Biological Status Differences Between a Hellenistic and a Modern Skeletal Population from Greece

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Introduction
This paper reports work in progress on a research project that started at UCL in September 2001. It focuses on two skeletal populations, one ancient (3rd-1st century BC) and one modern (late 19th-late 20th century AD), and investigates patterns of daily activity, diet, general health and nutrition by examining skeletal and dental pathology. Some preliminary results are presented here.

Historical and Socioeconomic Background of the Populations Under Study
The archaeological material (third to first centuries BC) comes from the North Cemetery of the Hellenistic town of Demetrias, Central Greece, which was excavated by the 22nd Ephorate of Prehistoric and Classical Antiquities of Volos, Greece. The town was founded by the Macedonian king Demetrios Poliorketes between 294-292 BC, by merging many smaller towns of Magnesia, with the purpose of creating an economically and politically powerful town on a strategic site. Demetrias, which played a significant military and political role throughout Greece, was one of the largest and most important towns and harbours of the Macedonian kingdom and controlled the whole of ancient Magnesia. Demetrios and his successors used Demetrias as a base for political interference and military attacks against Thessaly and Southern Greece (Kovratzhi 1996). Archaeological evidence reveals a flourishing industrial and commercial city with a mixed population of Macedonians, Greeks from the Greek mainland, the islands and Sicily, and immigrants from Asia Minor, Egypt, Syria and Phoenicia.

The people buried in the two modern Athenian cemeteries died in Athens between 1960 and 1996 and their dates of birth range from the late 19th to the late 20th century. The skeletons were obtained by the Laboratory of Anthropology, University of Athens, with the permission of the director of the cemeteries, and I am grateful to Dr S. Manolis (Assistant Professor of Biological Anthropology) for permission to study them. Athens, as the capital of Greece since 1834, was the centre of political, economic and cultural developments. The 20th century was a period of constantly changing socioeconomic conditions and political upheaval. Athens experienced major growth, especially in the second half of the 20th century, a period that also witnessed an acceleration of contact of all kinds with other European countries in areas such as trade, travel, diplomacy and the exchange of ideas. Historical evidence suggests a gradual drift away from farming to urban employment in all parts of Greece, with people from the mainland, the islands and outside the borders settling in Athens (Clogg 2002).
Aims
The current study explores the biological differences between an ancient and a modern population in Greece and attempts to interpret differences or similarities in the pattern, distribution and frequency of dental and skeletal pathologies. The issues that will be examined are as follows:

- Differences in the pattern of daily activity. These will be inferred from the presence of joint disease and trauma in the population.
- Contrasts in diet and in the use of teeth for non-dietary purposes that may be reflected by variation in the epidemiology of dental caries, periodontitis and tooth wear patterns.
- Variation in general health and level of nutrition, which will be related to differences in growth disturbances (identifiable through dental enamel defects).

Material and Methodology
Two hundred individuals (100 each from the ancient and modern collections), were recorded. These were taken from a total sample of 225 individuals from contemporary Athens and approximately 350 individuals from Hellenistic Demetrias. The data collection was conducted at the Biological Anthropology Laboratory at the University of Athens.

The presence or absence of teeth, bone elements and joint surfaces and their state of preservation were recorded, and the sex and age of each individual were estimated, using standard methods (Acsadi and Nemeskeri 1970; Bass 1995; Brooks and Suchey 1990; Iscan et al. 1984, 1985; Lovejoy et al. 1985; Meindl and Lovejoy 1989; Phenice 1969; Suchey and Katz 1986). The skeletons were then examined macroscopically, and the following conditions were recorded as being present or absent in each tooth, bone or joint surface: dental wear (Smith 1984); caries (Hillson 2001); periodontal disease (Karn et al. 1984; Kerr 1991); enamel hypoplasia (Hillson 2001); joint disease (osteoarthritis, diffuse idiopathic skeletal hyperostosis (DISH), ankylosing spondylitis, psoriatic arthritis, gout, rheumatoid arthritis) (Rogers and Waldron 1995) and trauma (fractures, dislocations, deformations) (Lovell 1997). In order to avoid the problem of differential preservation between the two populations and among subgroups, the prevalence of each disease was calculated by dividing the number of teeth, bones or joint surfaces affected by the disease by the total number of teeth, bones or surfaces present in the collections. Statistical analysis was carried out using the SPSS 11.0 statistical package.

