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NEW DIRECTIONS IN THE SKELETAL BIOLOGY OF GREECE

edited by Lynne A. Schepartz, Sherry C. Fox, and Chryssi Bourbou

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Differential Health among the Mycenaeans of Messenia: Status, Sex, and Dental Health at Pylos

by Lynne A. Schepartz, Sari Miller-Antonio, and Joanne M. A. Murphy

During excavations between 1939 and 1966, Carl Blegen and his team discovered several cemeteries that provide a diachronic view of the burial practices and biology of the Pylians inhabiting the Palace of Nestor and the neighboring area in Messenia during the Late Bronze Age (Figs. 10.1, 10.2). To an extent remarkable for their era, the Blegen team kept detailed records of the tomb excavations and worked to preserve the human skeletal material for biological study. Much of our knowledge of the Late Helladic IIIB Palace and these tombs comes from their detailed publications.[1] J. Lawrence Angel examined part of the skeletal collection in 1957. The results of his analysis, which focused primarily on the aging and sexing of the more complete specimens, were reported with the tomb descriptions. This is the only published information on the Pylos skeletons, aside from their inclusion in Angel's broader study of Mycenaean health and nutrition.[2]

The demographic findings from Angel's study of the Pylos human skeletal sample (Table 10.1) were based upon less than 40% of the total number of excavated burials (estimated to be 140).[3] Even so, because this was the sole source of information on the Pylos population, his results were used in many subsequent studies to document or reaffirm ideas about Mycenaean society, particularly the discussions of burial treatment and status. The role of males as rulers and warriors was emphasized, as was the striking predominance of male burials that Angel determined for several of the Mycenaean cemeteries.[4] For example, Angel reported that the Pylos Grave Circle contained the remains of twenty males and seven females.[5] This unequal sex ratio has been the focus of much Mycenaean scholarship,[6] but is it an accurate picture?

Variation in the human skeletal material from Pylos—whether demographic, morphological, or pathological—cannot be fully understood without considering the burial context. Since the beginning of Mycenaean archaeology, scholars have puzzled over the presence of two or more tomb types at some of the larger sites, such as Mycenae and Pylos.[7] In the early years, it was generally assumed that the architectural wealth of a tomb was indicative of the social status of the people buried in it. Tholos tombs, chamber tombs, grave circles, and cist or pit graves were thought to have

1. *Palace of Nestor* I–III. The tombs are detailed in Vol. III.

2. Bisel and Angel 1985.

3. *Palace of Nestor* III, pp. 79, 107. In addition to the information for Tholos III in *Palace of Nestor* III (N = 16, less one individual included in this analysis), this estimate includes the total count from Angel's field notes on Tholos IV in the Pylos Excavation Archives of the Department of Classics, University of Cincinnati, the Angel archive at the Smithsonian Institution, and revised sample sizes from this study (i.e., 108, plus 15 individuals from Tholos III and 17 individuals from Tholos IV).

4. Bisel and Angel 1985.

5. JLA 1957.

6. Acheson 1999; Cavanagh and Mee 1998; Mee and Cavanagh 1984.

7. Evans 1929, pp. 1–3; Schliemann 1878.

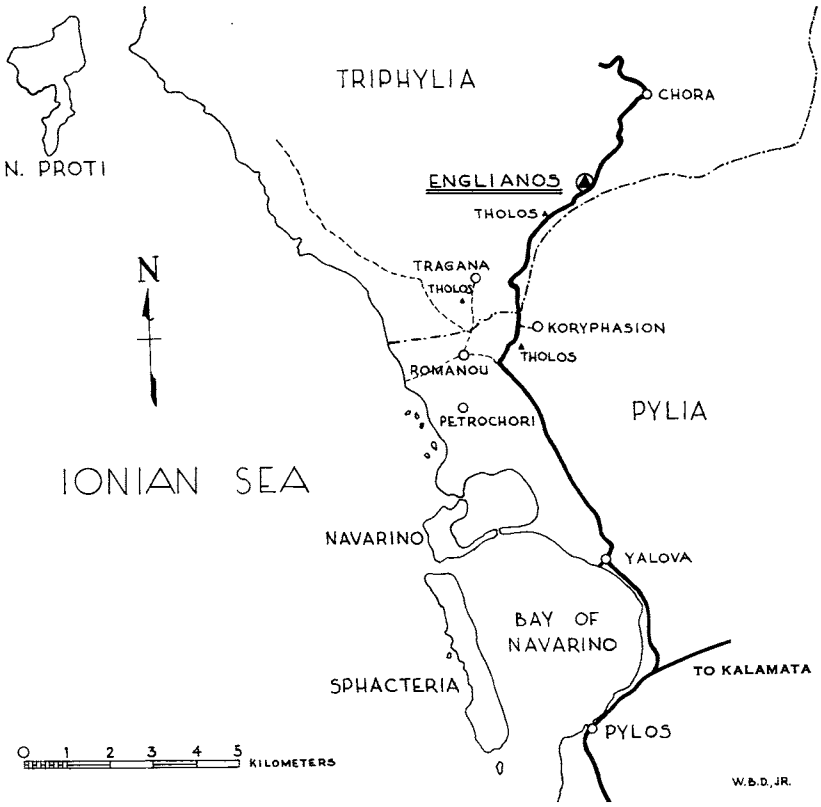

Figure 10.1. Map of the Pylos region with the location of palace structures at Englianos as a focal point.
W. B. Dinsmoor Jr., courtesy Department of Classics, University of Cincinnati

TABLE 10.1. ESTIMATED SAMPLE SIZES FROM PYLOS TOMBS

Tomb	*Blegen*	*Angel*	*This Study*
Grave Circle	21	27	31
Tholos III	16 min	–	1**
Tholos IV	17*	17	–
Tsakalis E-3	2	2	2
Tsakalis E-4	2 min	2	2
Tsakalis E-6	11	3	19
Tsakalis E-8	16	–	16
Tsakalis E-9	2 min	–	9
Kondou K-1	5–6	3	9
Kokkevis K-2	13	–	19
Total	106	54	108

* Blegen based this figure on Angel's estimation, rather than on the excavator's description. Blegen estimates are from the *Palace of Nestor III;* Angel's estimates are based on his field notes in the Palace of Nestor Excavations Archive, University of Cincinnati (JLA 1957); sample sizes for this study were determined using the field notebooks of Lord William Taylour (WDT 1953, 1957, 1958), William P. Donovan (WPD 1956), and Elizabeth Blegen (EPB 1939) in the Palace of Nestor Excavations Archive, University of Cincinnati, in conjunction with studies of the original provenience tags and the skeletal sample.

