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LIFE AND DEATH AT EARLY BYZANTINE AKRAIPHNIO, GREECE; A BIOCULTURAL APPROACH

ABSTRACT: Historical sources and bioarchaeological analysis from Greece have shown that the variable and intensive socio-political and cultural phenomena that characterize the Early Byzantine period had various effects on the populations (e.g. demographic decline, migration and mixing of population). The biological and cultural ability of populations to adapt to this continuously changing environment often characterized by deprivation and insecurity is debated. The paper reports on the Early Byzantine cemetery sample from Akraiphnio (5th–7th c. AD) in Boeotia, Greece. The analysis was carried out on 45 individuals in order to investigate health, disease and burial practices at the transition from Antiquity to the Early Byzantine period. Skeletal data and archaeological information on the burials were considered conjointly. Results showed a physically active and resistant, rural population involved in occupations requiring heavy labor. Several archaeological (disposal of the body) and skeletal features (developmental defects of the spine, average stature) raise questions about the cultural and biological identity of the sample. Finally, the behavior of the living society towards the deceased, particularly children is discussed. It seems that infants and children were largely family depended and their presence in the burial place might be the result of social choices.

KEY WORDS: Health – Disease – Burial practices – Early Byzantine period – Boeotia

INTRODUCTION

Archaeological and historical research testifies that important sociopolitical, economic and environmental events marked the transition from Antiquity to the Early Byzantine period in Greece. Between 4th–7th c. AD, Early Byzantines suffered problems due to insecurity, defense and subsistence: extensive invasions and installations of various groups, earthquakes, epidemics and social changes were associated with the introduction of Christianity (Cameron 1993, Mango 1980, Mitchell 2007, Morison, Sodini 2002, Ostrogorsky 1996). Early Byzantine period was also a turning-point for major social and cultural changes

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which took place and they had a lasting effect during the Byzantine era (e.g. Justinian's AD 527–65 reforms) (Morison, Sodini 2002). Within this society, cultural change followed the mixing of population, the settlement change and the juxtaposition of different social and religious groups (Cameron 1993, Lefort 2006). Intensive investigation and archaeological survey for the department of Boeotia in particular, showed the ability of populations, often small, to adapt to and survive into this continuously changing and curiously contradictory environment characterized by deprivation and insecurity but also by wealth and prosperity (Bintliff 2013, 2014).

This paper presents the results on health, disease, lifestyle and burial customs for the Early Byzantine rural cemetery sample of Akraiphnio in Boeotia (5th–7th c. AD) and combines bioarchaeological data with historical information and textual sources. The aim is twofold: firstly, examine whether biological status shows evidence of precarious and deteriorating living conditions within a transitional context in Boeotia by the end of Early Byzantine period; and secondly, look into social attitudes towards dead, in particular subadults.

HISTORICAL AND ARCHAEOLOGICAL BACKGROUND

Boeotia in the Early Byzantine period

The Byzantine Empire inherited from the Romans a complex system of organization both in social life and economic system. During the first half of the 6th c., the density of the rural population was high and the Byzantines had reached an elevated level of prosperity as a result of geopolitical and social peace and stability (Lefort 1993). At the second half of the 6th c., the ancient order began to decline. It is generally assumed that the imperial organization's ability to resist to the invasions of divers populational groups (e.g. Slavs, Sasanians, Arabs) weakened by demographic setbacks resulting from the plague. The reduction in the number of settlements and the measures taken by the Empire to settle Slavs in the imperial territory is seen as evidence of continuing problem of depopulation (Haldon 1990, Lefort 2002). At the late 6th and 7th c. the invasion of these groups made conditions precarious in regions under imperial control and undermined the flourishing village economy (Harvey 2008).

Our knowledge about Early Byzantine Boeotia derives from the available textual and archaeological source material, surveys and excavations (Bintliff 2013, Bintliff, Snodgrass 1989, Koilakou 2006, 2012, Trombley 1989, 2000). During the 4th–6th c. there is abundant evidence of highly advanced level of development and a flourishing urban and rural life; many cities of the Antiquity were transformed to fortified urban centers which served as economic and commercial centers and transit points for agricultural products (e.g. the coastline of Boeotia could be reached by ship and overland). At the same time, the creation of many new rural settlements testifies the development of the countryside, the expansion of land under cultivation and an important demographic increase (Avramea 2005, Koilakou 2012).

The second half of the 6th c. AD introduces a turbulent period for Boeotia that lasted up to the 8th c. AD (Avramea 2005, Koilakou 2012, Morison, Sodini 2002); small rural settlements disappeared, population regressed, and sites were less extended. Historical sources and archaeological evidence testify an important earthquake at AD 551 in Boeotia, though its disastrous impact on the population cannot be testified. In addition, from AD 541/542 up to AD 747 the Byzantine Empire suffered plague. Bearing in mind that the inhabitants of villages might be less affected than those of the cities probably due to the small population density or the distance from big urban centers, there is no reliable evidence (e.g. mass burials) of how plague episodes affected rural communities at the region of Boeotia.

Last but not least, the first invasions of Slavs at AD 580 marked the region; these groups were mainly agriculturalist, they were settled around Lake Kopais and they merged with the locals thus contributing to the demographic increase at the province of Boeotia (Koilakou 2012, Bintliff 2000, 2013). During the 7th–8th c. demographic decline is noted, important urban centers were abandoned, along with the degradation of the urban way of life, and the population moved to the countryside; these changes lead to the creation of numerous agrarian settlements (e.g. Akraiphnio) (Koilakou 2012). It is during the following centuries (9th–10th c.) that Boeotia started to flourish again when Thebes became the capital of the Theme of Hellas (Savvides 1988, Vlysidou *et al.* 1990).

Early Byzantine villages, subsistence and diet

Our knowledge about the form of the village and its features in the early centuries of Byzantium is very scarce contrary to later periods (Lefort 2002). Both grouped and open habitation sites are reported

suggesting that there must have been a regional variability in terms of form of rural habitation site in countryside. The Byzantine village provided the bulk of production and it was a fiscal-economic, social, demographic and political unit. Average Early Byzantine villages were mainly populated by farmers or small proprietors. The peasant household, either nuclear or extended, was the most important component of production and consumption (Harvey 2008) and produced enough to be more than self-sufficient (Laiou 2002).

Agricultural products were identical with the products of Antiquity. Inland areas were favorable to livestock farming while grain, vine and olive production were more important in more well-watered and fertile coastal areas. For communities which were located close to water sources (rivers, lakes, sea) (e.g. Akraiphnio) fishing could contribute substantially to the villagers' income. The Byzantine farmer used manual labor and animal traction in almost all activities in countryside, especially tillage and ploughing (Decker 2008). Common used hand tools were sickle for harvesting, two-pronged digging forks and drag hoes for preparing grain fields. Other activities like weaving, spinning, and sewing were practiced mainly within the framework of the hearth.

