

# **Mesolithic Hunters and Foragers of the Gangetic Plain: A Summary of Current Research in Dental Anthropology**

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The modern city of Allahabad is a very sacred place for Hindus, since three spiritually significant rivers merge there: the Ganges, the Jamuna and the invisible, or imaginary, Saraswati. While few westerners are aware that bathing in January in the *tri samgam*, or triple confluence, absolves devout Hindus of sins and guilt, most are familiar with the cremation platforms on the banks of the Ganges in Varanasi (Banares). Fortunately, the funerary rite of cremation practiced by Hindus today was not popular during the Mesolithic period of Indian prehistory.

Burial of the dead and the locally carbonate-rich soils have resulted in the preservation of abundant human skeletal remains -- some of which are heavily mineralized -- at three principal archaeological sites: Damdama, Mahadaha, and Sarai Nahar Rai. These sites are located in close proximity to one another in Pratargarh District about 40 kms. north of the city of Allahabad (Fig. 1).

The osteological and dental remains recovered from these aceramic, microlithic sites in the Gangetic Plain provide a unique opportunity to discover, through skeletal and dental studies, the health status, lifeways, and genetic affinities of these hunter-foragers of northern India.

## **Previous Paleoanthropological Research**

The first anthropological reports on the human remains from Sarai Nahar Rai were made in the early 1970's by P.C. Dutta and his associates, officers of the Anthropological Survey of India, Calcutta. I began my association with Allahabad University in January 1975, when through the courtesy of G.R. Sharma, I conducted a preliminary examination of the dentition of the Sarai Nahar Rai and Lekhahai skeletal series. The results of this study were appended to my doctoral dissertation which was devoted to documenting morphological and metrical variability in the dentition of the living peoples of North India (Lukacs, 1977).

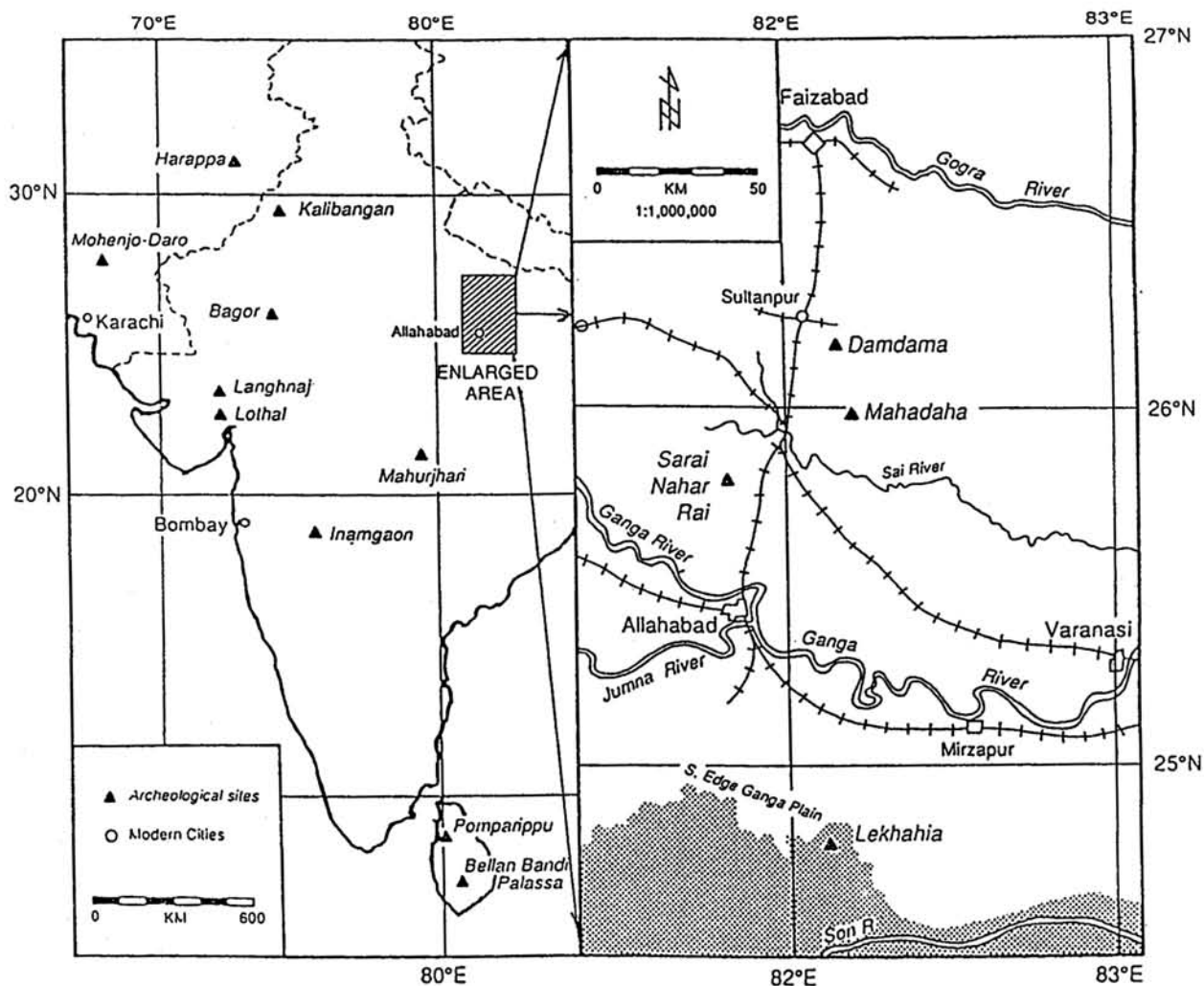
In the autumn of 1980, K.A.R. Kennedy examined the human bones from Mahadaha and Sarai Nahar Rai during a research visit to Allahabad University. The results of his investigations were published in the form of a comparative summary of the Sarai Nahar Rai and Mahadaha skeletal series (Kennedy, 1984), and as monograph reports on the Sarai Nahar Rai (Kennedy et al., 1986) and the Mahadaha human skeletal series (Kennedy et al., 1992). In February 1988 I returned to the Department of Ancient History, Culture, and Archaeology, Allahabad University, with my then student and research assistant Dr. Brian E. Hemphill, to restudy the Sarai Nahar Rai dental remains, and to conduct a comprehensive study of the Mahadaha dentition. The results of this research visit appear in the dental anthropology section of the Mahadaha monograph (Lukacs and Hemphill, 1992; Pastor and Johnston, 1992), in the discussion and comment section of *Current Anthropology* (Lukacs,

