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South Asian Bioarchaeology: Human- Environment Interaction and Paleopathology in Indus Valley Civilization



Contributing Editor
Ritu Gairola Khanduri

Gwen Robbins Schug : I am basically interested in human biocultural adaptations in South Asian prehistory. My work in India has mainly been focused on climate and culture change, effects of subsistence transition, biodemography, and paleopathology. I am particularly interested in understanding cultural processes in the second and third millennium B.C., when rapid urbanization was followed by equally rapid decentralization. These shifts had profound impacts on human health. Paleoepidemiology provides insights into the social forces at work in times of change. In the current context of global climate change, it is crucial to understand the specific, complex socio-environmental challenges faced by past people, the strategies employed for dealing with their circumstances, and the outcomes of those efforts.

Veena Mushrif Tripathy: My research interests are in palaeopathology and dental morphology. Palaeopathology is useful to understand complex bio-cultural adaptations related to subsistence and environmental changes. I am also interested in understanding the cognitive aspect of ancient populations through examination of burial practices and how they change through time. There is a large amount of skeletal material in India, ranging from the early Holocene to the Medieval period. Dental morphological assessment on different chronological and geographical brackets shows distinctive patterns, which help me to understand the population affinities within the subcontinent.

Plan map of the site of Balathal, near Udaipur in Rajasthan. The leperous skeleton was interred at this site circa 2000 B.C., under stratified layers of vitrified cow dung in a large stone enclosure. This site was a rural outpost of the Indus Civilization and the presence of leprosy here supports an association between the disease and urbanization, population

Gwen and Veena: We are currently working together to understand the process of urbanization and biocultural aspects of life at Harappa, a large city in the Indus Valley Civilization of the third millennium B.C. This project, BHARAT (Bioarchaeology at Harappa: Research and Training) concerns the

density, and long distance exchange networks relationship between urbanization, social differentiation, and paleoepidemiology. Social differentiation at Harappa is reflected

in the semiotics of mortuary practice and variation in the prevalence of injury and disease among different burial communities. Our evidence supports the hypothesis that this ancient city was not an exceptionally 'peaceful realm.' Structural violence and control over access to resources characterized Indus statehood too. We are interested in extending this research to additional Indus sites in the future, particularly sites currently under investigation. Based on the evidence from Harappa, Indian archaeologists interested in structural violence and statehood should refocus excavations to include the marginal and low-lying areas, outside the city walls.

Ritu Khanduri: The two of you previously published a paper on leprosy and the Indus Civilization. What particular insight into leprosy, climate change and human-environment interaction does India's context offer?

Veena: The scope of skeletal studies and palaeopathology in India is vast, and new methods strengthen the potentiality of the material. However, much of the human skeletal material from Indian sites remains unstudied or has only been partially studied using recent approaches. Research in India has global implications as the sub-continent has played, a vital role in migrations of human population from ancient times. Research in India also has potential to shed light on important questions about the evolution of infectious diseases, human-environmental interactions, and human variation.

In this context, our collaboration on the Indus Valley Project becomes a very important effort, not only to understand that civilization, but to use the most recent approaches to bioarchaeology in an examination of skeletal material excavated long ago. As a South Asian person myself, I play an important role in developing the interpretative aspect and sociological context of the population. I am fascinated by the large amount of variation in treatment towards dead people in South Asia. Looking at the pattern of mortuary practices of Harappa, and trying to understand the reasons, has been the most interesting aspect of this project for me on a personal level.



The skull of Balathal skeleton 1997-1 demonstrates features considered highly diagnostic of leprosy,

Gwen: In 2009, Veena and I published a paper describing ancient evidence for leprosy in a skeleton from the site of Balathal, a rural outpost of the Indus Civilization in Rajasthan. The discovery of leprosy at Balathal around 4000 years before present had important implications for understanding the evolution and migration of mycobacterium that causes this disease. Leprosy has low communicability, a long incubation period, and many people are immune to the disease. The natural history of the disease, and its discovery at Balathal, provide support for the hypothesized association with urbanization, population density, and extensive exchange networks. We suggest that our data also provide weak support for the late emergence model of the migration of *M. leprae*. In this model (proposed by Pinhasi et al. in Science magazine, 2005), *M. leprae* spread out of Africa during the Third Millennium Interaction Sphere, an exchange network that included cities in Egypt, Mesopotamia, and the Indus Valley. A competing model (Monot, 2005) suggested the disease spread

including facies leprosa, changes to the nasal aperture, bilateral necrosis of the malars, antemortem tooth loss, and maxillary resorption. This skeleton pushed back the first evidence for leprosy by 1400 years. Credit: Gwen Robbins-Schug

out of Africa early in the Pleistocene, but to date, there is no evidence for an early African exodus.

Ritu: How did your collaboration on both projects come about?

Veena and Gwen: We began our collaboration in 2001, during our respective archaeology projects for dissertation research at [Deccan College in Pune, India](#). We were both interested in understanding different aspects of a subsistence transition that occurred in peninsular populations in the second millennium B.C. While Veena worked on the biological

characteristics and pathological profile for the site of Nevasa (Mushrif, 2009), one of the largest Chalcolithic sites occupied during that time, Gwen worked on the biodemography of nearby Inamgaon (Robbins Schug, 2011). During this time, we took field trips together, discussed ideas and research findings. Most importantly, we established the trust and mutual respect that allows a close collaborative relationship to persist. Gwen is an assistant professor at [Appalachian State University](#), you can learn more about her projects through her [website](#) and Veena is an assistant professor at [Deccan College](#) in Pune, India.

