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Henneberg, Renata J.

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Dental Health and Affiliations of Inhabitants of the Ancient Greek Colony in Metaponto, Italy (6th - 3rd Century BC)

Renata J Henneberg

A thesis submitted to the Faculty of Science
University of the Witwatersrand, Johannesburg, in fulfilment of the
requirements for the degree of Doctor of Philosophy

December 1998

Declaration

I declare that this thesis is my own, unaided work.

It is being submitted for the degree of Doctor of Philosophy in the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination in any other University.

Renata J Henneberg

21 day of December 1998

ABSTRACT

The rare opportunity of studying the biology of a population with a considerable written historical record and rich archaeological documentation was provided by the human skeletal material excavated from the rural cemetery of ancient Greek colonists in Metaponto, Italy (6th-3rd century BC). While more is generally known about Greeks from the cities, the information about rural populations, and especially from areas colonised by Greeks, is still scarce. As far as it can be ascertained, this study is the first anthropological analysis of a large sample of dentition from the rural area associated with a Greek urban settlement in Southern Italy.

The permanent dentition of 176 individuals (163 adults and 13 sub adults) was studied in order to describe the dental health of the rural people and to establish their affinities. Data on metric and non metric characteristics of 2325 teeth were recorded and pathological conditions of the teeth and surrounding bone were described. Bucco-lingual and mesio-distal diameters were measured. Records of 44 selected epigenetic traits such as shovel-shaped teeth, Carabelli's trait, Etruscan upper lateral incisor, canine distal accessory ridge and pattern and number of cusps on molars and premolars among others, were used in analysis of biological distances between populations. Observations on dental caries, enamel hypoplasiae, periodontal disease, periapical abscesses, dental wear and tooth loss were collected and the results were compared with dental health in urban populations and with populations of different economies and from different times and geographical locations.

The dental health of the rural people of Metaponto was characteristic for populations whose subsistence was based on agriculture and it was generally poor. Frequency of caries was 57.2% and 5.8% of teeth were affected by caries. Frequency of enamel hypoplasia, mostly of linear type, was 78%. One third of the rural people suffered from periodontal disease and 19.2% of them had periapical abscesses. Comparisons with the urban population and others showed that the rural people

suffered less from caries, hypoplasia and periodontal disease than the urban population. The frequency of hypoplasia in this population seems to be related to systemic diseases such as treponematosis and less to nutritional problems. Rural and urban populations had different patterns of dental diseases which could be related to different life-styles.

The results of the analysis of biological distances suggest that the rural people were more closely related to the indigenous populations of Southern Italy than to the urban population and the Greeks in Greece. This may indicate integration of the colonists with the indigenous people. The analysis of biological distances suggested that at least some families buried their dead in family plots within the cemetery.

Biological findings complemented cultural information about the population and allowed for interpretation of changes in the health and biological endowment of the rural population which occurred during the time of colonisation.

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The University of the Witwatersrand for its stimulating research atmosphere and support of this study is kindly acknowledged.

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Publications resulting from the research directly related to this thesis.

In cases of co-authored publications Renata J Henneberg was the sole author of sections regarding dental problems whereas other co-authors dealt with information regarding other aspects of the study (eg archaeology, skeletal biology, isotope analysis).

Abstracts are related to presentations at consecutive congresses of the American Association of Physical Anthropologists (in Am. J. Phys. Anthrop.), Anatomical Society of Southern Africa (in: S. Afr. J. Sci, S. Afr. Medical Journal and in J. Anat.) and special conferences on the origin of syphilis and the safeguard of the cultural heritage in the Mediterranean.