** Only one specimen was located.

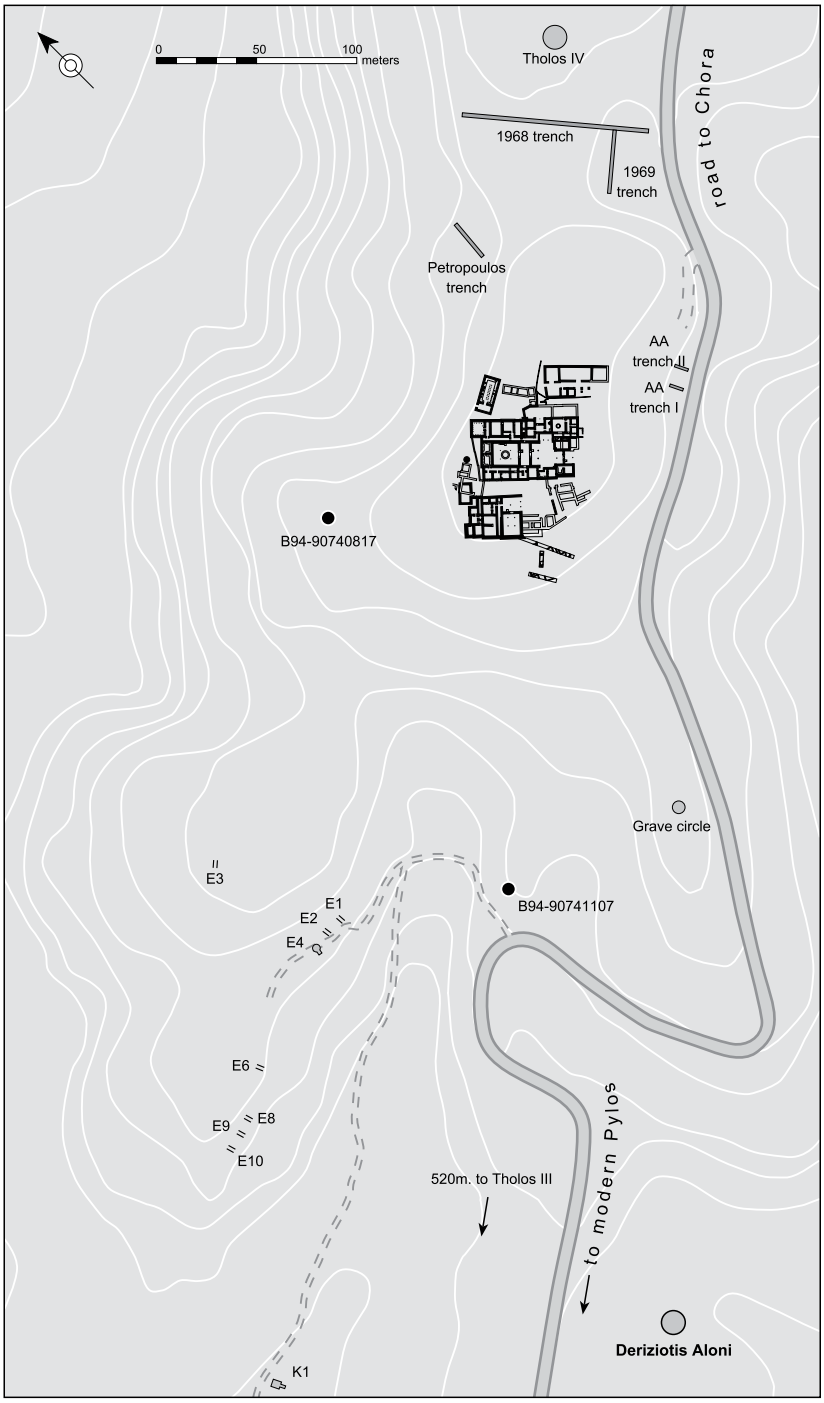

Figure 10.2. Map of the LH IIIB Palace of Nestor and the location of the associated cemeteries and excavation areas. E1–E10 are Tsakalis chamber and pit tombs, K1 is the Kondou chamber tomb. Drawing R. J. Robertson

been used by different echelons of society, with the tholos tombs being the reserve of the monarchy. Over the past century the conviction that there is a simple and direct correlation between wealth and tomb type has waned. Most recently, the tombs at Pylos have been interpreted as ideological tools of the Pylian elites, functioning as expressions of regional power and hegemony.[8]

8. Bennet 1995; Shelmerdine 1997.

Use of cemeteries in the vicinity of the palace structures at Pylos spanned the rise, zenith, and fall of the Pylian palatial system. Therefore, studying the human skeletal material with regard to the diachronic range of the tombs may shed light on the social, political, and economic changes that are thought to have taken place over the life of the polity. As a first step in that direction, this chapter contextualizes the Pylian tombs in the general debate about the correlation between status and tomb type, the ideological role of the tombs, and the relationship between the tombs and Pylian sociopolitical economy by focusing on the evidence for differential life experiences for the people of Pylos. To address this issue, we pursued the following general research questions: What do the samples in the tombs represent? Are they family tombs or special burials for elite warriors? Do individuals from different tomb types differ in health status, life experiences, or basic demography? Are the life experiences different for Pylian females and males?

BURIAL VARIATION AND STATUS AT PYLOS

The Palace of Nestor was the center for a complex economic and hierarchical system. From the Linear B tablets found in the Palace archive, several official positions and levels in the hierarchy can be securely identified: wanax (a ruler, often translated as "king"), other officials or leaders such as the lawagetas (*ra-wa-ke-ta*), basileus (*pa-si-re-u*) or group leader, companions (*e-qe-ta*), officials (*te-re-ta*), and mayors (*ko-re-te*) and vice mayors (*po-ro-ko-re-te*) of 16 major economic districts of the Pylian kingdom. It is also clear from the tablets that some Pylian women had considerable economic power.[9] Recent studies of the palace region by Minnesota Archaeological Research in the Western Peloponnese (MARWP) and the Pylos Regional Archaeological Project (PRAP) show the size of the palace and the adjacent settlement area is between 20–30 hectares.[10] There was a large structure at the site of the palace in Late Helladic (LH) IIIA and another and final structure built over that in LH IIIB.[11] The PRAP survey also demonstrated that during LH III, as the palace grew in size and economic complexity, the number of settlements in the 40 km area investigated around it decreased.[12] Shelmerdine suggests that this change may be indicative of the rise in power of the palace as a center and that people were moving from the outer areas of the provinces toward the focal settlement.[13]

PYLIAN TOMBS AND CHRONOLOGY

Blegen's excavations at the palace and its environs located six burial areas and four different types of tombs of Mycenaean date: the Grave Circle positioned 150 m to the south-southwest of the palace; Tholos III, 1 km southeast of the palace; Tholos IV, 80 m northeast of the palace; the Tsakalis chamber tombs between 210 and 360 m to the west-southwest of the palace; a simple pit (cist) grave among the Tsakalis chamber tombs; the Kondou chamber tomb located 500 m southwest of the palace; and the Kokkevis

9. For references, see Shelmerdine 1997, p. 566.

10. Davis et al. 1997, p. 428. The settlement around the Palace of Nestor spread for 1 km along the top of the Englianos ridge and 200–300 m over the ridge. This is five times the size of nearby Nichoria in LH III A.

