

AN OSTEOLOGICAL ANALYSIS OF THE NEOLITHIC SKELETAL  
POPULATION FROM GANJ DAREH TEPE, IRAN

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by

Peter John B. Lambert

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ABSTRACT

Few skeletal series of any size have been reported from the Middle Eastern Neolithic. The population from Ganj Dareh Tepe, an Early Neolithic occupation, is comprised of 49 individuals and forms the study group for this thesis. A variety of descriptive and analytical techniques describe the attributes of these individuals and the population in comparison to other archaeological populations.

Postcranial and odontometric data are used to examine both relative sexual dimorphism and intra-sex populational differences. The surviving crania from Ganj Dareh show one of the earliest known annular deformation variants and are not used for comparative purposes.

Sexual dimorphism in the Neolithic population from Ganj Dareh Tepe is found to be absolutely and relatively minor in comparison to that observed for two Bronze Age populations. Further, Ganj Dareh adult development differs from that observed in Bronze Age adults with males and females from the former having relatively greater long bone lengths and widths, except in the femur. This implies that overall body proportions may have altered between Neolithic and Bronze Age periods as both unrelated Bronze Age populations show similar tendencies. Odontometrics indicate no relationships between Ganj Dareh and any other population examined. These last comparisons do, however, supply information concerning four of the comparative samples. These are

Erg el Ahmar, Jericho Pre-Pottery Neolithic B and Jericho Bronze Age and the Natufian samples. Odontometrics compared for these populations show that Erg el Ahmar is not biologically similar to the Natufians although it has been so considered in the past. In addition, comparisons suggest that the Natufians may be ancestral to the Jericho Bronze population but not to the earlier group from PPNB.

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Credit for making the Ganj Dareh Tepe series available for study goes to Dr. P.E.L. Smith of l'Université de Montréal, Dr. Meiklejohn and Dr. Wade. Study space was supplied by Dr. Meiklejohn and the University of Winnipeg.

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Despite the considerable input made by those mentioned above, and some regrettably not, the errors to be found are mine alone. I trust these will prove to be few in number and importance.

This thesis is dedicated to my parents, Edith and John.

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## CHAPTER 1

### INTRODUCTION

This study is an examination of 49 individual skeletons from Ganj Dareh Tepe, an Early Neolithic occupation in Iran. A variety of data were collected in order to achieve two goals of value to osteology and Near Eastern prehistory. The first of these goals concerns use of a range of osteological techniques for collection of data from human skeletal remains. These data characterize this previously unreported series and are presented in appendices for subsequent osteological research. Further, these data comprise the basic information required for the comparisons appearing in ensuing chapters. The second objective concerns the comparison of Ganj Dareh Tepe remains, both between distinguishable subsamples of the study group, and between Ganj Dareh Tepe and a range of unassociated archaeological sites. Comparative sites with skeletal remains represent a wide range of geographical locations and chronology, coming from The Levant, Greece, Iraq and Iran and dating between Mesolithic and Bronze Age times.

The occupation mound designated as Ganj Dareh Tepe (P.E.L. Smith, '68) is situated in the province of Kermānshah. The tepe lies in the Gamas-Āb River valley, one of many such valleys found in the eastern flanks of the Zagros Mountains of western Iran.

The site (fig. 1) was discovered and excavated by Dr. P.E.L. Smith and crews from the Université de Montréal in 1967. This initial excavation was followed by three full field seasons in 1969, 1971 and 1974. The preliminary findings and interpretations appeared as a series of interim reports (P.E.L. Smith, '67; '68; '70; '72a, b; '74; '75; and '78). These form the basis for the brief description appearing below.

The roughly circular mound covers an area of approximately 1300 m<sup>2</sup> and has a maximum depth of about eight meters. The base of the mound lies about one meter below the present surface of the surrounding topsoil. Excavations through ca. twenty percent of the mound's volume exposed five major horizontal, culturally distinctive levels. These were designated, from upper to lower, Levels A through E. Carbon samples were recovered from four of these levels and subjected to radiocarbon dating techniques (Kigoshi, '67; Lawn, '70). The resulting dates, in years B.C., are summarized by Singh ('74):