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LIST OF ABBREVIATIONS USED IN THE THESIS

(In alphabetical order):

AB - distance between alveolar crest and cemento-enamel junction measured over the *midline buccal surface*

AC - alveolar crest

AC-CEJ distance - distance between alveolar crest and cemento-enamel junction

AD. - Anno Domini - after Christ

a.m. loss - loss of a tooth during life (*ante mortem*)

BC - before Christ

BL - bucco-lingual diameter

c. - century

C - canine

CD - distance between alveolar crest and cemento-enamel junction measured on an interproximal surface of the tooth (usually mesial)

CEJ - cemento-enamel junction

Ch - child *or* youth

e_x - % of individuals alive in age category

d_x - % frequency of deceased by age

D_x - number of deceased by age

e_x - life expectancy

F - female

I1 - first incisor

I2 - second incisor

indiv. - individual, individuals

L - lower

LC - lower canine

LI1 - lower first incisor

LI2 - lower second incisor

LLC - lower left canine

LLI1 - lower left first incisor

LLI2 - lower left second incisor

LLM1 - lower left first molar

LLM2 - lower left second molar

LLM3 - lower left third molar

LLP1 - lower left first (third) premolar

LLP2 - lower left second (fourth) premolar

LM1 - lower first molar

LM2 - lower second molar

LM3 - lower third molar

LP1 - lower first (third) premolar

LP2 - lower second (fourth) premolar

LRC - lower right canine

LRI1 - lower right first incisor

LRI2 - lower right second incisor

LRM1 - lower right first molar

LRM2 - lower right second molar

LRM3 - lower right third molar

LRP1 - lower right first (third) premolar

LRP2 - lower right second (fourth) premolar

l_x - survivorship

M - male

M1 - first molar

M2 - second molar

M3 - third molar

MD - mesio-distal diameter

MMD - Mean Measure of Divergence

N - number of individuals or teeth, sample size

No. - consecutive number (i.e. tombs)

ns - not statistically significant

P1 - first (third) premolar

P2 - second (fourth) premolar

PD - periodontal disease

p.m. loss - loss of teeth after death (*post mortem*)

q_x - probability of dying

SD or s - standard deviation

SD MMD - standard deviation of MMD

TCH-index - Tooth Cervical Height index

UC - upper canine

UI1 - upper first incisor

UI2 - upper second incisor

ULC - upper left canine

ULI1 - upper left first incisor

ULI2 - upper left second incisor

ULM1 - upper left first molar

ULM2 - upper left second molar

ULM3 - upper left third molar

ULP1 - upper left first (third) molar

ULP2 - upper left second (fourth) molar

URC - upper right canine

URI1 - upper right first incisor

URI2 - upper right second incisor

URM1 - upper right first molar

URM2 - upper right second molar

URM3 - upper right third molar

URP1 - upper right first (third) premolar

URP2 - upper right second (fourth) premolar

Var MMD - variance of MMD

$\bar{x}$ - arithmetic mean, average

1. GENERAL INTRODUCTION

1.1. Historical and archaeological versus biological evidence.

Great civilisations of the world are usually described by their impact on other civilisations and by their lasting influence on the modern world and activities of present day peoples. The ancient Greeks created one of the world's greatest civilisations. The impact of Greeks, especially from the time of their rapid cultural development and geographical expansion between the 7th and the 2nd century BC on art, architecture, literature, philosophy, science, politics, social life, languages and virtually every sphere of life is undeniable. Directly or indirectly the Greek culture has affected practically the whole world and its traces are present even in distant cultures which adopted, or were forced to borrow from the modern western civilisation.

Throughout centuries Greek culture and history have been studied from almost every possible angle (Dunbabin 1948, Grant 1987, Descoeudres 1990, Boardman et al. 1991). Evolution of culture, however thoroughly studied, cannot be fully understood without knowledge of the biology of the people who created this culture. The interaction between people, as physical and social beings, and the environment transformed with technology and social organisation in the process of interaction, is the force of development (Haldane 1949, Motulsky 1960, Dobzhansky 1963, Bielicki 1969, Hennenberg 1992).

Only relatively recently classicists have become aware that one important element of knowledge about the ancient Greeks, that of the people themselves as biological individuals, was usually missing in their studies. Ironically, the abundance of Greek artefacts from archaeological sites diverted classical archaeologists' attention from an important source of information namely human remains themselves. The human skeletal remains from the classical archaeological sites were often poorly excavated and

documented or even not preserved at all by classical archaeologists. This latter fact made it difficult or impossible to study the ancient Greeks from the physical anthropologist's perspective. This particular neglect of the skeletal material from the ancient Greek sites resulted in a disproportion between the amount of knowledge from historical documents and artefacts and the knowledge about biology of ancient Greek populations. The less glamorous part of their existence like average length of people's life, average number of children per family, diseases they most frequently suffered from, and many other related aspects of physical being of ordinary people was practically unknown.