Preliminary Results
Dental Pathology and Wear
The modern population displays more caries than the ancient, the main reason being that a modern diet contains more refined sugar. The levels of periodontitis and antemortem tooth loss are considerably higher in the modern group, as higher consumption of carbohydrates leads to large plaque deposits and therefore more periodontal disease. The ancient population shows significantly more dental wear since the ancient diet was
more abrasive and teeth were also used for non-dietary purposes. The distribution of enamel hypoplasia is yet to be analysed comprehensively. However, a preliminary assessment suggests a higher prevalence of the condition in the modern population.

**Skeletal Pathology**

The prevalence of osteoarthritis, a condition that dramatically increases with age, is higher in the modern population, mainly due to the fact that the older adult group (50+ years) in this population consists of a large number of individuals over the age of 65. In younger age groups (younger adults: 20-35 and middle adults: 35-50 years) however, osteoarthritis is more prevalent in the ancient population than in the modern. Although the frequency of DISH – which is associated with age, obesity, diabetes and diet – was expected to be much higher in the modern population (the hypothesis is based on the fact that the modern group is comprised of older individuals and known changes in modern dietary habits), it is in fact higher in the ancient. It should be noted, however, that the difference is not statistically significant. Higher DISH frequency in the ancient population could be linked to high social status and associated higher calorie diets (Jankauskas 2003: 292).

Comparing the two populations, the overall prevalence of fractures seems to be much higher in the modern population, but this might be misleading. In fact, what makes the ancient population appear less prone to fractures is the high frequency in the modern population of multiple perimortem fractures caused by motor vehicle accidents (in some cases there are more than 10-20 broken bones in the same skeleton) among the younger age groups. Excluding perimortem fractures from the statistical analysis, the difference in the overall prevalence of fractures between the two populations is not statistically significant. In addition to the fractures, one case of dislocation was observed in the ancient population and one case of deformation in the modern group.

**Discussion**

These preliminary results suggest that the inhabitants of a 3rd-1st century BC town and those of a modern city in Greece are biologically diverse but, at the same time, there are some similarities between them. Limited occlusal wear and higher levels of caries and periodontitis in the modern group support the idea of major differences in the diet and oral hygiene of the present-day population compared with the population in antiquity. More specifically, higher frequencies of carious lesions, especially in younger adults, suggest a diet rich in sugar, carbohydrates or food containing both starch and sugar (Hillson 1996: 278). More extensive dental attrition in the ancient population is related to the consumption of more solid foods. Higher prevalence of plaque, periodontal disease and antemortem tooth loss in the modern population could be associated with poor oral hygiene and high carbohydrate consumption (Hillson 1996: 259). Enamel hypoplasia, more frequent in the modern sample, is possibly the result of modern exposure to a wider variety of pathogens, leading to growth disruption.

Joint disease is more prevalent in the ancient population than in the modern in the younger age groups, perhaps suggesting differences in the pattern of daily activity. The
mechanisms and pattern of injury differ greatly between the two populations, the reason being that in the modern group, most injuries were the result of motor vehicle accidents. Although the modern urban population experienced a much higher frequency of trauma overall, there are no significant differences in the frequency of antemortem healed fractures, suggesting little difference in the pattern of hazardous daily activity between the two populations, a possible explanation being that both are urban populations.

Contemporary osteological collections are very scarce. The only information we have on modern populations is either through clinical assessment and radiographic diagnosis in living individuals, or from skeletal collections which are either unpublished or not directly comparable to other ancient or contemporary populations. This research project provides a rare opportunity to analyse an ancient and a modern osteological population which are directly comparable: firstly, they both have the same background, coming from industrial and commercial urban centres with mixed populations; secondly, their biological status is compared using the same methodology. When completed, this study will be used to investigate the effect of historical, economic and social factors on health conditions as observed through osteology, and may be used as a basis for future studies. It will also make a significant contribution to the anthropology and archaeology of the Hellenistic era of which very little is yet known in terms of population biology.

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References


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