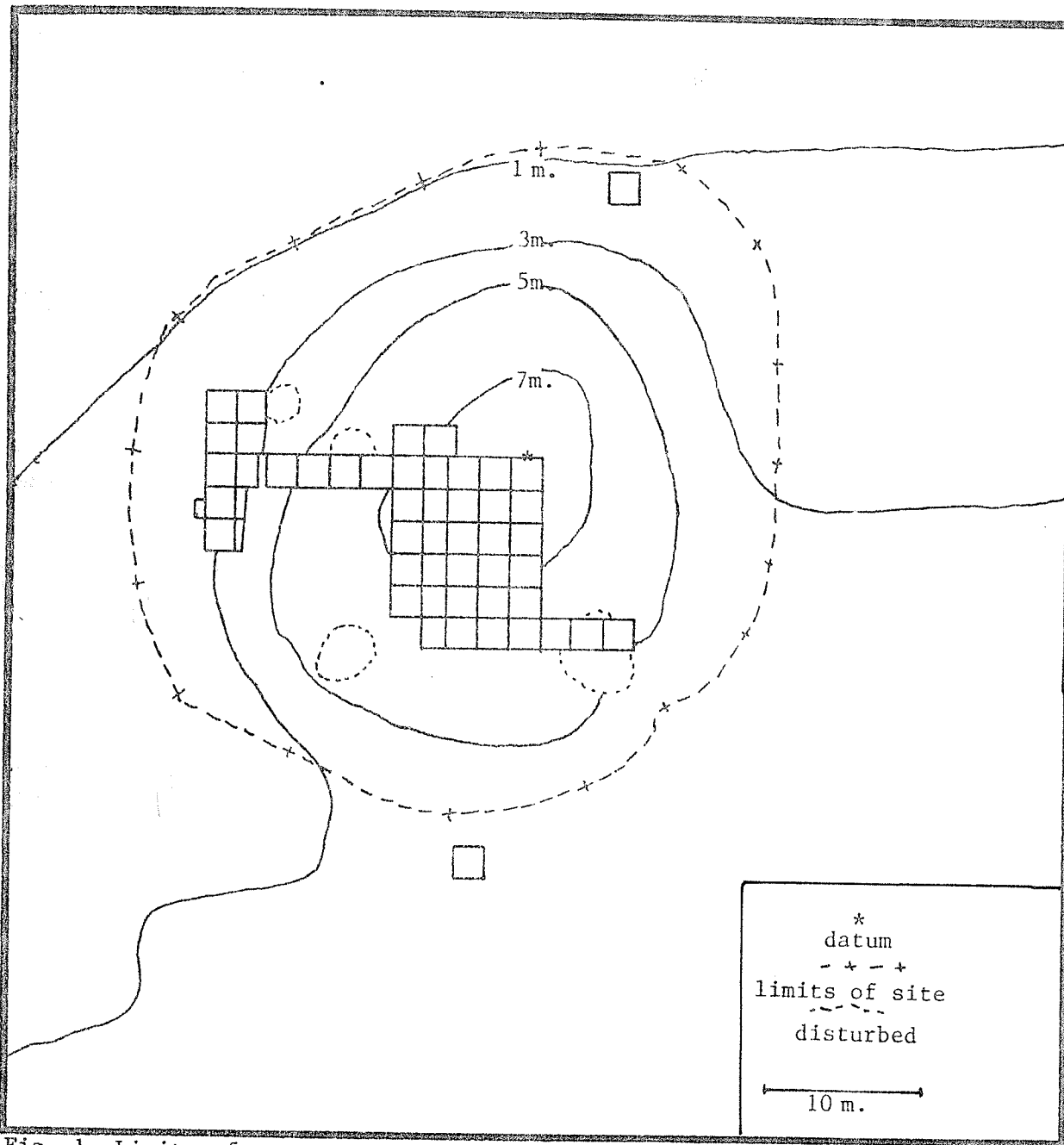


Fig. 1 Limits of excavation at Ganj Dareh Tepe, Kermanshah Province, Iran.  
(after P.E.L.Smith,n.d.)

Level A	6960 ± 170 (Gak 994)
Level B	6938 ± 98 (P 1486)
Level C	7289 ± 196 (P 1485)
Level D	7018 ± 100 (P 1484)
Level D (base)	8500 ± 150 (Gak 807)

The oldest remains were recovered from Level E. Relative to succeeding deposits, recovery was small but the assemblage was similar to the Upper Palaeolithic occupation from the nearby site of Tepe Asiab (P.E.L. Smith, '78,p.539). Features included a number of "round or oval depressions cut into virgin soil" that may have been for the placement of tents or reed huts (Burney,'77) or, for use as firepits (P.E.L. Smith,'74). There was no evidence to suggest that the site had been occupied on any more than a seasonal basis.

Deposits from Level D indicate greater permanence together with increasing dependence upon locally available resources. Remains from this level include chineh architecture, similar to that found at Jarmo (Burney,'77), clay bins and a variety of ceramics. Survival of the pottery from Level D is attributed to the intense burning of this occupation (P.E.L. Smith,'67; '68). This early occurrence of ceramics has led to the suggestion that Ganj Dareh Tepe represents an early and independent center of manufacture (P.E.L. Smith,'78), possibly the earliest known from the

entire Near Eastern archaeological record (Burney, '77, p.32).