Various literary sources from the Byzantine period along with recent biochemical research on human skeletal series offer valuable information on the types of diet of the Byzantines; grains, pulses, olive oil, wine, dairy products, fish and meat, fresh vegetables (e.g. cabbage, onions, leeks, carrots, garlic, cucumbers squash), and fruits (e.g. apples, pears, cherries, plums), as well as honey and nuts were the main components of the Byzantine, probably well balanced, Mediterranean diet (Dalby 1996, Kaplan 1992, Kazhdan 1997, Laiou 2002, Motsias 1998). Bread was very important, often supplemented by olives, olive oil, and beans. A differential access to food products and their consumption is observed between rich and poor, as well between cities and urban centers, and villages. Urban diet included more meat, fruits and vegetables than rural diet. Rich people ate white bread while the poor consumed bread made with barley. Rural Byzantine populations consumed widely cereals and legumes although meat consumption was not inconsiderable. It is noteworthy that the consumption of legumes offered the necessary intake in plant proteins in cases where the intake in animal proteins was deficient, thus contributing to an equilibrated diet. Wine and oil were available to all social classes. In a lower class diet, they would have been (along with dried grapes and olives) one of the main sources of fat and a considerable source of calories (Dalby 1996, Kaplan 1992).

Biochemical analysis on Greek Byzantine skeletal series (Bourbou, Richards 2007, Bourbou *et al.* 2011) showed that Byzantine diet was primarily based on C_3 staples (wheat and barley) and domesticated animals that fed on C_3 plants. In addition, obtained values suggested substantial consumption of meat or, more likely, dairy products. Furthermore, results showed that some Greek Byzantine populations consumed significant amounts of marine protein; the consumption of marine protein could be due to dietary restrictions and fasting regulations imposed by the Orthodox Church.

Deceased and burial place

Archaeological and historical research reveals that cemeteries during the Early Byzantine period were only allowed outside city walls (Doukata-Demertzi 1997, Kourkoutidou-Nikolaïdou 1997, Marki 1990). Byzantine cemeteries included four main grave types (Laskaris 2000): pit and tile covered graves were common and they were often associated with low status individuals, while cist and vaulted graves were elaborate and exceptional usually holding burials of upper class citizens. The position of the deceased was standardized: extended on the back with the forearms flexed on the abdomen or the chest and following the West-East orientation (Koukoules 1951, Nalpantis 2002). Christian customs also included the transportation of a skeleton or part of it from another grave (secondary burial) or the redeposition of the bones in the same grave in order to free space for the following inhumation.

The bioarchaeological analysis of burials from Byzantine skeletal series from Greece allowed investigating the association between biological and social status in terms of archaeological evidence of social differentiation (Tritsaroli 2006, 2008, 2011, Tritsaroli, Valentin 2008). Results showed that the organizing principles of the Byzantine cemetery were strictly related to the socio-economic context of the population but they also reflected the needs and choices of the local, urban or peasant, societies. A typical example is that of subadults: children of different ages were placed in the cemetery as members of high status families (e.g. Middle Byzantine cemetery of Thebes), or as a fragile segment of the population which received divine protection for the life after death (e.g. Middle

Byzantine cemetery of Xironomi), or by participating to daily life activities (e.g. Middle Byzantine cemetery of Spata) (Tritsaroli, Valentin 2008). A different case comes from the cemetery sample of Maroneia; here, the presence of a headshaped individual exemplifies the biocultural complexity of the Early Byzantine society (Tritsaroli 2011).

The site of Akraiphnio

Akraiphnio (*Figure 1*) is situated 18 km North/Northwest of Thebes, capital of the department of Boeotia, in the fertile Boeotian plain and in close proximity to Lake Kopais. Archaeological investigation at the site of Akraiphnio has brought into light numerous archaeological findings dated from the Geometric period up to the 13th c. AD (Andreiomenou 1994, Koilakou 1997, 1998, Kylafi 2000, Sabetai 2000, Vlachogianni 1997, 1998, Vlachogianni *et al.* 2008). The ancient cemetery of Akraiphia (7th c. BC - 2nd c. AD) includes approximately 300 excavated burial structures of various types (Kylafi 2000, Sabetai 2000). In 1997-1998, forty-five pit graves dated at the Early Byzantine period were excavated as part of the latest phase of use of the ancient cemetery. The graves followed a West-East orientation. Archaeological remains such as jewels and coins allowed the dating of the burials to the Early Byzantine period and they testify that the cemetery was used from the late 5th c. until the 7th c. AD (Koilakou 1998, 2003). Among the excavated graves only 35 were available for study. A Byzantine settlement was founded in the same area at the 10th-11th c. AD and destroyed a part of the Early Byzantine cemetery.

FIGURE 1. Map of Greece showing the location of Akraiphnio.

MATERIALS AND METHODS

The skeletal series includes 45 individuals. Skeletal preservation was moderate: 12 skeletons were preserved under 25%, 25 between 25-50% and 8 between 50-75%. Human skeletal remains were examined macroscopically under normal light conditions. Some graves included more than one individual; during the excavation each skeleton was removed separately. However, the skeletal analysis yielded occasionally additional individuals since several skeletal elements were duplicated. Thus, the estimation of the minimum number of individuals (MNI) based on specific skeletal parameters such as age, symmetry-side, morphology and paleopathology (Duday 1987) was essential in order to calculate the number of individuals held in each grave.

In order to proceed to the osteological analysis, the basic demographic parameters (sex, age, and stature) were determined first. Sex determination for adults was carried out using dimorphic aspects of the pelvis following the methods outlined by Buikstra and Ubelaker (1994) (also Milner 1992, Phenice 1969). Age-at-death was estimated from morphological changes of the pubic symphysis of the *os coxae* (Todd 1920, 1921). The moderate degree of completeness did not allow reconstructing an age-profile for the adults; in fact, only two adults preserved the pubic symphysis (*Table 1*). Age estimation for subadults was based on standards for dental eruption and development (Ubelaker 1989). The following subadult age groups were constructed: 0-4 years, 5-9 years, 10-14 years, and 15-19 years; this classification allowed comparisons between the series of Akraiphnio and other Early Byzantine populations. Stature calculations for adults focused on intact tibiae (this bone was better preserved than the femora), preferably left side bones (Trotter 1970); no calculations were made for adults of unknown sex.

Skeletal examination of pathological lesions used standard data collecting methods for relatively

complete skeletons suggested by Buikstra and Ubelaker (1994). Differential diagnosis of diseases was generally based on approaches such as those delineated by Aufderheide and Rodriguez-Martin (1998) and Ortner (2003). The lesions that were focused on this analysis were porotic hyperostosis and cribra orbitalia for identification of anemia (Buikstra, Ubelaker 1994, Stuart-Macadam 1985); linear enamel hypoplasia reflective of stress during tooth crown development associated with infectious disease, malnutrition, or other kinds of relatively acute periods of stress and growth arrests in childhood (Hillson 1986); periosteal

TABLE 1. List of individuals from Early Byzantine Akraiphnio (M = male, F = female, U = unknown).