11. Killian 1987, p. 209; Bennet 1995, p. 597.

12. Davis et al. 1997.

13. Shelmerdine 1997, p. 553.

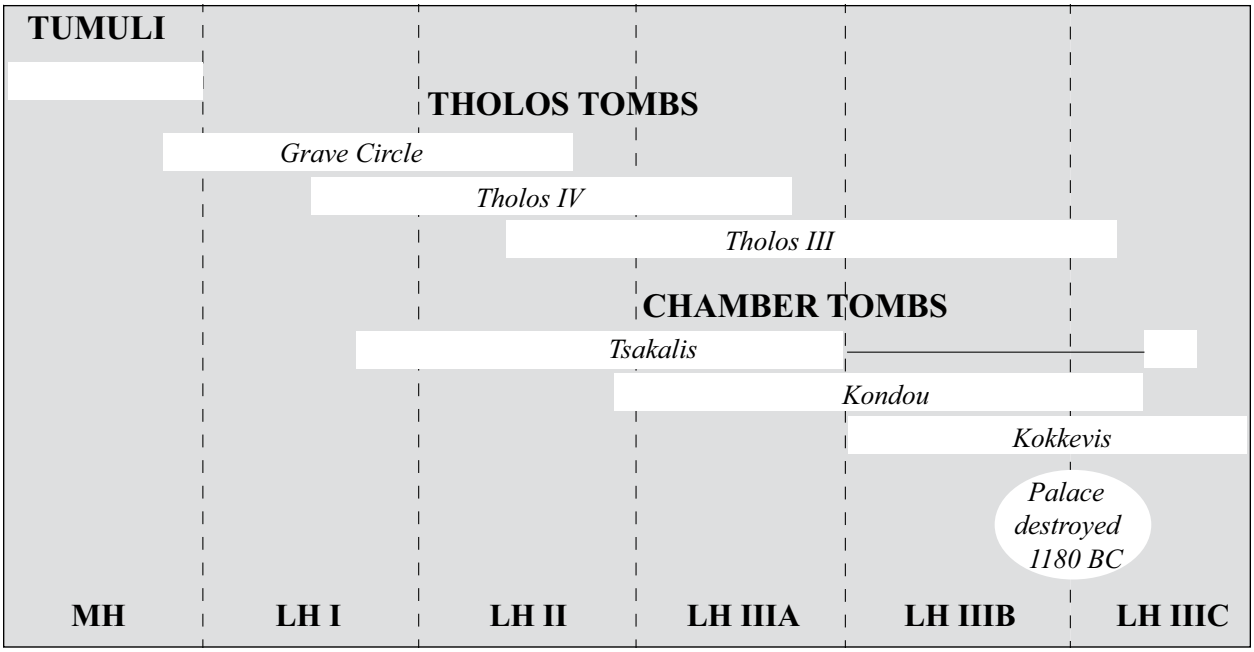

Figure 10.3. Relative chronology of the Pylos cemeteries. This rethinking of the tomb chronology is a result of new research on tomb contents by Murphy.

chamber tomb about 2 km southwest of the palace (Figs. 10.1, 10.2). Each of these tomb types is distinguishable by its unique architectural features. The chamber tombs have an entrance corridor (*dromos*) cut out of the natural rock. This leads into a larger chamber that has also been hollowed out of the hillside. The Grave Circle is a circular stone structure with several funerary and skeletal deposits. Based on similar finds elsewhere in Greece, and the absence of large quantities of stone, Blegen presumed that this circle had little in the way of stone superstructure and that it was simply covered by a pile of earth.[14] Recent studies in the area, and the presence of a field house constructed of large blocks near the Grave Circle, have led to a general consensus among scholars that it was a tholos tomb.[15] The tholoi, which are the most elaborate and massive funereal architecture forms, are built stone tombs. The burial chamber itself resembles an inverted cone with a *dromos* leading into it; these tombs were also covered with mounds of earth. Each type of tomb was usually used for the burial of more than one person and most were used over long periods of time.

The large majority of the tomb artifacts date to LH IIIA, the first palatial period, although several of the cemeteries were in use throughout the Late Bronze Age (Fig. 10.3).[16] A few pots from the chamber tombs were initially dated to LH IIIC,[17] and later redated to LH IIIB.[18] The amount of absolute time that the tombs were in use depends on which chronology one uses: According to the traditional low Aegean chronology, the tombs were in use from MH III–LH IIIB or 1600 B.C. to 1180 B.C., spanning a period of 420 years; according to the high chronology they were in use for 500 years from 1680 B.C. to 1180 B.C.[19] After the fiery destruction of the palace[20] in LH IIIB, there was a dramatic depopulation of the Pylos area, as indicated by the low levels of LH IIIC pottery found during the PRAP survey.[21] Several tombs continued to be used into the LH IIIC period, however.

14. For Blegen's discussion of this issue, see *Palace of Nestor* III, pp. 153–156.

15. The Grave Circle was originally referred to as Tholos V. *Palace of Nestor* III, pp. 71, 153–154; Davis et al. 1997, p. 420; Bennet 1999, p. 11. The Grave Circle is regarded as a tholos in this analysis.

16. *Palace of Nestor* III, pp. 228, 239; Mountjoy 1995, p. 158.

17. *Palace of Nestor* III, p. 228.

18. Mountjoy 1995, p. 158; Bennet 1995; Shelmerdine 1997.

19. See Shelmerdine 1997, table 1. The high chronology is strongly supported by scientific evidence; for an account of the high chronology, see Manning 1995, pp. 217–229. For the scientific reports that support high chronology, see Kuniholm et al. 1996, pp. 780–783. For a summary of the evidence for the low chronology, see Warren and Hankey 1989, pp. 137–169. For a brief and coherent summary of this evidence, see Shelmerdine 1997, p. 540.

20. Bennet 1995.

21. Shelmerdine 1997, p. 581; Davis et al. 1997, pp. 451–453.

CHANGING THEORIES ABOUT MYCENAEAN TOMBS

For the Mycenaeans of Pylos, the architectural form of a tomb and its dimensions, its location relative to the palace and center, its use over an extended time period, and the richness of its contents all played some role in the expression of social aspirations and realities. Theories about the people who used the tombs and the tombs' relationship with society have changed considerably due to two main developments: first, study of the chronology of the tombs; and second, the application of different theoretical frameworks. Initially, scholars assumed that the tholos tombs were used by a hereditary monarchy and that the chamber tombs and cist graves were, respectively, used by people on lower and the lowest social/political/economic strata. This long-standing hypothesis later changed based on Dickinson's chronological study of the construction of the tholos tombs at Mycenae, which showed that several of the tombs were in fact contemporaneous.[22] Darcque's subsequent study clearly showed that they could not be the burial places of a hereditary monarchy.[23] It then became commonly accepted that the tholos tombs were the mortuary architecture of the rich, rather than solely the rulers, while the chamber tombs were used by the lesser elites and the cists by the poorest in the society.[24] The current perspective is that tholos tombs were used by the elite as territorial markers, without assigning any particular political positions to these elites.[25]

The simple correlation of energy expenditure on mortuary architecture and status/wealth was the generally accepted view of Mycenaean tombs until recently. Yet empirical studies by Dickinson and Cavanagh and Mee on the artifacts in Mycenaean tombs revealed that the cist tombs should not be equated with the poorest people and that the contents of some chamber tombs were richer than the tholos tombs.[26] For Pylos, Cavanagh and Mee drew attention to the comparatively rich contents of both the Tsakalis E-6 chamber tomb and the Grave Circle.[27]