The first studies of human skeletal remains from ancient Greek cemeteries conducted by Angel (1943, 1944a,b, 1945, 1946, 1947, 1971, 1972a,b) proved that despite the abundance of cultural evidence, such as written historical material and archaeological findings, still little was known about common Greeks and their everyday life. For the reasons mentioned above only very few studies of the human remains from Greek cemeteries followed (Phillipas 1952, Bisel 1980, Bisel and Angel 1985, Agelarakis 1987, Bisel 1992).

With the development of biological techniques, and recently interdisciplinary approaches to classical archaeology (Carter, 1990a,b, 1998a) biological studies of the human remains can offer an alternative and a challenge to written and archaeological sources of our knowledge of the ancient Greeks (Grmek 1989, Henneberg and Henneberg 1990b, Henneberg et al. 1992, Henneberg and Henneberg 1994, 1998 a,b).

The general goal of this study is to supplement our scarce knowledge about biological characteristics of the ancient Greeks. Quantitative methods with emphasis on the entire population and its biological characteristics will be used in preference to descriptions of individual cases.

1.2. "Urban" versus "rural" studies of Greek populations.

From the historical and physical anthropologists' points of view more is known about Greeks who lived in the cities and within the territory of present Greece than about the rural people (Carter 1990a and b). Inhabitants of the rural areas comprised the majority of the total population of the ancient Greek world which included vast territories colonised by Greeks in Asia and Europe (Boardman 1980, Snodgrass 1990) (Figure 1.2-1).

Archaeologists and historians intensively explored the subject of Greek colonisation of the coastal area of Southern Italy and Sicily (Dunbabin 1948, Adamesteanu 1974, 1990, Boardman 1980, Carter 1980, 1987, 1990a,b, Graham 1982, Murray and Price 1990). The emphasis was, however, still on the cities. Very few rural settlements were studied in the Mediterranean areas colonised by Greeks (Adamesteanu 1974, Carter 1987).

The unique opportunity to study the biology of a rural community of colonised Greek territories was offered to the author in 1985 by Professor Joseph C. Carter from the Department of Classics of The University of Texas at Austin, under whose leadership the Metaponto rural cemeteries were excavated. In 1991 the author was invited to study the human remains from another cemetery closely associated with the city of Metaponto. The urban necropolis has been excavated by Italian classical archaeologists from the Museum of Metaponto led by Dr. Antonio De Siena. The material from the urban cemetery provided a comparative sample to the rural one.

Did the rural people differ, in biological sense, from the urban population? It can be anticipated from the peoples' different life styles dictated by surroundings as described below, that such differences were possible. If so, how and to what extent these two populations differed from each other will be investigated in this study.