Grave	Individuals	Preservation	Age	Sex	Stature
3	3.1	good	40–45 (phase 8 of pubic symphysis scoring system)	M	1.76 m
	3.2	moderate	adult	F	-
4	1	poor	18 m ± 6 m	U	-
6	1	moderate	1y ± 4 m	U	-
7	1	moderate	adult	U	-
8	1	moderate	adult	U	-
12	1	poor	15 y ± 36 m	U	-
13	13.1	poor	1y ± 4 m	U	-
	13.2	poor	6 m ± 3 m	U	-
14	1	moderate	3 y ± 12 m	U	-
17	1	poor	adult	U	-
18	1	moderate	birth ± 2 m	U	-
20	1	moderate	4 y ± 12 m	U	-
21	1	moderate	3 y ± 12 m	U	-
22	1	good	adult	U	-
24	24.1	moderate	adult	U	-
	24.2	good	adult	M	1.73 m
25	1	moderate	adult	F	1.78 m
26	1	good	adult	M	1.75 m
27	1	moderate	7 y ± 24 m	U	-
29	29.1	moderate	adult	U	-
	29.2	moderate	adult	U	-
30	1	moderate	15 y ± 36 m	U	-
32	1	good	adult	U	-
33	33.1	poor	adult	U	-
	33.2	poor	adult	U	-
	33.3	poor	subadult	U	-
34	34.1	moderate	adult	U	-
	34.2	poor	adult	U	-
35	1	moderate	5 y ± 16 m	U	-
36	1	poor	adult	U	-
37	1	moderate	adult	M	1.68 m
330	1	good	adult	U	-
331	1	moderate	adult	U	-
332	332.1	moderate	adult	M	-
	332.2	moderate	12 y ± 30 m	U	-
333	1	moderate	adult	U	-
336	1	poor	4 y ± 12 m	U	-
337	1	poor	adult	U	-
338	338.1	moderate	12 y ± 30 m	U	-
	338.2	moderate	8 y ± 24 m	U	-
	338.3	moderate	adult	U	-
339	1	good	15 y ± 36 m	U	-
340	1	good	27–30 (phase 5 of pubic symphysis scoring system)	U	-
341	1	moderate	adult	U	-

new bone as an indication of inflammatory responses resulting from systemic or localized bacterial infection, localized traumatic injury, or other pathological processes (Weston 2012); skeletal trauma in the form of healed and unhealed fractures (Lovell 1997, Merbs 1989); degenerative joint disease (DJD), vertebral osteoarthritis (OA), and Schmorl's depressions as indicators of habitual activities and lifestyles (Rogers and Waldron 1995, Waldron 2008); spina bifida and spondylolysis for congenital abnormalities (Barnes 1994); and dental diseases as indicators of oral health status and diet: dental caries (caries' size was classified according to Metress and Conway 1975), calculus (after the scoring system proposed by Brothwell 1981), alveolar bone resorption (vertical and horizontal bone loss), and antemortem tooth loss (AMTL).

Skeletal lesions were inventoried by presence-absence, by individual and by skeletal element. The percentages reflect the observed (n) over the observable (N). DJD are presented by individual and by joint (left and right) when at least one articular surface of the joint was preserved; vertebral OA and Schmorl's depressions are presented by vertebral segment (cervical, thoracic and lumbar). DJD and OA were not recorded for subadults. Dental diseases are reported by teeth/sockets and by individuals. *Tables 1* to *6* present results for adults (whole sample) and subadults. *Table 7* contains comparative data on human skeletal collections from Early Byzantine sites in Greece. Statistical comparison (x^2 test) was used when primary data were available in the literature, with statistical significance set at 0.05. Finally, a brief description of the graves and burials was made by using their archaeological features, the results on the MNI and age-at-death; the cross-analysis helped to investigate burial treatment among adults and towards subadults.

RESULTS

Demography

Forty-five individuals composed the Early Byzantine skeletal assemblage of Akraiphnio (*Table 1*). Sexing and ageing were not possible for the majority of the adult population due to the poor skeletal representation of *os coxae*. Hence, among 27 adults, five were characterized as males and two as females. Age-at-death was estimated for one 40–45 year-old male and one 27–30 year-old adult of undetermined sex. Average living stature calculated for five sexed individuals was 1.74 m. It is interesting to note the female skeleton from Grave 25 was 1.78 m tall. Subadult dentition was preserved for 17 out of 18 individuals; age-at-death ranged from birth ±2 months to 15 years ±36 months. More than half of the

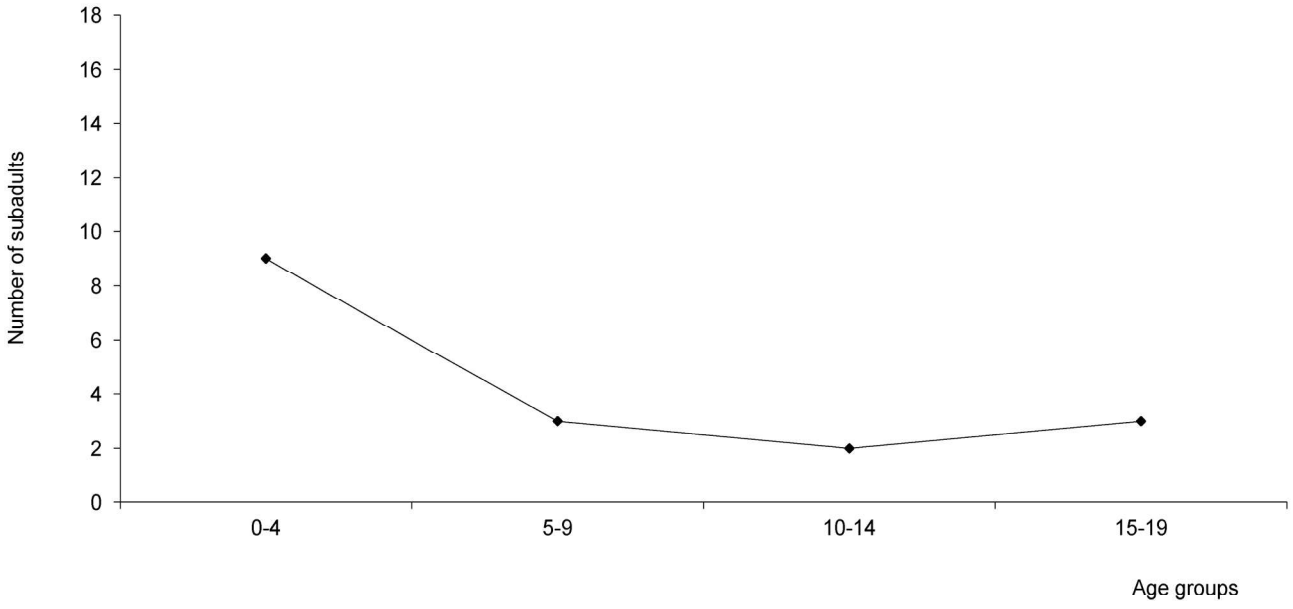

FIGURE 2. Mortality curve for the subadults of Akraiphnio.

subadults were less than 4 years. The mortality curve for the subadult sub-sample is presented in *Figure 2*.

Dental diseases

Antemortem tooth loss presented the highest frequency among dental conditions affecting 22.7% of dental and alveolar remains (73 of 322 teeth/sockets, 13 of 21 adults) (*Table 2*), both maxillary (N=33) and mandibular (N=40). The number of teeth lost during life ranged from 1 to 19 in an individual. The unusually high frequency of tooth loss for the anterior teeth was noted (27 of 89 incisors, 4 of 47 canines) (*Figure 3*). Similarly, calculus affected 21.8% of teeth (36 of 165 teeth, 10 of 18 individuals) and occured mostly on anterior teeth (18 incisors, 6 canines); calculus deposits were of slight to medium size (*Figure 4*). Alveolar bone resorption was recorded for 14.1% of sockets (44 of 312 sockets, 8 of 21 individuals). Dental caries affected 3.6% of adults' teeth (6 of 165 teeth, 3 of 18 individuals) and they were pits to medium/large. Among subadults, two adolescents of 15 year-old presented carious lesions (3 of 147 permanent teeth). No particular pattern of dental wear was observed for adult dentitions.