Social theories about expressions of status in mortuary treatment, especially those elaborated in the works of Binford, Brown, and Tainter, were adopted by Mycenaean processual archaeologists and gave much credence to the accepted correlation between wealth in death and status in life.[28] More recently, however, the postprocessual movement in archaeology has underscored a greater complexity for mortuary behavior.[29] This perspective, as applied by Voutsakis and Cavanagh and Mee to Mycenaean Greece, suggests that in certain circumstances mortuary behavior does not clearly and simply reflect the status of the recently dead, but can instead create an elevated social position for that person that they may never have held in life.[30]

The tombs of Pylos have been central to the works of scholars reconstructing the ways in which power was created, legitimized, and spread over the kingdom. This debate has mainly focused on the tholos tombs, even though chamber tombs are the most commonly found burial structures dating to the LH period.[31] The earliest Messenian tholos tombs, dating to MH III, were at Koryphasion and Koukounara.[32] By LH I–II, they had been built at several sites: Pylos, Voidokoilia, Tragana, Koukounara,

22. Dickinson 1977, 1982.

23. Darcque 1987, pp. 190–200.

24. Tsountas and Manatt 1987; Dickinson 1983, p. 56. For a summary of the traditional position and reasons why it is erroneous, see Boyd 2002, pp. 11–12.

25. Bennet 1995, p. 596; Mee and Cavanagh 1984; Wright 1987.

26. Dickinson 1983; Cavanagh and Mee 1998, p. 56.

27. Cavanagh and Mee 1998, p. 73.

28. Saxe 1970; Binford 1971; Brown 1981.

29. Hodder 1982; Parker Pearson 1999.

30. Hodder 1982; Cavanagh and Mee 1990, 1998; Mee and Cavanagh 1984.

31. Cavanagh and Mee 1998, pp. 40, 44.

32. Lolos 1989.

Routsi, Nichoria, Peristeria, and possibly Psari.[33] At several additional sites, tholos tombs were built in LH IIIA and used during LH IIIA–LH IIIB: Nichoria, Dara, Mouriatada, Malthi, Ano Kopanaki, and Vigla Kalpaniou.[34] During LH III, however, several of the larger of these tombs were abandoned and smaller ones were built at most of the sites where new tholoi were constructed.

Bennet reasoned that the expansion of Pylos is strongly implied by the fact that most of the tholos tombs at sites in its vicinity go out of use in LH IIIA, "reflecting their effective demotion within the power hierarchy."[35] For example, he suggested that the construction of a new tholos tomb at Nichoria indicated that a new ruling elite had been established—potentially with the support of an external power.[36] Nichoria was apparently expanding in LH IIIA when a *megaron* (throne room) was built. In LH IIIA2, the megaron was destroyed. At the same time, a tholos tomb was built at the edge of the site. Bennet's analysis highlighted the incongruity of a local elite building a tomb when the main sign of hierarchy at Nichoria, the *megaron,* was destroyed. In a further development of Bennet's theory, Shelmerdine argued that the construction of the LH IIIA2 tholos at Nichoria was linked to its assimilation into the Pylian state, with the tomb functioning as a status symbol connecting the local elites at Nichoria with Pylos.[37] Larger tholos tombs continued to be used only at sites with administrative ties to Pylos.[38] Most recently, Cavanagh and Mee suggested that the presence of several tholos tombs in Messenia indicates that there were a number of elite families.[39]

Chamber tomb construction was the other critical component of Mycenaean burial practices in Messenia. The earliest chamber tomb in Messenia, at Volimidia, dates to the MH period.[40] In the Early Mycenaean period, LH I–LH II, the earliest tomb in the Tsakalis cemetery at Pylos, E-8, was constructed, as was a chamber tomb at Volimidia.[41] In LH III, chamber tombs became the most popular type of tomb in all of Greece; at Pylos this growth in popularity is evidenced by the construction of five more in the Tsakalis cemetery. The great increase in chamber tombs in LH III suggests that a greater portion, and perhaps a different segment, of Messenian society were expressing their social position through tomb construction. The chronological development of the chamber tombs and their widespread construction (both large and small) in LH III contrasts with the decreased number of large tholos tombs and the apparent connection between tholos tombs and palatially related sites.

CHARACTERISTICS OF THE PYLOS CEMETERIES

Grave Circle

The burials in the Grave Circle[42] were clearly defined and the only disturbance was from modern agricultural activity.[43] Individuals were placed into four pits of varying sizes. The oldest burials in the cemetery were in pithoi or very large jars; three of these were located in the east side of the

33. Cavanagh and Mee 1998, pp. 44–47.
34. Cavanagh and Mee 1998, pp. 77, 83, fig. 6.2.
35. Bennet 1995, p. 598.
36. Bennet 1995, p. 598.
37. Shelmerdine 1997, pp. 101–102.
38. Shelmerdine 1997, p. 553.
39. Cavanagh and Mee 1998, p. 77.
40. For detailed studies of the chamber tombs, see Cavanagh and Mee 1998; Dickinson 1977; Graziadio 1988.
41. *Palace of Nestor* III, p. 195.
42. Located on the Vayenas property, the Grave Circle was originally referred to as "Vayenas" in the excavation notebooks and in Angel's field notes.
43. *Palace of Nestor* III, p. 148. This lack of grave disturbance contrasts with the heavy damage to the superstructure of the tholos.

circle and one was in the west. The latest burial was laid out in an extended position in a shallow pit (Pit 2) in the center. There were two deposits of disarticulated skeletons: one in the east near the three pithoi and one in the north. The pithos burials may date to late MH or early LH. The objects interred with them included bronze cauldrons, daggers, rapiers, and boars' tusks that may be from a helmet. There were only a few pots associated with the pithos burials or with the extended burial in Pit 2. Several other artifacts were found on or near the body in Pit 2. These included a bronze mirror found near the pelvis, a small knife, a sword/dagger, a juglet, a cylindrical painted *phi* figurine that lay on the chest, and a chert arrowhead that had been placed between the legs. In addition to the above grave goods, there were deposits of bronze objects, obsidian and chert arrowheads, and ceramics in the Grave Circle that are not associated with any skeletal material. Fine quality ornaments of gold, ivory, and silver were recovered throughout the chamber. A large number of pots of LH I–LH IIIA1 date were found in the northern part of the circle, but these also cannot be associated with any individual burials.[44]

Tholos III

Although large quantities of human and animal bones were found in Tholos III (35 baskets were recorded in the field notebook),[45] all of them had been disturbed and moved from their original context. The disarray of the tomb led Blegen to suggest that it had been ransacked in antiquity.[46] There were two pits in the floor of the chamber; both contained disturbed human remains, beads, and broken pottery. Skeletal remains, beads, pottery, and pieces of gold were strewn throughout the *dromos*, the doorway, and the chamber of the tomb.[47]