Ritu: Can you describe a little bit about how you currently view those early research projects?

Veena: I was interested in ancient history and Deccan College was my principal choice of place to pursue this interest because it is the best institution in India for Indian Archaeology. During my doctoral studies in Deccan College, under Professor Walimbe's supervision, I developed a strong interest in researching human remains and discovered my passion for Osteoarchaeology. During those years, from 2001 until 2006, I researched and published on skeletal assemblages on many sites. In 2007 I got a chance to work on skeletal series from early historic collection at Anthropological Survey of India. It was a very good experience as I had the opportunity to work independently. I spent the initial years of this study describing the pathologies or bone anomalies on skeletons. But now after spending a considerable number of years researching this subject, I am situating these pathologies in a larger context. Earlier the question was "what is the pathology?" Now the stress is more on "why and how is this anomaly present in certain populations?"

Gwen: I came to Deccan College for the first time as a Master's level student in 1999. I came with my graduate advisor, Dr. John Lukacs. He had longstanding research interests on subsistence transition at Inamgaon and had a strong collaborative relationship with several senior scholars working at Deccan College. My first visit was only for 2 months. During that time, I worked with John on his research projects, completed one project of my own, went to the site of Balathal and began my work on the skeletal collection, and most importantly, I developed my own relationships with the scholars at Deccan College. They have supported my work in India since that time and they have helped me tremendously in accessing and understanding various different collections. The work I began at that time, looking at human-environmental interactions and our work on Balathal, formed the core of a research agenda I am still pursuing.

Ritu: Could you tell us more about how the framework of structural violence deepens understanding of the past and the present?

Gwen and Veena: Harappa and the Indus Valley Civilization in general have been portrayed as a peaceful realm and the lack of interpersonal violence was actually an interpretive problem for

archaeologists, who felt they had to explain urbanization and state formation in the absence of clear evidence for social stratification or state use of violence. Although there are many different conceptions of statehood, archaeologists in India have addressed this problem by making a distinction between states based on exclusion and those based on incorporation. It was argued that Harappa was a rare example of a peaceful, heterarchical state. The human skeletal material was never consulted to address this question. Based on our evidence for both exclusion and social differentiation in the mortuary practices at Harappa, we argue that Harappa was not entirely peaceful and social differentiation was part of life. We hope archaeologists working in this area will plan future excavations to include the peripheral areas outside the cities; excavation outside the city walls will tell us more about Indus society.

We are using the human skeletons as artifacts of the social experience. We used the concept of structural violence in our most recent work because it accounts for the clear distinctions we see in the burial practices, ritual aspects, prevalence of trauma and infection. The mortuary and bioarchaeological evidence at Harappa suggests that the social experience in South Asia was not exceptionally different from other early urban civilizations; the kinds of suffering and the patterns of violence present at Harappa suggests structural violence—unequal power, uneven access to resources, and oppression that leads to denial of basic needs and even violence.

Ritu: What are some of the implications of your recent work on climate and culture change in peninsular India?

Gwen: The trope of climate change, or monsoon variability, has been widely used to explain periods of culture change in South Asian prehistory, particularly climate is used to explain why a geographic region or a way of life is abandoned in South Asian prehistory. Through a critical examination of the evidence for both climate and culture change in peninsular India during the second millennium B.C., I demonstrated that subsistence transition to agriculture in this semi-arid region was accompanied by important biodemographic changes, which may have led to issues with sustainability and local environmental degradation. While there is no evidence of large-scale climate changes at this time, the successful adaptation to the semi-arid climate in this region was thwarted by population growth, increasing costs of reproduction (high fertility and infant mortality), and rising rates of skeletal emaciation in the immature skeletal remains. My results suggest that local processes of population pressure and sustainability were at work during this period of Indian prehistory.

Ritu: Any concluding thoughts you'd like to share?

Gwen and Veena: We are interested in building more collaboration between Indian and foreign scholars in bioarchaeological research. The wealth of human skeletal material in India has so much potential to address anthropological questions. India is a place rich in ecological and biological variation, the archaeological record is deep and spans thousands of years. Scholars who are interested in pursuing research in India should contact Dr. Mushrif Tripathy directly and begin a conversation about the possibilities (vmushrif@gmail.com).

William David Nutt assisted with the preparation of this transcript. William is a graduate student jointly pursuing a masters in Anthropology and a MBA at the University of Texas-Arlington. His research interests include science, technology, culture change, and collapse,

focusing on both archaeology and cultural anthropology. A Graduate Research Fellow with the National Science Foundation, he is completing a project on sociopolitical upheaval and culture change in the Near East at the end of the Bronze Age.

Ritu Gairola Khanduri is an assistant professor of cultural anthropology in the University of Texas-Arlington. She read history in the Jawaharlal Nehru University and anthropology in the University of Texas- Austin. Her research foci include media, globalization, history, and science in colonial and contemporary India. She also writes and researches on Gandhi and Hindu images in the diaspora. Her research has received support from the Wenner – Gren Foundation’s Hunt Postdoctoral Fellowship, Social Science Research Council , Fulbright-Hays, and the Institute for Historical Research- University of London/Mellon Foundation. Ritu’s recently completed book manuscript is an ethnography of newspaper cartooning in India. Supported by a Fulbright Senior Scholar Grant, she is currently researching on women and science.

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