Dental enamel hypoplasia reached 24.6% of the observable dental remains (87 of 353 teeth, 7 of 34 individuals) (*Figure 4*). The lesion was more frequent among subadults (27.1%) (51 of 188 teeth, 4 of 16 individuals) than among adults (22%) (36 of 165 teeth, 3 of 18 individuals) and affected only permanent dentition. A large number of teeth affected by individual were found among old children (8 and 12 year-old), adolescents (15 year-old) and adults. The distribution of enamel defects showed that molars (N=27) and incisors (N=26) were the more affected teeth followed by premolars (N=20) and canines (N=14). However, this distribution may be biased because of the large number of incisors and canines lost prior to death; probably, the real number of anterior teeth affected by enamel defects was

TABLE 2. Dental diseases among adults.

	per teeth			per individuals		
	N	n	%	N	n	%
Caries	165	6	3.6	18	3	17
Calculus	165	36	21.8	18	10	56
ATML	322	73	22.7	21	13	61.9
Alveolar bone resorption	312	44	14.1	21	8	38.1

FIGURE 3. Antemortem tooth loss of mandibular central incisors (Grave 24.2, adult male).

FIGURE 4. Dental enamel hypoplasia on mandibular teeth, dental calculus on incisors and canine (Grave 22, adult of unknown sex).

higher. This hypothesis could be made for calculus too.

Cribra orbitalia and porotic hyperostosis

Cribra orbitalia (*Table 3*) occurred on a 3 year-old (Grave 21) and a 15 year-old (Grave 339). In the first case, the lesion was unilateral (right side), appeared as porosity with coalescence of foramina and some thickening (degree score 4) and it was active at the time of death (activity score 1); this child was also affected by new bone formation on the temporal bones, sphenoid and tibiae. In the second case, the lesion was characterised by barely discernible porosity (degree score 1) and a mixture of active and healed porosity at the time of death (activity score 3); it is noteworthy that linear enamel hypoplasia affected 18 of 30 observable teeth of this adolescent. None of the affected individuals presented hyperostotic lesions on the cranial vault.

Porotic hyperostosis was more frequent among subadults (33.3%) than adults (15.8%) (*Table 3*); it was expressed mainly by the superficial vault surface in the form of a fine, regular pitting seen in small circumscribed areas in the region of the parietal and the occipital bone, parallel to the sutures. No excessive thickening or expansion of the diploe was observed. The lesion affected more the parietal than the occipital bone. The moderate preservation and completeness of cranial bones did not allow an age-specific distribution of these lesions according to the subadult age groups. It can only be mentioned that hyperostotic lesions were recorded on the cranial vault of four individuals aged at birth, one, twelve and fifteen years each.

Periosteal new bone

The lesion was manifested by mild woven bone deposits or had a longitudinally striated appearance without evidence of cloacae. Periosteal new bone affected more than half of the individuals (53.3%) (16.2% of the bones). Lower extremities were more affected than upper extremities for both adults and subadults; adults' fibulae and subadults' tibiae (*Figure 5*)

TABLE 3. Cribra orbitalia and porotic hyperostosis.

	Adults			Subadults			Adults			Subadults		
	per bones						per individuals					
	N	n	%	N	n	%	N	n	%	N	n	%
Cribra orbitalia	7	0	0	10	3	30	5	0	0	7	2	28.6
Porotic hyperostosis	38	6	15.8	30	10	33.3	19	3	15.8	12	4	33.3
Parietal	29	6	20.7	19	7	36.8	16	3	18.8	10	4	40
Occipital	9	1	11	11	3	27.3	14	1	7.1	11	3	27.3

TABLE 4. Periosteal new bone.

	Adults			Subadults			Adults			Subadults		
	per bones						per individuals					
	N	n	%	N	n	%	N	n	%	N	n	%
All locations	257	35	13.6	181	36	19.9	27	13	48	18	11	61
Humerus	45	2	4.4	31	4	12.9	24	1	4.2	16	2	12.5
Radius	39	0	0	29	2	6.9	22	0	0	18	2	11.1
Ulna	37	0	0	28	3	10.7	22	0	0	16	2	12.5
Femur	46	4	8.7	32	7	21.9	24	2	8.3	17	4	23.5
Tibia	48	12	25	32	17	53.1	25	7	28	17	9	52.9
Fibula	42	17	40.5	29	3	10.3	23	11	47.8	16	2	12.5

were the most affected bones. Periosteal new bone was more frequent among subadults (19.9% of bones) than among adults (13.6% of bones) (*Table 4*); the comparison between subadults and adults was at the limit of statistical significance (*p=0.079516*). Although moderate skeletal preservation and completeness did not allow an age-specific distribution of this lesion, it is noteworthy that infants and children of all ages had at least one bone affected except a 4 year-old, a 5 year-old, and a subadult of unknown age. A one year-old child (Grave 6) showed bending at the distal third of the left radial shaft and a seven year-old child (Grave 27) exhibited bilateral bending at the medial shaft of both ulnae (coupled with periosteal new bone) and both radii.

Trauma

Traumatic lesions were observed upon the thorax, the upper and lower extremities. All traumas recorded on the thorax and upper extremities were healed fractures and they presented a callus. Four adults were affected, of whom three on the ribs (3 of 23 individuals) and one on the radius (1 of 22 individuals). The adult from Grave 333 had two left ribs fractured; post-traumatic new bone formation was noted on the dorsal view of one rib. Finally, a female individual (Grave 25) showed *myositis ossificans* on the diaphyseal proximal end of both fibulae (*Figure 6*); this condition was not associated with other skeletal injuries. It is noteworthy that this individual was found to be the tallest in the sample.

Degenerative Joint Diseases (DJD)

Degenerative conditions were generally manifested by surface porosity and lipping. Surface destruction and osteophyte formation on the margins of the joints

FIGURE 5. Periosteal new bone on right tibia (Grave 14, 3 year-old child).

FIGURE 6. *Myositis ossificans* on the diaphyseal proximal end of the left fibula (Grave 25, adult female).

TABLE 5. Degenerative joint Diseases.

	per joints			per individuals		
	N	n	%	N	n	%
Glenohumeral	25	6	24	40	7	17.5
Sternoclavicular	13	5	38.5	21	9	42.9
Acromioclavicular	16	6	37.5	25	7	28
Elbow	23	8	34.8	41	11	26.8
Wrist	13	1	7.7	20	1	5
Hand	21	2	9.5	36	5	13.9
Hip	21	4	19	37	6	16.2
Knee	23	5	21.7	44	9	20.5
Ankle	24	8	33.3	46	14	30.4
Foot	22	5	22.7	42	10	23.8

occurred in few cases. The lesions were found on 54.2% of the adults (13 of 24 individuals). The sternoclavicular (38.5%), acromioclavicular (37.5%), the elbow (34.8%) and ankle (33.3%) were the most affected joints (*Table 5*). Always bearing in mind that the sample of the sexed adults is too small to make any general inferences, most cases were recorded on males.

Vertebral pathology

Vertebral pathology included spinal OA, Schmorl's depressions, trauma, fusion, spondylolysis and spina bifida (*Table 6*); 70.8% of the sample was affected (17 of 24 individuals). A preference was noted for males. Spinal OA frequency was high compared to the other types of vertebral pathological conditions; spinal OA was manifested by osteophyte formation on the margins of the vertebral bodies coupled by porosity of the vertebral body-end plates, porosity and destruction of the diarthrodial joints. Schmorl's depressions were less frequent (10–30.4%). Spinal OA and Schmorl's depressions presented the same distribution affecting mostly the thoracic segment, followed by the lumbar and cervical vertebrae. Trauma comprises one case of hemispondylosis on the left side of LV4 coupled by fusion of the arches LV3–LV5 (Grave 32). In another case, the fusion of the arches between the axis and the C3 was recorded (Grave 29.1) (*Figure 7*).