Tholos IV

The archaeological deposits in Tholos IV[48] were very disturbed and the excavators suspected that it, like Tholos III, had been looted in antiquity. The great quantity of charcoal in the tomb suggested to them that it had been periodically cleansed by lighting fires in the chamber. Human and animal bones were numerous, as were plain-ware sherds, but only four complete pots were recovered.[49] Beads of glass paste, lapis lazuli, amethyst, amber, and gold were abundant, as were worked stone, bronze, and furniture parts. Gold was plentiful, especially gold leaf. In fact, so much gold leaf was attached to the floor in the center of the tomb that the excavators initially thought there had been an intentional gold covering there.[50] There were several pits in the floor; one large semicircular pit was parallel to the northwestern wall of the chamber. Some of the most striking and unique finds of all the cemeteries in Pylos came from this pit. These included a gold pendant in the shape of a figure-of-eight shield, a gold bead seal with the "royal griffin," and an amber spacer-bead, which according to Blegen et al., was very similar to an example found in a Wessex cemetery in England.[51] A stone cist built against the southeast wall of the tomb contained only one human femur, but there were many small finds including a gold signet ring.[52]

44. *Palace of Nestor* III, p. 138.
45. EPB 1939.
46. *Palace of Nestor* III, p. 77.
47. *Palace of Nestor* III, pp. 73–95.
48. Located on Kanakaris land, this tholos is also referred to as the "Kanakaris" tomb in the excavation notebooks and Angel's field notes.
49. The excavator commented that there were pre-Mycenaean sherds.
50. *Palace of Nestor* III, pp. 102–106.
51. *Palace of Nestor* III, p. 105.
52. *Palace of Nestor* III, p. 105.

Chamber Tombs: Tsakalis, Kokkevis, and Kondou

In the Tsakalis cemetery there were five complete chamber tombs (E-3, 4, 6, 8, 9), three unfinished tombs that consisted of only a *dromos* (E-1, 2, 10), one unfinished *dromos* (E-12), and three tombs that were located but not excavated (E-5, 7, 11). One chamber tomb was explored on the land belonging to Kontos (Kondou K-1) and a second Mycenaean tomb was excavated on Kokkevis land (Kokkevis K-2 or γ).[53]

Similar mortuary practices were carried out in all three cemeteries. Individuals were buried in pits or laid out on the floor of the chamber. In some instances (e.g., at Kondou K-1 and Tsakalis E-10), remains of burials were also found in the *dromos*. Several bodies were found laid out in extended position and one (in Tsakalis E-9) was contracted. Most typically, the extended burials appeared to be less disturbed and were described as the latest burials in the tombs.[54] There are also many cases of secondary treatment. Bones were found in jars and scattered over other burials.

The Pylos chamber tombs show far more variability in their contents than the tholos tombs. The most common finds in these tombs were pottery and beads. All tombs contained pots and bronze (mostly knives and swords) and stone artifacts. Tsakalis E-6 stands out as having more numerous and richer grave goods than the other chamber tombs, while Tsakalis E-9 seems to be relatively poorer.[55]

Pit Grave

Tsakalis E-3 was a simple pit that contained four pots and two bodies positioned one on top of the other.[56] The pots lay on top of the upper body; there were no objects with the lower body. Above the pit were several stones associated with an upturned cup and a carnelian bead.[57]

Based on the preceding discussion of Mycenaean burial practices, if the architecture and richness of tombs is a direct measure of access to resources during life, we would predict that individuals from the Grave Circle, Tholos III, Tholos IV, and Tsakalis E-6 at Pylos would have access to the best nutritional resources. Based on our knowledge of Mycenaean food and dietary studies,[58] those individuals should have a higher protein diet (including meat from wild and domestic animals, dairy products, pulses, and potentially marine life) with less dependence on carbohydrate-rich

53. *Palace of Nestor* III, pp. 176–215, 224–237.

54. The extended burials were often located in the central portion of the tomb; their better preservation suggests that they were primary burials and later interments. This interpretation is often supported by the date of the associated vessels, but the effects of tomb robbing and later disturbances in tombs must have played a significant role in the destruction of primary burials.

55. Cavanaugh and Mee 1998.

56. This grave is variably referred to as a pit or cist burial. In *Palace of Nestor* III, p. 177; the skeletons are described as lying in the *dromos*—presumably because E-3 was thought to be an unfinished chamber tomb that was used but never completed. Regardless of its classification to specific burial type, E-3 is notably simpler than the other burials known from Pylos.

57. *Palace of Nestor* III, pp. 176–177.

58. We have information on Mycenaean food resources from diverse sources, including Linear B tablets, frescos, faunal studies, paleobotanical studies, and staple isotope analyses of human bone. See also papers in Wright 2004; Halstead and Barrett 2004; Tzedakis and Martlew 1999; Vaughan and Coulson 2000. See also Chaps. 11, 13, and 14 in this volume.

cariogenic foods. They should therefore show fewer dental pathologies.[59] Conversely, individuals from tombs with simpler architecture and fewer grave goods should show higher levels of dental pathology.

MATERIALS AND METHODS

All of the currently known Pylian skeletal collection was studied by Schepartz and Miller-Antonio in 1998–2003.[60] According to their analysis, the Pylian skeletal sample currently available for study[61] includes 108 individuals from nine tombs (Table 10.1). The Tholos III material that was excavated in 1939,[62] with the exception of one fairly complete cranium, remains unstudied. Unfortunately, the present location of that material, as well as the Tholos IV sample studied by Angel, is unknown.[63] Based on the Blegen team's excavation notes and Angel's estimate of the minimum number of individuals for Tholos IV,[64] the remains of 106 individuals were excavated. If the results of this study are factored into the calculation of the minimum number of individuals (MNI), the total rises to 140.

Age and sex for each skeleton was independently assessed by Miller-Antonio and Schepartz. The entire collection was then reassessed to refine aging and sexing estimates based on a fuller understanding of the observed range of variation in the population. Due to the fragmentary nature of the material, a combination of aging techniques[65] based on pubic symphysis, dental development, and tooth wear[66] were applied. Sex determination was based on pelvic and cranial morphology,[67] with additional metric data from postcrania for some specimens. Specific age estimates were made when possible, but individuals were most frequently assigned to age cohorts.

For the dental analysis, teeth were judged as lost antemortem when the alveolar bone exhibited substantial remodeling to the degree that no root sockets were functional. Caries presence, determined by visual

59. For syntheses of the general relationship between dental pathology and nutrition, see Larsen 1997 and Hillson 1996. For excellent discussions of the biological consequences of dietary variation and social stratification, see Powell 1988; Goodman 1998; Cucina and Tiesler 2003. We focus on dental health in this study as it provides us with the largest sample for analysis. Other indicators of health, such as porotic hyperostosis, were also evaluated. There is limited evidence for these conditions in the Pylos sample, in contrast to the prevalence of dental pathology, as mentioned in the Discussion section.

60. The authors wish to thank Xeni Arapoyianni and Yioryia Hatzi of the 11th Ephorate of Prehistoric and Classical Antiquities, and the staff of the Chora Museum for their help in assisting this research; Shari Stocker and Jack L. Davis, Director of the American School of Classical Studies at Athens, for their invitation to study this material and unflagging support and guidance; the Louise Taft Semple Fund of the Department of Classics, University of Cincinnati, the Institute for Aegean Prehistory for financial support; and Erin Williams for extracting and collating the information from the Blegen excavation notebooks.