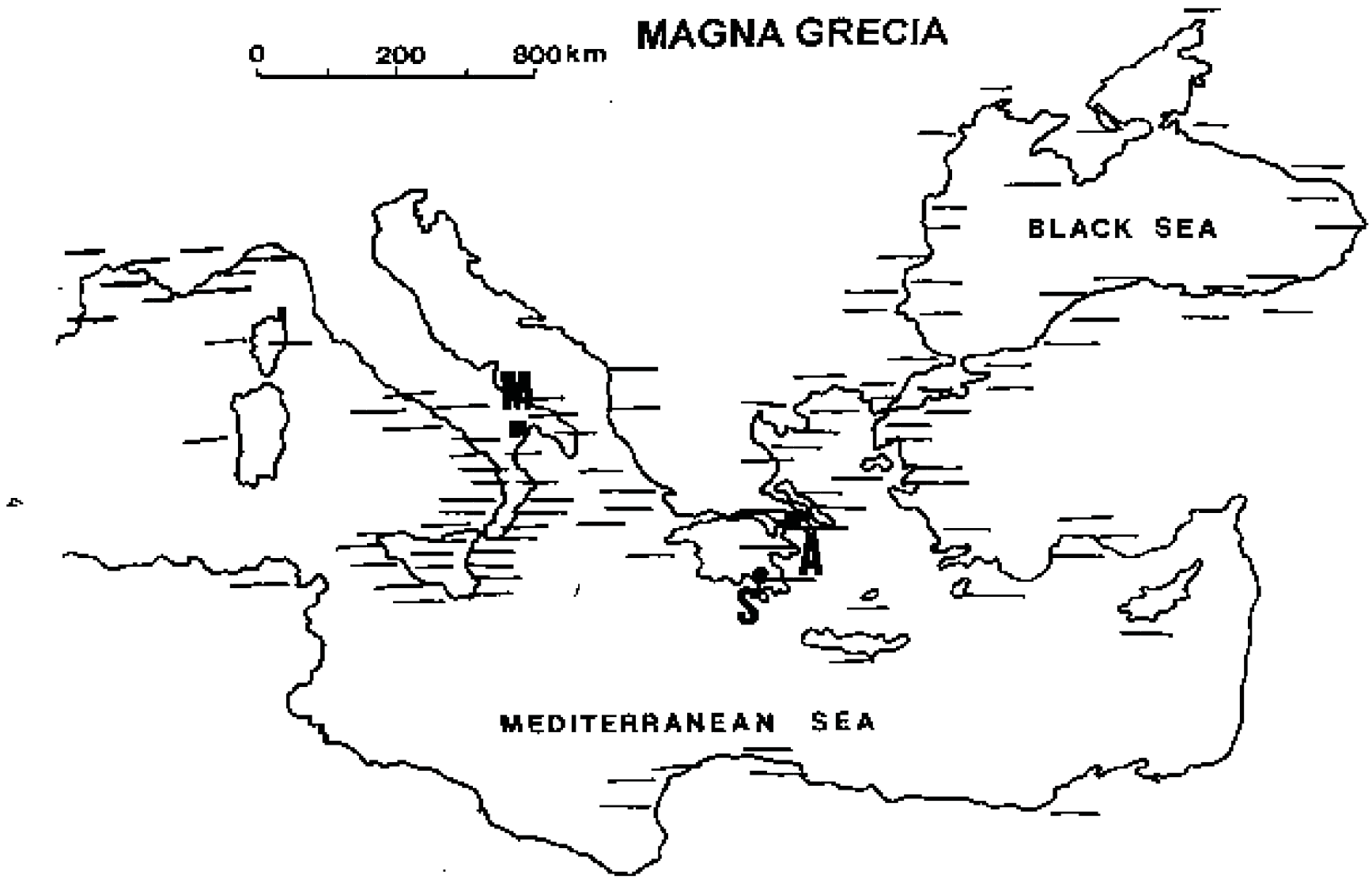


Figure 1.2-1. Schematic map of the area of the Mediterranean occupied by Greeks (Magna Grecia) occupied by Greeks around the 4th century BC (modified from Cartledge 1993). Dots represent Metaponto (M), Athens (A) and Sparta (S). Short lines represent the Greek cities or trade centres.

1.3. Colony of Metaponto: Brief history of the place from written and archaeological evidence.

The colony of Metapontion, the Greek name of the place called in Latin Metapontum and in modern Italian Metaponto (the Italian version will be used in the thesis), was founded in the 7th century BC by Achaeans from the Peloponnese (Dunbabin 1948, Boardman 1980, Adamesteanu 1974, Grant 1987, Carter 1990a,b). The settlers erected their city and a port on the seashore of the Gulf of Tarent, South Italy, on sites previously inhabited by the indigenous Italic population of what is now a region of Basilicata (Carter 1990 a,b) (Figures 1.2-1 and 1.3-1). Little more than a century before that colonisation, the Greeks began their greatest expansion to territories occupied by people who did not speak their language and whom they called "barbarians" (see Boardman et al. 1991, p.38) in order to establish trade centres. Colonisation of the new territories around the Mediterranean Sea and the Black Sea followed. New cities similar in their general planning to these in Greece were founded on the coasts of Sicily, Italy, Asia Minor, North Africa and France over a period of more than two centuries (Figure 1.2-1). Rich agricultural areas found in Sicily and South Italy sped up colonisation and consolidation of these lands. The colonies developed quickly growing in population numbers, power and wealth and flourished between the 6th and 3rd century BC, especially in the Classical Age (5th and 4th c BC) (Dunbabin 1948, Graham 1982, Grant 1987, Boardman et al. 1991). In many cases the colonies were richer than the cities in Greece and their people were spoiled by the wealth and easy life. Even today, to describe somebody who enjoys life, eats well, and indulges in all kinds of pleasures (and can afford all of it), the term "sybarite" is used after the inhabitants of Sybaris. Sybaris was one of the richest colonies in the South Italy, famous for its wealthy and soft life style. Most of the cities or city-states (see Boardman et al. 1991,