Spinal developmental defects include two cases of spondylolysis and three cases of spina bifida (*Table 6*) that are distributed among three individuals: the old male 3.1 and two adults of unknown sex. More precisely, one case of bilateral lumbar spondylolysis (LV4) was coupled by bilateral fusion between the arches of the L4–L5 (Grave 3.1); no fusion between vertebral bodies was observed. One adult showed spina bifida on the sacrum (*Figure 8*) (Grave 337). Finally, one case of thoracic spondylolysis (TV4), lumbar hemispondylosis mentioned above and two cases of

TABLE 6. Adults' vertebral pathology (CV = cervical vertebrae, TV = thoracic vertebrae, LV = lumbar vertebrae, OA = osteoarthritis, SD = Schmorl's depressions).

	per vertebral segment		
	N	n	%
CV OA	20	10	50
TV OA	23	17	73.9
LV OA	21	12	57.1
CV SD	20	2	10
TV SD	23	7	30.4
LV SD	21	3	14.3
CV trauma	20	0	0
TV trauma	23	0	0
LV trauma	21	1	4.8
CV spondylolysis	20	0	0
TV spondylolysis	23	1	4.3
LV spondylolysis	21	1	4.8
CV fusion	20	1	5
TV fusion	23	1	4.3
LV fusion	21	2	9.5
CV spina bifida	20	0	0
TV spina bifida	23	0	0
LV spina bifida	21	1	4.8
Sacrum – spina bifida	19	2	10.5

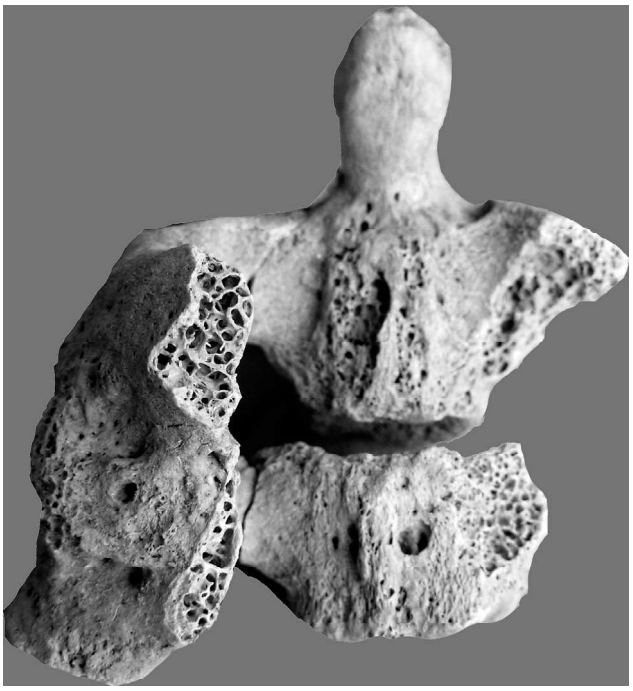

FIGURE 7. Fusion of the arches between the axis and the C3, left side preserved (Grave 29.1, adult of unknown sex).

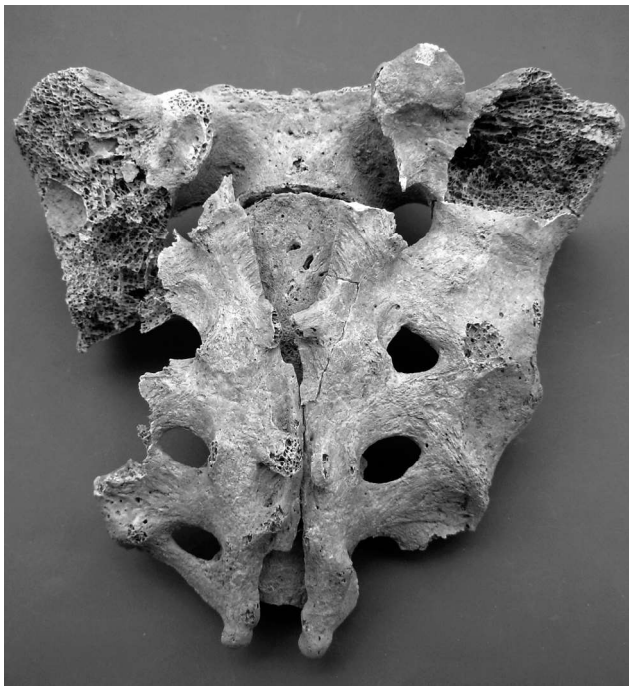

FIGURE 8. Spina bifida occulta on the sacrum (Grave 337, adult of unknown sex).

spina bifida (L5 and S1–S2) affected the vertebral column of one adult (Grave 32).

Graves and burials vs skeletons

The identification of 45 individuals from 35 graves showed an average of 1.3 individual and a variation from 1 to 3 of individuals in each grave. Twenty seven graves included the bones of one individual each and eight graves included the remains of two or three individuals. The cross analysis of archaeological and biological data revealed no differences between adults and subadults in burial treatment. Hence, 19 graves contained only adults and 13 graves included bones of subadults; adults and subadults were found conjointly in 3 graves. Among 19 graves with adults' remains, 15 contained one individual each and 4 included two individuals each. A similar distribution was observed for the subadults: 12 graves held the remains of one individual each and one grave included two individuals. The subadults found in the same grave with adults were aged between 8 and 12 years.

The majority of both adults (N=18) (males and females) and subadults (N=13) were found in primary position. Seventeen adults had the same skeletal position that is extended on the back with the upper extremities folded on the abdomen, chest or shoulders. The redeposited or pushed bones of 9 adults and 5 subadults were placed either at the west or north of the grave. Contrary to the rest of the burials, the individual from Grave 32 was placed in a flexed position, on its right side in an East-West orientation facing the North. The upper extremities were folded on the abdomen (left) and the elbow (right) and both lower extremities were strongly flexed.

DISCUSSION

Health and disease at Early Byzantine Akraiphnio

Stature is a sensitive indicator of stress during development and overall health status during growth; it varies in relation to environmental factors, including climatic conditions, diet, socio-economic status, and disease (Maat 2003, 2005, Steckel 1995). As far as diet is concerned, it is considered that protein consumption is favorable for stature (Maat 2003). As much as the picture obtained from stature values may be an artifact of the small sample, this is a positive finding for the

general health status of the series of Akraiphnio suggesting that the general environmental milieu of this population was at least not suboptimal; this finding could also be related to the frequencies of other paleopathological conditions, e.g. dental calculus which is assumed to have positive correlations with protein consumption (Hillson 1979, 1986).