61. The entire Pylos skeletal collection examined for this analysis is located in Apotheki 2 of the Chora Museum.

62. EPB 1939.

63. The material from the 1939 excavations of Tholos III was originally transported to the National Museum in Athens as it was recovered prior to the construction of the Chora Museum. The one known cranium, which was not studied by Angel, was found in Apotheki 1 of the Chora Museum. The burials from Tholos IV were studied by Angel in 1957, but they are not catalogued in the Chora Museum or National Museum collections. See postscript of this chapter for updated information on this situation.

64. JLA 1957; EPB 1939; WPD 1956; WDT 1953, 1957, 1958.

65. Buikstra and Ubelaker 1994.

66. Adapted from the techniques of Miles and Molnar, as discussed in Hillson 1996.

67. Buikstra and Ubelaker 1994.

inspection with hand lens magnification,[68] was tallied by individual tooth. Linear enamel hypoplasia, also assessed by visual inspection with hand lens magnification,[69] was denoted as present or absent. The total dental sample includes both teeth present and those missing where antemortem status could be assessed from the condition of the alveolus. Units of analysis included individual teeth and dentitions.

RESULTS

Demography: General Age and Sex Ratios

The notion that Pylian burial customs involved something other than the interment of family groups, or that Pylian society was heavily biased toward male burial, is not supported by the present analysis. As noted above, Angel identified twenty adult males and seven adult females in the Pylos Grave Circle. We found evidence for four more individuals, and a surprisingly different sex ratio: nine males and twelve females, plus nine unsexed adults (Table 10.2). The Kokkevis K-2 chamber tomb is the only burial structure that seems to have had a biased sex ratio of ten males and four females. However, there is a striking underrepresentation of children or subadults under 18 years in all of the tombs; very young children are completely absent.[70] It appears that most Pylian families did not inter their children in the family tomb.

Another important result of this demographic analysis is that the total *N* of the sample (108 burials, plus 32 more individuals if Blegen et al.'s Tholos III and Tholos IV estimates are included),[71] is approximately 45% higher than the excavator's or Angel's estimates, suggesting a much larger proportion of the population was buried in chamber or tholos tombs.

Using very general age cohorts (Table 10.3), age estimates are possible for 60% of the individuals. The most abundant category consists of younger adults (*N* = 24). Using more specific age cohorts for the more complete chamber tomb materials, we find that the majority of the younger adults are in the 25–30 year age cohort; and very few individuals are estimated to be much older than their late 40s. This contrasts with Angel's identification of some quite elderly individuals based on suture closure. This finding also differs from the age distributions for other Late Helladic III skeletal

68. See Rudney, Katz, and Brand 1983. Carious cavities were counted, as were brown stained spots of arrested caries. The latter were only counted when tooth enamel condition and their position, typically adjacent to an affected tooth surface, made an identification of carious decay more probable than postmortem staining from sediments. While these procedures are most practical for field data collection, we recognize their shortcomings and that the true prevalence of caries is probably higher than what is documented here.

69. Buikstra and Ubelaker 1994.

70. It is unlikely that significant numbers of infant and child burials were missed by the excavators, who carefully screened the sediments and recovered numerous small finds, including isolated human teeth.

71. *Palace of Nestor* III, pp. 79, 107.

TABLE 10.2. GENERAL AGE AND SEX DISTRIBUTION

Tomb	*Male*	*Female*	*Adult?*	*Child/SA*
Grave Circle	9	12	9	1
Tholos III	–	1	–	–
Tsakalis	13	12	15	8
Kondou K-1	2	4	1	2
Kokkevis K-2	10	4	1	4
N = 108	34	33	26	15

SA = subadult 13–18 years.

TABLE 10.3. AGE DISTRIBUTION

Tomb	*Child (0–12)*	*Subadult (13–18)*	*Young Adult (19–30)*	*Old Adult (31+)*
Grave Circle	–	1	11	4
Tholos III	–	–	1	–
Tsakalis	7	2	14	5
Kondou K-1	–	2	–	4
Kokkevis K-2	1	3	4	6
N = 65	8	8	30	19

TABLE 10.4. SEX AND AGE DISTRIBUTION

Site	*Young Female (19–30)*	*Old Female (31+)*	*Young Male (19–30)*	*Old Male (31+)*
Grave Circle	4	2	3	2
Tholos III	1	–	–	–
Tsakalis	5	2	7	3
Kondou K-1	–	3	–	1
Kokkevis K-2	2	1	2	5
N = 43	12	8	12	11

samples from the Argolid and the Agora,[72] where Angel also identified many older individuals.[73]

It is possible to provide both sex and general age estimates for approximately 40% of the sample. In Table 10.4 they are presented as younger or older adult females or males. Overall, the proportions of males and females in both adult age cohorts are about equal, although individual tomb groups show some variation, which is not unexpected. For example, there are more younger males in Tsakalis and a few more older ones in Kokkevis.

These basic demographic data suggest that the Pylian burials are not biased in favor of male interment, and that younger males, who might be at greatest risk for death in warfare, are not overrepresented. The adult representations are not different from what we would expect in family tombs. Yet it is important to again emphasize that young children from these social groups were rarely given the formal burial treatment afforded adults. A larger and even more intriguing question, that cannot be answered at this point in time, is why so few Pylian burials—adult or otherwise—have been located.

Dental Health

As might be expected, teeth are the most numerous elements in this sample and for that reason they are the focus of the analysis. There are 68 partial or complete dentitions that can be evaluated. To maximize analytic potential, both individual teeth (*N* = 625) and dentitions (*N* = 68) were evaluated. As we also assessed tooth presence or absence based on alveolar condition,

72. Halstead 1977; based primarily on Angel's data in *Palace of Nestor* III, pp. 79, 107.

73. We suggest that in light of our results, those age estimates should be used with caution.

TABLE 10.5. INDIVIDUAL TEETH

Site	*N*	*N Assessed*	*N AM loss*	*N Caries*	*N Hypoplasia*
Grave Circle/ Tholos III	135	167	8 (4.8%)	5 (3.7%)	6 (4.4%)
Tsakalis	327	341	14 (4.1%)	39 (11.9%)	43 (13.2%)
Kondou K-1	30	88	46 (52.3%)	12 (40%)	1 (3.3%)
Kokkevis K-2	133	172	27 (15.7%)	8 (4.7%)	8 (4.7%)
Total	625	768	95 (12.4%)	64 (8.3%)	58 (7.6%)

N = total number of teeth observed; *N* Assessed = total number of teeth and tooth sockets; AM = antemortem.