pp.13-14 for the concise description, also Murray and Price 1990) in occupied territories were so rich and powerful that they minted their own silver or copper coins usually with the symbol of the city on it. In case of Metaponto, known as cultural and also an agricultural centre (Adamesteanu 1974, Carter 1990a,b), the wealth of the colony came from the fields and the symbol designed on the coin was a barley-ear (Grant 1987).

The typical Greek city-state territory consisted of a "polis" - a proper city, and a "chora" - a countryside surrounding the city. The polis was a compactly built urban development with temples, a market place or an area of public meetings, a theatre, a place for sport games and private houses usually surrounded by city walls. The chora surrounded the city outside the city walls and supplied the urban population with agricultural products. Arable land was divided into farms with farmhouses built on the fields. The citizens of the city-state usually resided in the city and commuted to the farm if they owned one. Burials found in the vicinity of farmhouses show that families working on the fields or perhaps supervising the fields occupied the farmhouses permanently (Carter 1990a,b, 1993, 1998a).

Metaponto was organised in the way described above (Figure 1.3-2). The densely populated city during the heyday of its prosperity could have accommodated as many as 12.5 to 25 thousand inhabitants. The size of the colony could have been much bigger. It could have had as many as 40 thousand inhabitants as estimated from the size of an ekklesiasterion, the public meeting place for the citizens, built in the form of an amphitheatre (Carter 1990a). The streets were straight and flanked by gutters of an open sewage system. The houses had rather small rooms with doors opening directly to the streets. The temples and the market place occupied the centre of the city. The city walls separated the city from the countryside divided into relatively large farms. The presence of the farms was found on some 270 archaeological sites covering the area extending up to 13 km from the city walls. Two rivers Bradano and Basento and numerous springs supplied the colony with fresh water. Most of the farms produced substantially more

food than the families could use during the year (Henneberg and Henneberg 1990b, 1998a, Henneberg et al. 1992). The surplus was sold in the city and exported to Greece in exchange for other goods. Judging by the grave goods found during the excavation of the rural cemeteries the people of the chora also fared well economically.

The rural people of Metaponto lived in the open spaces, in close contact with nature, drinking fresh water from the springs, apparently with enough food to eat. Were the rural people healthy? To their contemporaries Metaponto was well known for its doctors (Lo Porto 1980), but how limited their medical interventions were in this time we can assess in part by quantitatively examining the human remains and estimating the pathological conditions at the population level (Henneberg and Henneberg 1990b, Henneberg et al. 1992, Henneberg and Henneberg 1994, 1998a).

1.4. The origin of rural Metapontines: cultural versus biological adaptation to the rules of colonisation.

According to written history and evidence from archaeological artefacts the colonists from Metaponto were in contact with local Italic people, Lucanians and Oscans who lived to the North of Metaponto (Adamesteanu 1990, Carter 1990b, 1998c). From ancient Greek literature and written historical sources it is known that people who were not Greeks did not have the rights of citizens in the city-states and in the Classical Age it was considered good to have slaves who were "barbarians" (Cartledge 1993). Only later in the 3rd c BC did assimilation of native people of occupied lands become more common (Descoeudres 1990, Carter 1993). Archaeological findings at the Pantanello necropolis in rural Metaponto show change through time in the proportion of burials according to the Greek style and ritual, and burials with artefacts, suggesting gradual assimilation of natives into the Greek society (Carter 1990a: 36, Morris 1987, 1994). Unearthed ceramic deposits within the chora also suggest coexistence of indigenous

people and Greek colonists in the chora of Metaponto from early times of colonisation (Carter 1993, 1998c).