Various causative factors of calculus formation should be considered when analyzing skeletal series (e.g. individual susceptibility, food preparation methods, poor oral hygiene, drinking water mineral content, oral microorganisms) (Lieverse 1999). At Akraiphnio dental calculus is not unusually high for a rural population. Despite the peasant way of life and the fact that meat should have been considered as a luxury product difficult to acquire, especially in large amounts, it seems probable that these people consumed animal proteins (e.g. dairy products). An alkaline oral environment, usually related to the consumption of meat, and poor dental hygiene might be responsible for the amount of this lesion. Although this study is not supported by biochemical analyses, it is noteworthy that stable isotope analysis of bone samples from Classical Thebes showed an increase in the $\delta^{15}N$ of human values compared to prehistoric periods that was interpreted as the result of a more systematic exploitation of freshwater resources from the lakes together with intensification in agriculture, possibly with the aid of manure (Vika *et al.* 2009). The proximity of the settlement of Akraiphnio to Lake Kopais does not exclude the possibility that these Early Byzantine villagers had access to freshwater fish available for consumption. The diachronic comparison of average stature of neighboring populations from Thebes (Vika 2007) dated to archaic/classical (average stature 1.66 m) and hellenistic times (average stature 1.64 m) showed that stature of the villagers of Akraiphnio was higher. It can not be assessed if this is random due to the small sample size or if factors other than diet might also be at the origin of these differences, such as different genetic background.

Antemortem tooth loss can be the result of variations in dietary consistency, nutritional deficiency diseases, cultural or ritual ablation and trauma (Lukacs 1989, 2007). Consumption of sugars, especially when refined or when contained in sticky food, leads to a marked increase in the prevalence and intensity of carious lesions (Hillson 1986, Larsen 1997, Larsen *et al.* 1991, Touger-Decker, van Loveren 2003) and it would be an important factor in periodontal disease and conducive to alveolar resorption and tooth loss (Hillson 1979). The people of Akraiphnio did not seem to emphasize a soft, high-carbohydrate staple but should have a diversity of medium-coarse foods. In addition, there is no ethnographic or paleoanthropological evidence for ritual ablation of teeth in Early Byzantine Greece. In the case of interpersonal violence, other traumatic lesions should appear conjointly on the skull or mandible, which was not the case here. As a result, the high percentage of AMTL and the overall prevalence of dental lesions could be in part rooted in environmental factors such as poor sanitary conditions. On the other hand, literature on dental trauma includes cases where the loss of the anterior teeth before death is considered to be the result of extramasticatory use of teeth (commonly anterior teeth used as a third hand in domestic activities) (Milner, Larsen 1991). Hence, the loss of anterior teeth at Akraiphnio might be further augmented by non-dietary factors such as accidental falls or occupational use of teeth as tools which might be considered as consequence of the rural lifestyle of these people.

Cribra orbitalia and porotic hyperostosis are most commonly linked to some types of anemia which can be of genetic origin or can result from acquired conditions such as megaloblastic anemia (most commonly caused by chronic dietary deficiencies and malabsorption of vitamin B_{12} or folic acid) (Walker *et al.* 2009), scurvy, rickets, iron deficiency of nutritional origin, infections, parasitic load and other chronic stressors that influence iron metabolism, or any combination of the abovementioned causes (Stuart-Macadam 1985). At Akraiphnio both lesions were mainly periosteal and they were of slight to moderate involvement. There were no pathological lesions suggestive of genetic anemia on the postcranial bones. On the other hand, growth arrest signs on the teeth provide a reliable indicator of periods of stress during tooth crown development caused by childhood disease, vitamin deficiency, malnutrition or infection (Goodman, Rose 1990, 1991). The individuals who showed evidence of enamel hypoplasia were older children, adolescents and adults. Even if a direct correlation between cribra orbitalia and hypoplasia cannot be affirmed, children who have suffered from nutritional stress are more susceptible to develop both conditions (Stuart-Macadam 1985); this is the case of one adolescent at Akraiphnio. As much as the distribution on enamel defects may be biased because of the number of anterior teeth lost before death, it is reliable to think that a large part of the population of

Akraiphnio were exposed to stress for a long period during childhood. Since an age-profile for the adults is largely unknown, it can only be suggested that increased stress during childhood related to early death for some members of this population.

Periosteal new bone formation occurs in response to any pathological stimulus and accompanies a variety of disease processes, including inflammation, specific and non-specific infections, hematopoietic diseases and trauma (Mensforth *et al.* 1978, Ortner 2003, Weston 2012). Periosteal reactions in actively growing children, usually under one year, should be considered with caution since they are not rare or abnormal but they may be the result of normal periosteal bone growth (Shopfner 1966, Weston 2012). If the lesions recorded on fifteen long bones belonging to four subadults under one year at Akraiphnio are considered as non pathological, then the frequency of subadult periosteal new bone drops from 19.9% to 11.6%, which is less than the frequency of adults' periosteal reactions; the difference is not statistically significant. Making allowance of the differential preservation, completeness and small size of the subadult sub-sample, the frequency of subadult periosteal new bone nevertheless remains high, in particular when compared to other Early Byzantine samples.

Patterns of neonatal and postnatal mortality (0–4 years) show that the leading causes of deaths during the first years of life are infections, congenital anomalies and injuries. In addition, important environmental and cultural variables can play an important role in the etiology of infant mortality including weaning process and its' accompanying biological adaptations, or age- and sex-specific food restrictions and regulations which can lead to malnutrition (Gordon *et al.* 1967, Mensforth *et al.* 1978). At Akraiphnio it is not possible to isolate a specific deficiency or even additional factors that might have resulted in the lesions recorded on juvenile remains. Even if the cases of bending on upper extremities for two individuals could be evidence of rickets (Mays *et al.* 2006, Ortner, Mays 1998), and the porous and hypertrothic lesions on the sphenoid bone accompanied by cribra oribtalia for one individual could be considered as evidence of scurvy (Ortner 2003, Ortner *et al.* 1999, 2001), the lack of several criteria related mainly to the location of the lesions due to the moderate skeletal preservation did not allow for a differential diagnosis for the observed lesions. Taking into consideration the number of individuals who died before the age of four, a period during which children were still family depended and some of them were at least partially breast-fed (in Byzantine Greece gradual weaning possibly terminated around the age of 3 years) (Bourbou, Richards 2007, Bourbou, Gavrie-Lok 2009), it is probable that the synergistic interaction among infectious diseases, unhygienic conditions surrounding artificial feeding and the overall health of the children's environment could be at the origin of subadults' deaths recorded at Akraiphnio.

Periosteal new bone among adults appeared especially on tibia and fibula which are not surrounded by a large amount of soft tissue and therefore were more susceptible to infection. Furthermore, bones near the skin are more exposed to direct trauma than bones with overlying muscle. At Akraiphnio, the morphology and location of periosteal new bone among adults' bones point to non-specific infections or minor trauma as a responsible agent resulting from physically demanding living conditions such as hard field work, farming, and similar daily activities that can be found on the Early Byzantine rural setting, rather than to a nutritional deficiency or other disease complexes.

The absence of an age-profile for the adults hindered considerably the interpretation of degenerative and traumatic conditions. The anatomical locations of OA and injuries, especially on the upper extremities, the back and the thorax point to repetitive stress and minor trauma as the most plausible explanation for these lesions and show that stress applied upon the skeleton resulted from a physically demanding, vigorous lifestyle. Thus, laborious activities, as they have been presented at the beginning of this analysis, which related mostly to agrarian tasks such as cultivation, food acquisition, processing and preparation, craft production, heavy weight transport and walking in countryside might illustrate the hazardous nature of the rural environment and its increased potential for accident. Since the age profile for the adults is not known, other factors such as physiological wear and tear on joints due to advanced age can not be excluded.