Figure 10.4 ***(left)*****. Female mandible with slight–moderate occlusal wear, occlusal caries on the LM3 and RM2, and extensive antemortem tooth loss of LI1-C, LM2 (with anteriorly displaced LM3 in response), and RI1-I2, RM1, RM3.** Scale 1:2. Courtesy Department of Classics, University of Cinncinnati

Figure 10.5 ***(right)*****. Maxilla with very slight occlusal wear and extensive remodeling of the left molar sockets.** Scale 1:2. Courtesy Department of Classics, University of Cinncinnati

a total of 768 teeth could be evaluated for presence/absence (Table 10.5). Carious lesions were always associated with antemortem tooth loss in individuals over 22 years. Tooth loss was not necessarily associated with heavy tooth wear, as these two examples of young people with major tooth loss illustrate (Figs. 10.4 and 10.5). This suggests that caries infection leading to rapid tooth loss was a serious factor for this population because 12.4% of teeth were lost antemortem. High rates of caries and antemortem tooth also have also been reported for other Mycenaean populations.[74] Linear enamel hypoplasia was only found in mild expressions, and it was fairly uncommon, occurring in only 7.6% of the combined sample (Table 10.5). The rarity of this attribute of "survivors"—those who live through childhood stresses—suggests that some low level of stress was experienced by a small proportion of the individuals studied. From the analysis of the individual teeth, the sample as a whole exhibits moderate levels of all three conditions.

In order to test the relationship between tomb type and these dental indicators of health status, we then compared the frequencies for individual cemeteries. Notably, teeth from the Grave Circle and Tholos III have low levels of antemortem loss, caries, and hypoplasia. Antemortem loss and caries are extremely frequent in the small Kondou subsample (52.3% and 40%, respectively). As caries frequently lead to tooth loss, it is informative to look at the two conditions together. Here, the contrasts between the

74. For example, most recently in the western Peloponnese at Ayia Triada, Tsilivakos et al. (2002) report 17.88% antemortem tooth loss and 7.7% caries.

TABLE 10.6. INDIVIDUAL TEETH: ANTEMORTEM (AM) LOSS AND CARIES COMBINED

Site	*N Assessed*	*N AM and Caries*
Grave Circle/Tholos III	167	13 (7.8%)
Tsakalis	341	53 (15.5%)
Kondou K-1	88	58 (65.9%)
Kokkevis K-2	172	35 (20.3%)
Total	768	159 (20.7%)

N Assessed = total number of teeth and tooth sockets observed; AM = antemortem.

TABLE 10.7. SITE TYPE AND ANTEMORTEM (AM) LOSS/CARIES RELATIONSHIP

	AM/Caries	*No*	*Total*
Grave Circle and Tholos III	13	154	167
Chamber	146	455	601
Total	159	609	

Chi-square = 21.694, $df = 1$, $p \leq 0.001$.

TABLE 10.8. SITE TYPE AND HYPOPLASIA RELATIONSHIP

	Hypoplasia	*No*	*Total*
Grave Circle and Tholos III	6	129	135
Chamber	52	438	490
Total	58	567	

Chi-square = 4.783, $df = 1$, $p \leq 0.05$.

Grave Circle and Tholos III and the chamber tombs are even more evident (Table 10.6). The combined level of these two conditions for the entire sample is 20.7%. There is a significant relationship (chi-square = 21.694, $df = 1$, $p \leq 0.001$) between tomb type (Grave Circle/tholos or chamber) and the frequency of these two conditions (Table 10.7). Similarly, there is a significant relationship (chi-square = 4.783, $df = 1$, $p \leq 0.05$) between tomb type and hypoplasia occurrence (Table 10.8). In both cases, Grave Circle/tholos teeth have lower levels of pathology.

Most teeth within a dentition are exposed to the same stresses, thus the frequency of dental pathology is highly correlated within a dentition. As a whole, a fairly high proportion of the dentitions from Pylos show some form of dental pathology, but again, the Grave Circle/tholos dentitions appear healthier (Table 10.9).

More importantly, the comparison of dentitions enables us to compare males and females (Table 10.10). The chamber tomb female dentitions have the highest frequencies of antemortem loss and caries (60% and 70%, respectively), while the highest levels of hypoplasia occur in the chamber

TABLE 10.9. DENTAL HEALTH BY DENTITION

Site Type	*N*	*N AM*	*N Caries*	*N Hypoplasia*
Grave Circle/ Tholos III	19	2 (10.5%)	3 (15.8%)	3 (15.8%)
Chamber	49	14 (26.9%)	18 (36.7%)	21 (40.4%)
Total	68	16 (22.5%)	21 (30.9%)	24 (33.8%)

AM = antemortem loss.

TABLE 10.10. DENTAL HEALTH BY DENTITION AND SEX

Site/Sex	*N*	*N AM*	*N Caries*	*N Hypoplasia*
Grave Circle/ Tholos III F	5	1 (20%)	1 (20%)	
Grave Circle/ Tholos III M	4	1 (25%)	1 (25%)	1 (25%)
Chamber F	10	6 (60%)	7 (70%)	4 (40%)
Chamber M	18	4 (22.2%)	9 (50%)	10 (55.6%)
Total	37	12 (32.4%)	18 (48.6%)	15 (40.5%)

AM = antemortem loss.

TABLE 10.11. DENTAL HEALTH BY DENTITION AND TOMB TYPE

Site Type	*N*	*N AM*	*N Caries*	*N Hypoplasia*
Grave Circle/ Tholos III F	5	1 (20%)	1 (20%)	
Grave Circle/ Tholos III M	4	1 (25%)	1 (25%)	1 (25%)
Tsakalis F	6	3 (50%)	5 (83.3%)	4 (66.7%)
Tsakalis M	10	2 (20%)	4 (40%)	8 (80%)
Total	25	7 (28%)	11 (44%)	13 (52%)

AM = antemortem loss.

tomb males (55.6%). If the differences between the Grave Circle/tholos and the Tsakalis cemetery subsample are examined, the distinction between males and females is most notable in the Tsakalis chamber tombs (Table 10.11). Our results indicate that there are significant differences between the dental health of males and females at Pylos and that these differences are correlated with tomb type.

DISCUSSION

The Pylos population is characterized by few indicators of poor skeletal health. For example, there is limited evidence for age-related osteoarthritis and joint surface destruction; this is not unexpected as few Pylians interred in these tombs seem to have lived past 40 years. There are a few healed injuries, but they are not seen in the skeletal elements as expected for Bronze Age combat, such as the forearms, ribs, or crania; nor do they appear with greater frequency in males. Response to some stresses, evident in expanded

diploë, bone porosity, and cribra orbitalia, are noted in a small number of females and subadults from both the Grave Circle/tholos and chamber tombs, but these do not seem to have been the result of population-wide stresses. In contrast, the Pylians were characterized by relatively poor dental health and this is especially evident in the chamber tomb burials.