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1990), in the Indian journal *Man and Environment* (Pal, 1992; Lukacs and Pal, 1992), and are briefly summarized below. It was during the course of research on the Mahadaha dentition in 1988, that I was invited to undertake a study of the 46 human skeletons from Damdama, another Mesolithic Lake Culture site, and plans for the current 1991-92 research project were initiated.

News of archaeological artifacts and human skeletal remains derived from Sarai Nahar Rai (n = 14 skeletal specimens), the first Ganges Plain Lake Culture site discovered, was reported by Sharma (1973) to an international audience of prehistorians in 1973. The nearby sites of Mahadaha (n = 32 skeletal specimens), excavated in two seasons (1977-78 and 1978-79), and Damdama (n = 46 skeletal specimens), excavated between 1983 and 1987, have both yielded abundant skeletal remains (General: Varma, 1981-83; Mahadaha: Pal, 1985; Sharma et al., 1980; Damdama: Pal, 1988; Varma et al., 1985).

Figure 1. Map of India and adjacent regions with sites discussed in the text.



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### **Research in Progress: Human Skeletal and Dental Remains from Damdama**

Current research activity focuses on the skeletal biology and dental anthropology of Mesolithic human remains from Damdama. This research is a joint project in collaboration with Dr. J.N. Pal of the department of Ancient History, Culture and Archaeology, University of Allahabad<sup>2</sup>. As field excavator of the Damdama skeletons, Dr. Pal has recorded the stratigraphic context, compiled a field inventory of skeletal elements, and photographically documented each burial. In addition, his assistance in the preparation and analysis of skeletal remains in the laboratory is indispensable to the project's success.

The fieldwork phase of the project began in November 1991, with the American Institute of Indian Studies providing financial support and arranging Government of India clearance<sup>3</sup>. Mr. Greg C. Nelson, a doctoral student in the Department of Anthropology at the University of Oregon, is providing essential assistance in the field laboratory for a two month period this winter.

Forty-one graves at Damdama have yielded 46 skeletons, with some graves containing more than one skeleton. Grave numbers VI, XVI, XX, XXX, XXXVI are double burials and Grave Number XVIII is a triple burial. On the basis of field identification by Dr. Pal, about half of the skeletons are male, 40% are female, and 9% are of uncertain gender. The Damdama skeletal series is predominately adult, although the crania of two children are present. These observations await laboratory confirmation by me, and precise estimates of age at time of death are among the goals of this field season.