Spondylolysis is the ossification union failure of the pars interarticularis of the vertebra, resulting in separation of the vertebra into the ventral part and the dorsal part (Auderheide, Rodriguez-Martin, 1998). The etiology can be congenital and traumatic associated with unusual stress in the lower back (Merbs 1983). However, these two causes are not mutually incompatible since one individual can be congenitally predisposed to a stress fracture of pars interarticularis. Spina bifida is the failure in the development of the

neural canal associated with incomplete development of the elements of the neural arch of one or more vertebrae (Barnes 1994, Ortner 2003). Spina bifida is thought to result from a combination of genetic and environmental factors such as inadequate intake of folic acid in the mother's diet, maternal diabetes, maternal obesity, exposures to infections or other harmful agents during the mother's development (Guitierrez *et al.* 1996, Mitchell *et al.* 2004). The mildest form of spina bifida (spina bifida occulta) occurs mostly on the specimens from archaeological sites since the most severe type is not compatible with survival (Manchester 1983). In the small sample examined here both lesions occur independently and conjointly as it is also reported in the literature (Waldron 1993). These cases include also fusion of vertebral arches which co-occur with spondylolysis. Differential diagnosis excludes the possibility that fused arches were part of several congenital malformations of the spine such as the Klippel-Feil syndrome or incomplete segmentation of vertebral segments (Aufdeheide, Rodriguez-Martin, 1998). It seems more probable that the fusion of the arches was secondary to OA lesions of the spine (Grave 29.1) or spondylolysis. The multiple developmental defects that co-occur in individual 32 are remarkable and they could be interpreted as indication of different genetic background.

Children and Childhood

Children are often unknowable through the archaeological record because they leave few material indications, with the exception of child burials. The study of non-adult human remains has contributed substantially to our knowledge on the biological profile and the behavior of past populations towards dead. During the last years important advances have been made underlining the necessity of a multi-disciplinary approach to children and childhood in Byzantium (Bourbou 2010, Tritsaroli, Valentin 2008). This study emphasizes on the ages of children and their sociocultural implications.

According to the Byzantine law, the subadult life can be divided in three phases: the infants from 0 to 7 years, the children or juveniles up to 12 years for the girls and to 14 years for the boys (age at which the marriage was authorized by the law) (Kiousopoulou 1997) and the adolescents or older subadults up to 25 years old (Tourtoglou 1985). With respect to the importance that Byzantines gave to education, this division seems to follow schooling; formal primary education for infants after 4 years and secondary education for children (Antoniadis-Bibicou 1973, Kalogeras 2000).

During the first centuries of Christianity, children were still the forgotten people in ancient sources (Cameron 1993) indicating probably that children themselves were still given a low priority in the written record rather than individuals did not care about children. After the 6th–7th c. AD, family became the most powerful element of the Byzantine society (Kazhdan 1988) while the theoretical structure of voluntary kinships has been created by the end of the 7th c. AD (Patlagean 1978). For the broadly agriculturally and pastorally based economy of the Byzantine society of Akraiphnio, people would have been engaged in activities that contributed primarily to the household economy and to the maintenance of the most important unit of the society, that of the family.

The importance of the family is also highly accentuated by the presence of the infants and children among adults in the burial place. At Akraiphnio, subadults represent mainly the first two age categories described above, the infants and the children. These individuals belonged to a vulnerable age group and it is probable that acute and severe insults provoked their sudden death without always creating paleopathological changes on the bones. Hence, it is important to underline that children under four, in other words newborns, children at the age of weaning and just before the beginning of formal primary education, were still largely family depended. For this reason, it is reasonable to propose that the presence of these age groups in the sample of Akraiphnio is not suggestive of high infant mortality nor it indicates deprivation or extreme living conditions; on the contrary, the presence of the very little is selective, and designates the close ties to their families and their protection after death. It can be assumed that children were neither segregated nor isolated from the general population but they were buried in equal terms among their relatives.

Burial customs

The Early Byzantine cemetery of Akraiphnio showed homogeneity in grave architecture. All the graves had the same, rather poor, construction with very few or no grave goods. Most of the burials respected the individuality of the deceased by holding only one deceased, either adult or subadult. Nevertheless, the same uniformity was not recorded for the orientation and the disposal of the body; the archaeological features regarding the position and

orientation of the adult buried in Grave 32 could attribute to this burial a different cultural and/or social status.

Several burials belonging to different populational groups have been found in the Greek territory and they are dated to the Early Byzantine period: various ethnic groups including Jews and Goths were identified at the Early Byzantine cemetery of Thessaloniki (Marki 2006); a large number of anthropomorphic graves found in the city of Veroia were attributed to Goths, who were present in the city during the 4th and 5th c. AD (Pazaras 1978); burials linked to Slavic culture have been found in many places in Central and Southern Greek mainland (a list of various sites is provided in Laskaris 2000, see also Mailis 2011); a female skeleton with intentional cranial modification from Early Byzantine Maroneia was linked to Hun culture (Tritsaroli 2011).

The scanty offerings in the burials of Akraiphnio and the fact that the associated settlement has not been located hinder the investigation on the cultural and social identity of this population. However, the few accompanying objects placed in the burials provide no evidence for a foreign culture; the only indication could be the disposal of the body in Grave 32. In fact, the available archaeological and historical data are not conclusive and they do not allow attributing to this individual a particular cultural or social identity. In addition, it can not be inferred if the disposal of the body in Grave 32 was the result of social or individual choices. In any case, this burial was not isolated from the rest of the cemetery and the burial space remained uniform in terms of grave typology and distribution.

Comparison to Early Byzantine populations from Greece

During the last years considerable progress has been made on the study of human skeletal series from Greece. Notably for the Byzantine period, bioarchaeological analyses of cemetery populations have added volumes to our understanding of the human past in the Greek territory. Nevertheless, the use of variable methodology and recording methods among researchers as well as the presentation of data make often comparative analysis a difficult task. For the purposes of the present analysis several reports are considered including the sites of Eleutherna and Messene (Bourbou 2003, 2004), Sourtara (Bourbou and Tsilipakou 2009), Maroneia (Tritsaroli 2008), Aliki (Buchet, Sodini 1984), Knossos (Musgrave 1976), and Corinth (Wesolowsky 1973). As far as dental and skeletal paleopathological conditions are concerned, comparable data were available for the sites of Sourtara and Maroneia (northern Greece), Messene (Peloponneese), and Eleutherna (Crete). The comparison does not include data on burial customs since the association between skeletal evidence and funerary context of the samples is rarely inferred in most studies.

Table 7 summarizes the available data on adult/subadult ratio, age-at-death, sex, and stature from Early Byzantine assemblages. The average stature of the population of Akraiphnio was one of the highest in Greece (Angel 1984) and among the highest obtained for Early Byzantine series. Adults and subadults were normally represented at Akraiphnio; the proportion of subadults (40%) matches that at Eleutherna (34%), Knossos (40%) and Abdera (45%), it is significantly

TABLE 7. Comparative data on Early Byzantine human skeletal series in Greece. *The sample here includes two additional individuals which were studied after the first publication of preliminary results.