We predicted that if health status was related to resource access (as measured by tomb type and richness), then individuals from chamber tombs should have relatively poorer dental health. Our results support this prediction for all the chamber tombs, even though these tombs vary in the relative "richness" of their contents in terms of the number and quality of grave goods. The notable examples of this variation are the Tsakalis E-3, E-6, and E-9 tombs. E-3 is described above as the simplest burial in the cemetery with a very basic structure (a pit) and four ceramic vessels as grave goods. The two individuals from it are young adults aged 20–25 years with clear signs of dental pathology. Tomb E-9 was also identified as a relatively poor burial,[75] and all of the dentitions that can be evaluated show dental pathology. Thus, both of these tombs provide evidence supporting the suggested general association between tomb type, status, and dental health. In contrast, tomb E-6 might be expected to contain individuals with healthier dentitions because it contained a broader and more luxurious assortment of grave goods. The E-6 tomb is unusual in other ways. It has the greatest number of children preserved ($N = 5$) and the greatest number of interments.[76] The majority of these individuals, including the children, have poor dental health. This is an interesting result given the richness of this tomb, and its deviation from our prediction requires some discussion. The poor dental health of the individuals in this tomb could be the result of greater access to certain nutritional resources, such as more of the high-carbohydrate, cariogenic foods—but not greater access to the animal protein resources that may have characterized the diets of Grave Circle and tholos individuals (perhaps provided during feasting at the palace). At the same time, members of this chamber tomb family also had somewhat greater access to some of the types of grave goods, namely bronze, gold, and ivory, found in the Grave Circle and tholos tombs. Hence, this tomb might reflect interments of a larger family with more personal capital and collective resources, or an attempt to raise the status of the family that built it.[77]

The difference in dental health observed between the Grave Circle/tholos and the chamber tombs may also reflect temporal changes in the resource base of Pylos. Most of the chamber tomb burials are more recent than the Grave Circle, and date to later stages of the palace (Fig. 10.3). The declining dental health of chamber tomb individuals might be indicative of more cariogenic foods in the Pylian diet in general at the height of the palace as population pressure lessened access to varied food resources.[78] This resource change might have had greater impact on females. The conditions underlying the differences between males and females in the chamber tombs may demonstrate early life stress (seen as mild hypoplasia in more vulnerable young males) and then later, greater stresses for females as they encounter reproductive demands on their nutritional resources.

The effect of reproductive stresses on female dentitions is not well understood. Walker, and also Walker and Hewlett[79] documented higher

75. Cavanagh and Mee 1998. The "poverty" of this tomb is reflected in the type, rather than the number, of grave goods. For example, it contained no bronze or gold.

76. The minimum number of individuals suggested for this tomb, 19 burials, is based on the most conservative estimate derived from cranial/dental material, existing associations of elements in the curated collection, and the field notebooks. A higher estimate of 28 individuals is obtained when postcranial elements are added to the calculation.

77. Cavanagh and Mee 1998.

78. A stable isotope study to investigate this possibility was initiated in 2005.

79. Walker 1988; Walker and Hewlett 1990.

levels of dental pathology for females among present-day African foragers and farmers and prehistoric populations of California and discussed the possible causes of these differences. They suggested that factors such as differential use of cariogenic foods, eating patterns (females snacking throughout the day during food preparation), and oral hygiene contribute to poorer dental health. Walker specifically examined the clinical findings on pregnancy and dental condition, citing dental literature that does not provide much evidence for higher caries rates, tooth loss, or periodontal disease in pregnant women even though pregnancy gingivitis is known to occur.[80] However, these modern clinical studies comparing the oral health of pregnant to nonpregnant women are not directly applicable to prehistoric populations for several reasons. Women in prehistory, especially those in food-producing societies, probably began reproducing at younger ages, experienced shorter birth intervals, and thus had higher parity. The potential combined effects of those three reproductive factors on the depletion of maternal nutritional and mineral reserves may have played an important role in the poorer dental health of prehistoric women such as those in the chamber tombs of Pylos. We contend that the old adage "a tooth for every child"—while not describing the dental condition of most women today—potentially held great meaning for the women of Pylos who experienced significant levels of dental decay and antemortem loss while still in their reproductive years.

CONCLUSION

There are several major results of this analysis that have relevance for other studies of skeletal biology in prehistoric Greece. First, the size of the sample, as determined from this analysis, is probably at least 45% greater than what might be determined from published excavation reports and Angel's previous analysis. Yet, the younger sector of the population—infants, children, and subadults—is almost unrepresented. More importantly, the sex ratio is not biased toward males, as had been reported in earlier Mycenaean skeletal biology studies. Younger adults of both sexes are the most frequently represented age cohort, and few individuals lived past 35 years.

Individuals from the Grave Circle and Tholos III appear to have better dental and skeletal health, but this finding might be biased by differentially poorer preservation of the Grave Circle burials and small subsample sizes. In particular, the health of adult females, especially in the chamber tombs that span much of the palace's height, may have been substantially worse than that of males, with higher levels of carious infection, tooth loss, and porotic hyperostosis and related bone changes. This may relate to sex-based dietary differences or additional stresses on young female alveolar health, possibly associated with pregnancy.

This analysis presents the initial stage of research on the health and demography of the Mycenaeans of Pylos. Subsequent work, designed to address the questions of differential health, status, and burial treatment generated by this first study, is in progress. The poorer dental health of chamber tomb burials, and adult females in particular, may reflect dietary

80. Walker 1988. There is no evidence that caries is directly associated with pregnancy, although the other factors that Walker cites could certainly contribute to its higher prevalence in females.

differences. In order to assess this, 50 bone and dental root samples were collected for stable isotope analysis. The sampling strategy was to select representative numbers of males and females from each tomb. In addition, samples from children were included to gain information about dietary variation throughout the life course.[81]

Pylian skeletal biology will be placed into a broader perspective through comparative analyses of other Mycenaean populations. A study of the burials in the Athenian Agora, initiated in 2005, is now highlighting the tremendous variation in health and skeletal robusticity between the populations of Attica and the Peloponnese. The diversity of burial treatments at Pylos is also undergoing intensive reexamination. This includes detailed evaluation of the tomb structures using the Blegen archival materials and field notebooks, and a reexamination of the tomb ceramics; the first systematic analysis of the faunal remains from the burials is also planned.[82] Together, these bioarchaeological approaches to the study of the Pylians and their burials should provide answers to many of the questions this initial study raises.

POSTSCRIPT

This analysis involved only the portion of the Pylos sample that was available up to 2006; subsequently, the burials from Tholos III and Tholos IV were located in the National Archaeological Museum in Athens[83] and another Kokkevis chamber tomb was discovered and excavated by L. Malapani. Schepartz and Miller-Antonio began analysis of this additional material in 2007. Use of the entire Pylian sample may alter the conclusions presented here, but the results of the dietary isotope analysis[84] do support our findings that the life and health of Pylians differed significantly when status and sex are considered.

81. The sampling was conducted by A. Papathanasiou and L. A. Schepartz; the analyses were conducted by M. Richards of the Max Planck Institute.

82. J. Murphy is conducting the new study of the Pylos tombs and their archaeological contents; the faunal analysis will be done by P. Halstead and V. Isaakidou, Sheffield University.

83. We are very grateful to S. Triantaphyllou for her work in the museum collections and for bringing this to our attention.

84. Presented at the 2006 European Paleopathology Association meeting held in Santorini.

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Abbreviations for Archival Sources

EPB = Palace of Nestor Excavations Archives, Elizabeth P. Blegen Notebook, 1939, University of Cincinnati, Cincinnati.

JLA = Palace of Nestor Excavations Archives, J. Lawrence Angel Papers, 1957, University of Cincinnati, Cincinnati.

WDT = Palace of Nestor Excavations Archives, William D. Taylour Notebooks, 1953, 1957, 1958, University of Cincinnati, Cincinnati.

WPD = Palace of Nestor Excavations Archives, William P. Donovan Notebook, 1956, University of Cincinnati, Cincinnati.

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