The question may arise: was the Greek influence only cultural or also biological and to what extent did the Greeks mix with local populations from the beginning of the colonisation? This study attempts to answer this question by analysing selected discrete and metric heritable dental traits and other biological characteristics of the people from the colony of Metaponto. Further, it is expected that multivariate analysis of the heritable traits will disclose affiliations of Metapontines to other European populations.

1.5. Greek burial customs: random use of burial grounds versus family plots.

Every society tries to deal with death by compensating the loss of its members with burial ceremonies specific to its culture. Greeks buried their dead with objects necessary to cross the border between the worlds of the living and the dead, and objects used by the person in everyday life. Excavations of ancient Greek cemeteries revealed that burials were usually grouped in small clusters in the burial ground. From the similarities in grave goods and other characteristics of the burials archaeologists suggest that each cluster of burials was used by one family sometimes over a few generations (Morris 1987, Carter 1990a,b, 1993, 1998b). The best documented example of family groups is from Athens where inscriptions on tombs' stone covers made it possible to trace families (Humphreys 1980). Yet, there are many questions regarding the interpretation of the burial clusters as family plots on the cemetery (Carter 1998b).

It is anticipated that by using various biological characteristics as indicators of familial affinities the author will be able to test a hypothesis of the family groups in Greek cemeteries.