While most specimens consist of between 40% and 80% of the skeleton, a few individuals from disturbed areas of the site are represented only by the skull or by selected post-cranial remains. Just over 80% of the collection includes well preserved dental remains, often in maxillae and mandibles that are affected to varying degrees by post-burial diagenesis. These remains were transported to the laboratory with minimal cleaning and reconstruction of damaged bones, Lab work presently consists of a healthy amount of preparation work, mixed with skeletal and dental analytic observations. Diophtographic drawings, photographic documentation, and radiography of the collection will be completed during the final phase of research in May.

An important ancillary goal of this project is to establish with greater precision the absolute chronology of Damdama. The Ganges Valley Lake Culture sites are thought to date to between 10,000 and 3,000 B.C., but the basis for the earlier date is problematic (Kennedy et al., 1986). This season thermoluminescence and <sup>14</sup>C dates from fired clay balls and bone samples, respectively, are anticipated from the Physical Research Laboratory, Ahmedabad.

The ultimate goal of our study is to provide a comprehensive descriptive and comparative analysis of the skeletal biology and dental anthropology of all 46 specimens from Damdama. These data, when combined with existing data on dental and skeletal variability in other Lake Valley Cultures, will enable us to formulate preliminary answers to important research questions, which have yet to be answered for the Indian subcontinent, for example:

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- 1) What is the relationship between mode of subsistence (hunting and gathering vs. agriculturalism) and the patterns of dental and general health among prehistoric populations?
- 2) How did the stresses associated with a Mesolithic technology and lifestyle affect the skeleton and dentition of these early human populations?
- 3) Is there close correspondence between archaeologically based culture history and biologically based population history of the subcontinent?
- 4) Has human occupancy of the Ganges River Valley been characterized by a single continuously evolving group of human populations, or discontinuously by repeated replacements of one human population by another?

### **Conclusions from Previous Studies**

In order to provide some idea of present knowledge regarding the dental characteristics of these microlithic hunter-foragers, conclusions derived from earlier studies of the Mahadaha and Sarai Nahar Rai dentition are briefly summarized below:

- 1) Teeth were subjected to heavy occlusal wear implicating primitive food preparation technology and a coarse diet. Excessive anterior dental wear in specific specimens implies use of incisors and canines as a manipulative device in occupational activities. Root stumps are often fully functional and tooth dislocation is present. Interproximal wear grooves are probably due to habitual tooth-picking with a bone needle.
- 2) The types and prevalence of dental disease strongly suggest a hunting and gathering lifestyle. The low caries rate, in particular, is due to the combined effects of a significant proportion of meat in the diet and the coarsely textured nature of the produce consumed. Rapid dental wear due to coarse food erases cusps and fissures from the teeth, denying food particles suitable locations for entrapment and caries formation. Antemortem tooth loss is due to attrition-induced pulpal exposure, not to dental caries. This finding also suggests a hunting and collecting subsistence strategy, independent of the archaeological record.
- 3) Tooth size is large. Despite the failure of specific dental indices to indicate this, the cross-sectional crown area of 1,314 mm<sup>2</sup> reflects the large size of both anterior and posterior teeth. Large teeth are biologically and evolutionary adaptive, given the tough diet and manipulative stresses to which they were subjected. A large tooth wears more slowly and has a longer functional life than a small tooth.
- 4) Genetically, the Mesolithic Lake Culture people of the Gangetic Plain are not closely related to any of the four skeletal series to which they can be compared (Sarai Khola and Timargarha in northern Pakistan; Neolithic Mehrgarh in Baluchistan Province, Pakistan; and Inamgaon in Maharashtra, western India). While they bear some resemblance dentally to the Neolithic inhabitants of Mehrgarh, Pakistan, the Mesolithic people of the Ganges drainage can only be regarded as having a distant relationship with them. It appears that the people of Sarai Nahar Rai and Mahadaha may have contributed little biologically to later populations of the Deccan Plateau.

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### Notes

1. After May 15, 1992, please send correspondence to Department of Anthropology, University of Oregon, Eugene, Oregon 97403, USA.
2. In addition to Dr. Pal, his colleagues Dr. V.D. Misra, Dr. R.K. Varma, Dr. J.N. Pandey and Dr. D. Mandal of the Department of Ancient History, Culture and Archaeology, University of Allahabad, have been involved in the excavation of these Ganges Lake Culture sites. I should also like to thank Dr. S.C. Bhattacharya, Head of the Department of Ancient History, Culture and Archaeology for providing research affiliation, for his interest in the project, and for providing a comfortable work environment.
3. The assistance of AIIS officers Dr. Joseph Elder, Dr. Frank Asher, at home, and the encouragement and council provided by Dr. Pradeep R. Mehendiratta in India, helped make this project a reality.

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