Additional evidence for incipient agriculture consists of high frequencies of blades and bladelets showing edge polish or "sickle-sheen" and ground-stone mortars and pestles (P. E. L., Smith, '67; '68; et al.; Burney, '77). Animal husbandry is suggested by the presence of domesticated goat (Capra sp.) identified by D. Perkins and B. Hesse (P.E.L. Smith, '72b; '74). Frequencies varied slightly in upper levels suggesting that a relatively stable cultural tradition persisted through the occupation.

Burial recording forms identify 42 features. All but four of these were discrete, with the remaining four features containing two individuals. However, because of in situ mixing, it is likely that features containing more than a single individual, with one exception, were discrete. This exception concerns three individuals (G. D. 15, 16 and 17) recovered from a claybrick sarcophagus.

In addition to the 46 individuals recovered from the mound, three were associated with a peripheral feature. While these are not documented by forms, they are assumed to belong to the Ganj Dareh Tepe series and designed as G. D. 43, 44 and 45.

Of the original 46 individuals, seven are presently without level associations, while six additional individuals have been given tentative association with



the upper levels (A, B, C) using information from the burial recording forms. The remainder are securely associated to either Level B (three individuals), Level D (27 individuals) or Level E (three individuals). No skeletons were recovered from Level C.

When present, grave goods were found with young individuals rather than adults (P. E. L. Smith, '78). Frequently, fragments of sheep or goat crania and, sometimes, complete skulls were used. Less frequently, human or animal figurines were included. Traces of reed matting have been recovered with two burials, while a single young individual from Level D was wearing an exotic olivia-shell and stone-bead necklace (P. E. L. Smith, '70). Burial forms suggest that there was no prescription for orientation of the body or the head, nor for body flexion or extension.

Descriptions of individual skeleton from Ganj Dareh are provided in Chapter III. Each includes a general statement on the condition of the skeleton and an enumeration of bones used in assessing age and sex according to a variety of techniques. These are discussed in Chapter II. The importance of determining age and sex is that, together, they constitute the criteria for distinguishing between subsamples within a biological population (i.e. males and females; preadolescents and adults).

Once separated, samples of males and females

were characterized by a variety of metric and nonmetric data. Techniques used were selected for their utility and applicability to the Ganj Dareh Tepe remains. As this study is intended to be comprehensive, unrelated techniques were used to collect data from various parts of the human skeleton. These, in turn, formed data bases for comparisons within and between skeletal groups. Because comparative data were not generally uniform in describing different populations, it was convenient to make and discuss comparisons under three headings that delineate specific skeletal complexes. These are, a) "The Cranial Complex", b) "The Postcranial Complex", and c), "The Dental Complex". The first category includes the cranium and mandible while the second includes all postcranial bones. The Dental Complex includes all identifiable teeth. Techniques associated with each complex are discussed in Chapter II.

The palaeopathology of the series is considered in Chapter IV. This represents a survey of various bone and dental changes that are traditionally considered to be diagnostic of pathogenesis. In most cases, hard-tissue abnormalities observed occur in various frequencies and with different degrees of severity. Others are rare and have unknown causes. This chapter also details anomalous characteristics at Ganj Dareh Tepe. Most notable is intentional cranial deformation. Frequencies for the more

common anomalies and pathologies are used to compare Ganj Dareh to published frequencies for other Near Eastern skeletal series.

The primary bases for comparisons are the metric data particular to the three skeletal complexes. Chapter V, entitled "Analytical Techniques", discusses of the nature of these data. An explanation of techniques used in making inter- and intra-population comparisons also appears in this chapter. The comparative samples were selected primarily for the utility of data. Samples suitable for comparison are discussed in Chapter VI, together with a brief synopsis of their archaeological and cultural associations.

Results obtained from the different analytical techniques are presented in Chapter VII. This chapter is essentially descriptive, with discussions of the different sets of results and brief summaries. The detailed description of results is intended to extract the maximum of information and to illustrate the utility of a multi-faceted analysis. A more general summary of the results of the study is presented in Chapter VIII, "Summary and Conclusions".

The approach taken in this thesis was to treat the study series as as a representative sample of a larger Early Neolithic population. Following this, the Ganj

Dareh sample was compared to other samples, each representing culturally and biologically distinctive populations. It is anticipated that some important conclusions may result from this study, particularly concerning inter- and intra-sample metric variability. It is further anticipated that these results will be useful for both comparative osteology and for prehistoric interpretations.