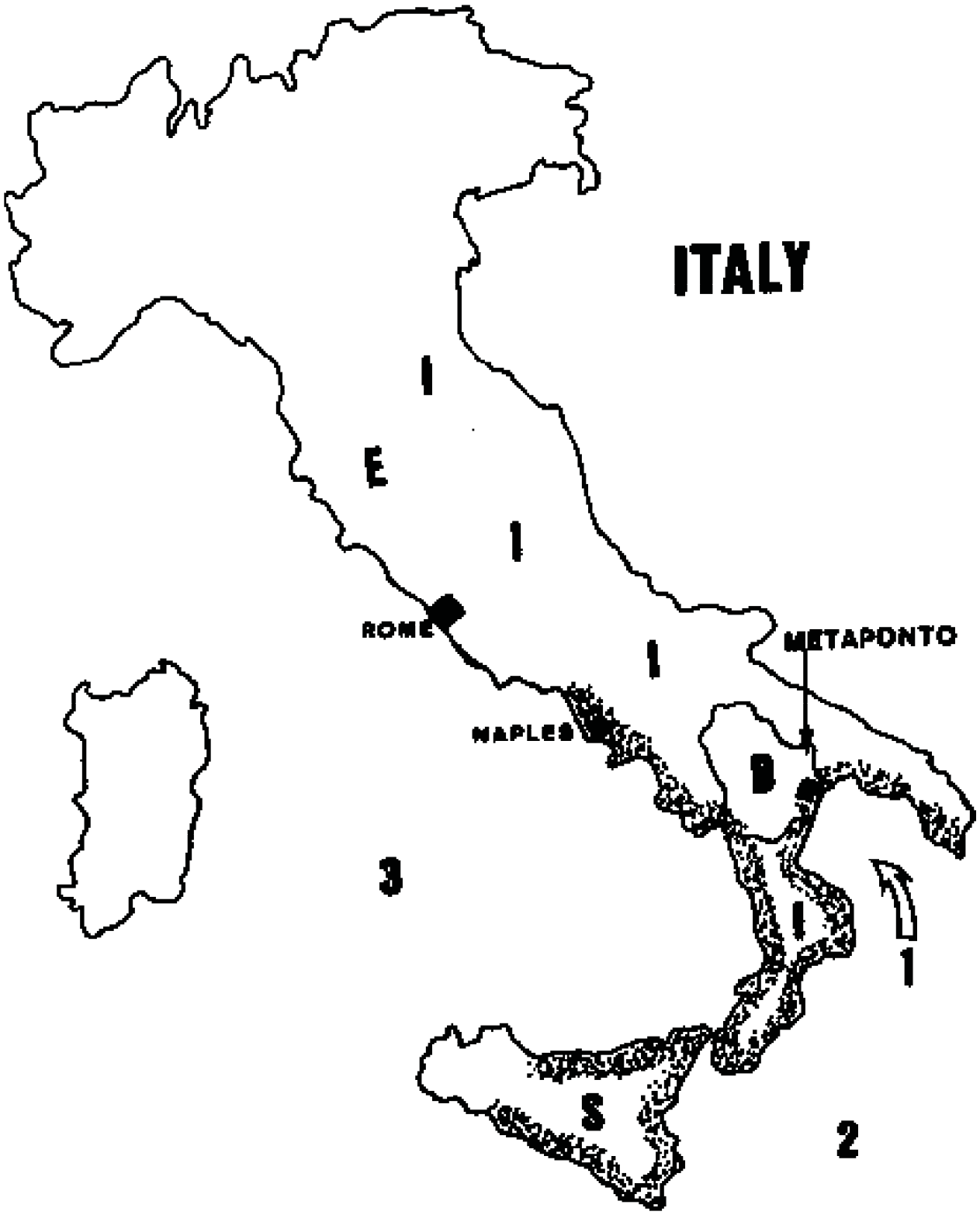


Figure 1.3-1. Schematic map of the present day Italy showing areas occupied by ancient Greeks: Coastal regions of Southern Italy and Sicily (dots) surrounded by Tyrrhenian (3) and Ionian (2) seas (modified from Piazza et al. 1988). Metaponto is placed on the Gulf of Tarent (1) in the present day region of Basilicata (B). At the time of Greek colonisation of the South of Italy, several Italic (I) populations such as Oscans and Lucanians lived in close vicinity of Metaponto occupying the same territories. Italics were surrounded by Etruscans (E) to the North and to the South by Sicels (S) in Sicily.