	Total	Subadults	Adults	Males	Females	Stature M	Stature F
Akraiphnio	45	18	27	4	1	1.73	1.78
Maroneia (Tritsaroli, 2008)*	38	5	33	8	10	1.70	1.57
Abdera (Agelarakis, 1992–1993)	40	18	22	16	5	1.68	1.56
Thassos (Buchet, Sodini, 1984, Buchet 1986)	147	124	23	22	1	1.62	1.50
Sourtara (Bourbou 2009)	71	15	56	27	15	1.70	1.52
Messene (Bourbou 2003, 2004)	74	19	55	23	12	1.70	1.52
Lerna (Wesolowsky, 1973)	164	47	117	54	43	1.63–1.73	1.60
Eleutherna (Bourbou, 2003, 2004)	151	51	100	52	21	1.69	1.60
Knossos (Musgrave, 1976)	50	20	30	9	12	1.61–1.78	1.50–1.62

higher to that of Maroneia (*p =0.0064856*) and Sourtara (*p=0.028134*), and lower to that of Thassos (*p=2.99E-05*); comparison with Messene and Lerna was at the limit of statistical significance. The subadults' mortality curve of the Akraiphnio sample resembles that of Sourtara. The under-representation of subadults in Maroneia is probably due to sample bias (Tritsaroli 2008). On the contrary, the over-representation of subadults in the churches of Aliki at Thassos is interpreted as the result of social rather than individual choices (Buchet, Sodini 1984, Buchet 1986). The number of individuals of undetermined sex for the series of Akraiphnio does not allow further discussion on the demographic profile of the sample in relation to the other Early Byzantine samples.

The distribution of dental caries, calculus and AMTL observed at Akraiphnio is similar to that of Sourtara for which dental data suggest a dependence of carbohydrates in the diet (Bourbou, Tsilipakou 2009). Caries frequency was significantly lower for Akraiphnio (3.6%) compared to that of Maroneia (9.2%) (*p=0.023223*) and it was similar to that of Eleutherna (2.9%), Messene (3.6%) and Sourtara (3.7%). On the contrary, calculus rates at Akraiphnio (21.8%) were similar to these at Maroneia (27.4%) but significantly higher than those obtained at Sourtara (*p=1,99E-03*), Messene (*p=2,38E-03*) and Eleutherna (*p=1,36E-12*). It is noteworthy that at Maroneia calculus (27.4%) was three times more frequent than caries (9.2%); in particular, sex and age-related variations were observed in the expression of calculus which could be linked to the unequal access to meat resources by males and older individuals (Tritsaroli 2008). The inhabitants of Akraiphnio (22.7%) were significantly more affected by AMTL than the inhabitants of Maroneia (*p=6.30E-03*), Messene (*p=4.47E-02*) and Eleutherna (*p=0.029681*). Finally, the occurrence of dental enamel hypoplasia was significantly higher for the people of Akraiphnio (21.8%) than for the other skeletal series; dental enamel hypoplasia frequency ranged between 0.4% and 2.8% for the series of Sourtara, Eleutherna and Messene while the inhabitants of Maroneia were affected at 14%.

Hematopoietic diseases were generally more common among the people of Akraiphnio (*Table 3*) compared to the above-mentioned samples. Cribra orbitalia (13%) and porotic hyperostosis (occipitals 5%, parietals 8%) were the more commonly observed paleopathological lesions at Early Byzantine Sourtara and affected both adults and subadults (Bourbou, Tsilipakou 2009). Three subadults from Eleutherna and two from Messene exhibited cribra orbitalia, while porotic hyperostosis was present in only one adult from Messene (Bourbou 2004). One case of cribra orbitalia among adults was recorded for the sample of Maroneia (Tritsaroli 2008).

Inflammations of the periosteum found in contemporary Early Byzantine series were not frequent compared to the sample of Akraiphnio where this condition reached 16.2% of the observable bones. Adult periostosis showed a low percentage at Sourtara, Eleutherna and Messene not exceeding 7%; similarly, subadult periostosis at Eleutherna and Messene ranged from 1.6 to 3% (Bourbou 2006). At Maroneia, the skeletal analysis showed that new bone formation among adults and subadults did not exceed 15%. With respect to degenerative diseases, it seems that only thoracic OA at Akraiphnio (73.9%) differs substantially from the other sites where vertebral OA ranges between 3.1% for the lumbar segment at Messene to 59% for thoracic vertebrae at Sourtara. As far as trauma is concerned, a small number of fractures are reported among different Early Byzantine sites involving mainly the upper and lower extremities, and the back. Finally, few cases of developmental defects were observed at Sourtara (lumbar cleft neural arch), Messene and Eleutherna (spina bifida occulta on the sacrum), and Maroneia (sacralization, single block vertebra, lumbar spondylolysis, pedal symphalagism) but in none of these sites congenital defects co-occurred in the same individual as it was the case of individual 32 from Akraiphnio.

CONCLUSIONS

The impact of the frequently insecure conditions which agitated the Empire during Early Byzantine times on health and daily life of the population is largely discussed in the literature (Bintliff 2013, 2014, Morisson, Sodini 2002, Stathakopoulos 2008). Recent bioarchaeological research on human skeletal samples from Greece has contributed substantially to the investigation and reconstruction of human past during the first centuries of Christianity (Bourbou 2010, Bourbou, Tsilipakou 2009, Tritsaroli 2006, 2008, 2011). It has been argued that cultural and biological adaptation of Early Byzantines to strenuous conditions followed two major patterns: either the resistance to a variety of stresses and even the good living until the following centuries (9^{th}–10^{th} c. AD) when cities became prosperous again (e.g. Messene, Sourtara), or the

abandonment of the settlement due to deprivation and insecurity (e.g. Eleutherna) (Bourbou, Tsilipakou 2009).

The skeletal record on health, disease and daily life at Akraiphnio brings up a hearty, physically active and hard working population. There is no direct skeletal evidence for interpersonal violence (e.g. invasions, warfare), mass graves or anomic or haphazard burial conditions among local families (e.g. devastating plague). As far as the archaeological and limited skeletal evidence from the rural settlement of Akraiphnio can tell, the consequences of these conditions and their degree of impact on the local population cannot be determined with certainty. The high percentage of periosteal inflammations considered in conjunction with the occurrence of trauma, DJD and hematopoietic disorders suggest that the people of Akraiphnio experienced, in their majority, stress sufficient to cause sickness lasting long enough to produce bone lesions (the absence of an age profile for adults limits considerably the interpretation of skeletal data). On the other hand, these people seem to have had adopted a rather adequate diet which could be considered along with high stature. Compared to Early Byzantine populations from Greece, the people of Akraiphnio were probably exposed at some level of risk and infectious agents deriving either from the rural way of life or from a generally changing living environment but they seem to have been strong and robust enough to overcome stress. However, the mixture of individuals who varied in their underlying frailty or susceptibility to disease and death remains unknown (Wood *et al.* 1992).

Historical and archaeological evidence for the 5th–7th c. Greece, including Boeotia, testifies the presence of various cultural groups and the mixing of population. The only archaeological indication of this type at Akraiphnio was the disposal of the adult skeleton in Grave 32 which, so far, cannot be attributed to a particular culture. Furthermore, some skeletal features such as developmental defects of the spine but also average stature could be used as a starting point for future research, including biogeochemical analysis, in order to investigate if the people buried at Akraiphnio or some of them, had a different genetic background. Such additional study will also contribute to elucidate migration patterns in Early Byzantine Greece.

Finally, archaeological evidence of social differentiation showed some kind of homogeneity in mortuary behavior. Infants and children, who are the most vulnerable to episodes of stress during development in any population, shared the same burial ground and received similar burial treatment like adults. It would be reasonable to propose that the living society made the choice to include the most fragile members of this village among adults' burial place in order to provide them with protection for life after death thus showing its affection towards the little ones.

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