), (Eds. and Transl.) I. Johnston, and G. H. R. Horsley, Loeb Classical Library, Harvard University Press, Cambridge, Massachusetts, VI.6, 455K, p. 234-235. Apropos, to this bibliographical passage, Galen addressed the complexity and the potential dangers of surgical intervention at the temporal bone and the side of the head in general, while mentioning that Eudemus the Methodic was plastering up surgical openings of the head where the *dura mater* was exposed with a cataplasma called 'Isis', a glutinous adhesive, and exteriorly with oxymel, *ibid.* VI.6, 543K-455K, p. 230-235.

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