## CHAPTER II

### LABORATORY TECHNIQUES

Subsumed under the above heading are two classes of techniques called "preliminary techniques" and "techniques of data collection". The first is the set of procedures required for preparing the Ganj Dareh series for study and include, a) cleaning; b) reconstruction; c) preservation; d) identification; and e) separation of mixed burials. Techniques used for determining age and sex are also considered here.

The second class of techniques includes those presented by various authors explaining procedures for collecting metric and nonmetric data. Authorities were selected to include techniques that would offer the greatest diversity of data, particularly those that would be suitable for comparisons. As a result, techniques of data collection represent a range of more or less traditional procedures, designed first for characterizing the individuals in the skeletal series and, second, for detecting any significant differences.

### Preliminary Techniques

Procedures for the preparation of archaeological human remains are outlined by Bass ('71) and Brothwell ('72). Both of these sources were used as general guides during the preliminary stages.

The condition of the Ganj Dareh remains ranged from poor to good with the majority of individuals showing variable preservation. Few bones had not suffered at least some post mortem damage. Most affected were the tabular bones of the cranium and, particularly, the pelvis. Long bone and pelvic epiphyses were poorly represented. Bone frequencies indicate that it is unlikely that burial customs at Ganj Dareh Tepe included the practice of mutilation or disassociation of the skeleton after death. Evidence for this practice has been noted for some sites in the Levant and Anatolia (Burney, '77, p.11).

Elements of the adult dentitions were consistently well preserved, occurring both in the intact alveolar bone or loose. Frequently, teeth from Level D had been blackened and shattered by heat. In addition, bones from this level showed evidence of heat exposure ranging from slight blackening, to calcination. Shattered teeth were rarely identifiable and in many cases, only root fragments were recovered. Subsequently, no attempt at measurement was made for such teeth.

Bones and teeth from the series were cleaned with a brush and dental picks. Many fragments were enveloped by a fire-hardened matrix of soil that was initially difficult to remove. When dried out at room temperature, the matrix could be brushed away. In a few cases, matrix was removed after softening with water. Blocks of bone-containing matrix were either water screened or allowed to soak in tepid water. However, this was found to damage the exposed edges of the fragments and was discontinued for larger blocks. Two of these large blocks, both containing the delicate thoracic elements of two different individuals, were not disturbed.

Once free of removable soils, delicate fragments and particularly well preserved bones were immersed in a solution of acetone and Ambroid.

Elements of the skeleton were then identified with the aid of Anderson ('69), Brothwell ('72), Bass ('71) and Gray's Anatomy ('77). Bones were then associated with individual skeletons. Because there were several cases where more than one individual was called by the same burial number (G.D.), or individuals were without a field number, a system of laboratory numbers was devised and new numbers assigned to each identified individual (Table 5). The codes used for these laboratory numbers integrate information concerning vertical provenience, sex and original Ganj Dareh burial designation.

Briefly, the initial number of the five number code refers to the burial provenience. Individuals were coded by one of six possible numbers to correspond with the following system:

Level A, B or C (uncertain provenience)	1
Level B	2
Level C	3
Level D	4
Level E	5
Unknown	6

Burial forms record the recovery of six individuals from slumped earth from the upper levels. These individuals have been coded with the prefix "1" to indicate their lack of a more accurate level association.

The second number of the laboratory code denotes the sex. Individuals whose skeletal development is sufficiently advanced to exhibit morphologically distinctive characteristics associated with secondary sexual development (Acsádi and Nemeskéri, '70) were assigned to sex and coded as male ("1") or female ("2"). When adults failed to consistently display characteristics of either sex, or where an adult was minimally represented, the individual was coded as adult, sex unknown ("0").

Preadolescents, including infants and children, were coded as "3" to indicate that sex determination was



not possible due to the absence of the necessary criteria. Individuals showing ambiguous sex characteristics because of skeletal immaturity made determination of sex impossible. In these cases, individuals were coded with the number ("3"). Individuals designated as skeletally immature were not included in metric analyses of the cranial or postcranial complex. However, where preadolescents were represented by permanent teeth, the teeth were measured for inclusion in adult samples.

#### Age and Sex Determination

Determination of these two characteristics is important for ensuring that metric and non-metric data accurately characterize Ganj Dareh subsamples. Estimations of age and sex relied on comparisons of developmental and morphological characters of the individual skeleton to pre-existing standards developed by a number of authors.

The following techniques were used to determine age. The results of age and sex assessment are presented in Chapter III (Table 5). When teeth from preadolescents were present, age was suggested on the basis of tooth eruption standards (Schour and Massler, '41). The the absence of erupting teeth, age is assessed by measuring long bones and comparing results to standards of known age (Johnston, '62; Sundick, '78). Long bones representing older preadolescents and young adults displaying different