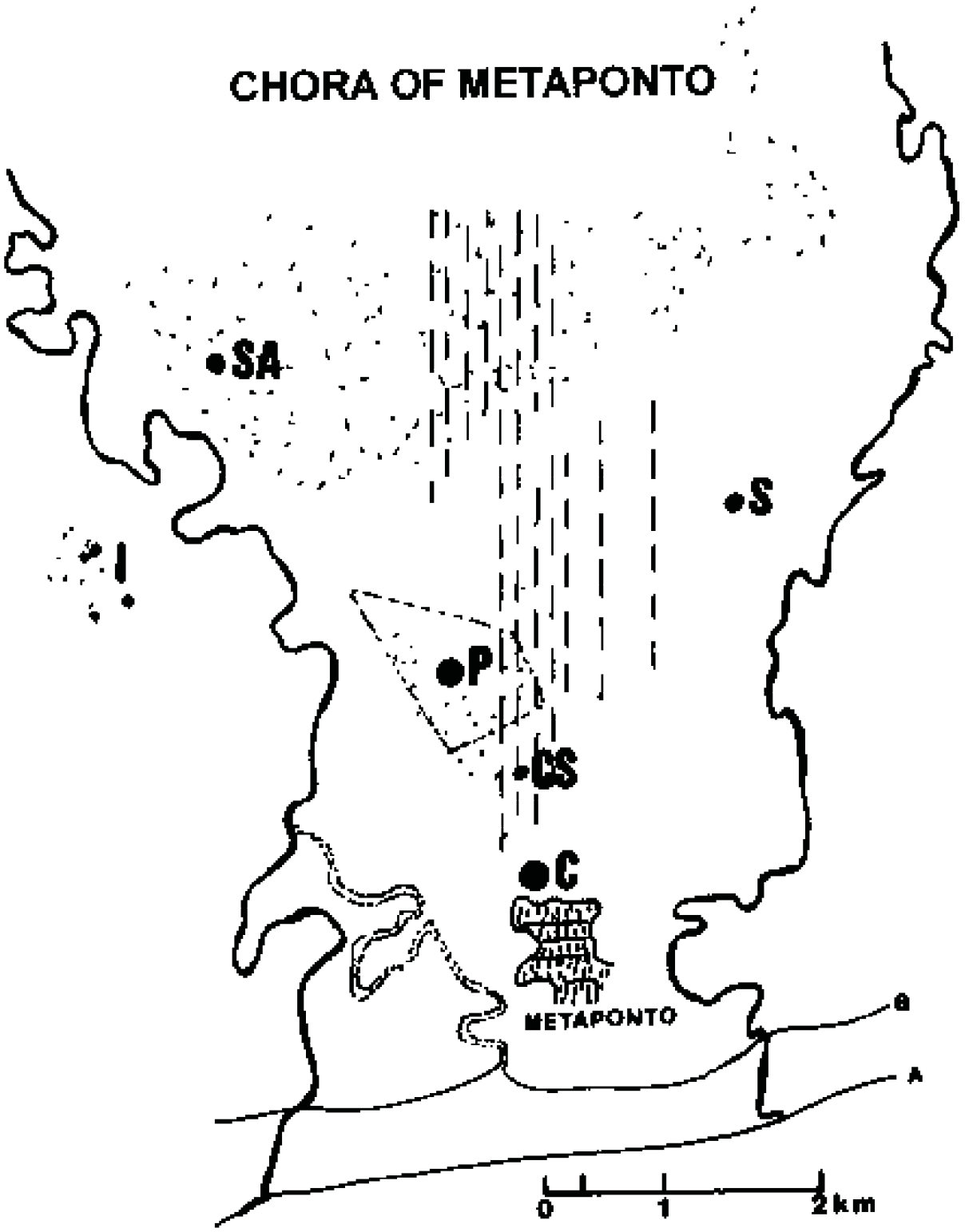


Figure 1.3-2. Schematic plan of the chora of Metaponto between the rivers Bradano and Basento (modified from Carter 1998). The city of Metaponto was situated near the seashore (B - ancient coast line, A - present coast line) with its necropolis (Crucinia - C) to the North of the city, just outside the city walls. Some 3.5 km from the city northern walls was the rural necropolis Pantanello (P). Between the two large necropoleis one burial with a skeleton was found at the Pantanello Sanctuary Celeste (CS). Smaller burial grounds, associated with individual farms, at Sant'Angelo Vecchio (SA) and Saldone (S) were in a few kilometres distance from Pantanello necropolis. Indigenous Italic settlements (I), excavated around the same time as Greek burial places, were in close proximity to the city and the Greek chora. Vertical lines represent ancient land divisions. Dots represent rural area surveyed by American archaeologists where evidence of human activities (sherds of pottery, tiles etc.) was found.

1.6. General evaluation of the skeletal material from the burial grounds of Metaponto. Teeth versus whole skeletons: the author's research choice and aim.

Up to date about one thousand burials were excavated in Metaponto and in the surrounding rural chora. The human skeletal material of 684 individuals in two samples (rural of 272 individuals and urban of 412 individuals) comprises the largest collection ever excavated in the areas colonised by ancient Greeks in the Mediterranean. Both samples, because of their substantial size, constitute valuable sources of information, despite often less than ideal preservation of the skeletons.

Previous studies of the skeletal material from the rural area of Metaponto showed that the population was affected by various diseases, some of them of a systemic nature. Macroscopic and histological examination of the individual skeletons revealed pathological changes on bones which suggest presence of treponematosis among rural people in the chora (Henneberg et al. 1992, Henneberg and Henneberg 1993a,b, 1994, 1998a). In other cases porotic thickening of the skull vault points towards thalassemia (Henneberg and Henneberg 1990b, Henneberg et al.1992, Henneberg and Henneberg 1998a), a genetic condition often found in areas affected by malaria (Rucknagel 1964, Menini 1970, Ascenzi and Balisteri 1977, Grmek 1989). Preliminary examinations of the skeletal material from the urban cemetery also showed presence of thalassemia (Henneberg et al. in preparation). It is well documented that the Mediterranean region was affected by malaria in the prehistoric and historical times and the bone changes associated with thalassemia have been described from many archaeological sites around the Mediterranean Sea (Angel 1966, Ortner and Putschar 1985, Grmek 1989). Other pathological signs on bones in the skeletal sample from rural Metaponto have also been found such as osteoarthritic changes and traumatic conditions (Henneberg and Henneberg 1990b, 1998a). The picture of general health in the population would not be complete without assessment of dental health and general condition of the teeth.