

Aryan Invasion in the Indian Subcontinent: Facts and Fallacies

The Physical Anthropological Perspectives

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The concept of Indo-Aryan group of peoples and their invasion has played a prominent role in explaining the cultural history of the Indian sub-continent. It was propounded that the Aryans, living somewhere outside India, invaded the Indian sub-continent around 1500 B.C. and after supplanting the indigenous powers and cultures settled in India. The Aryans were held responsible for the destruction of the earlier populations (esp. Indus valley civilization) and building of new cultures in the areas they invaded. The subject of this paper is to examine the physical anthropological dimensions of the “Aryan problem”, which are two fold: a. “foreign phenotypic element” in the later phases of Harappan culture, and b. the “massacre evidence” at Mohenjo-Daro.

Findings of the restudies of Harappan skeletal series and implications thereof for evaluating the 'Aryan Invasion Theory' have been discussed. The findings strongly indicates that the hypothesis of identification of “foreign phenotypic element” or unceremonious slaughter of native Harappans is not supplemented by bone evidence.

Keywords: Indo-Aryan, Invasion, Harappa, Mohenjo Daro, Physical Anthropology

Introduction

Enormous amount of biological and cultural variability manifested in the prehistoric and living Indian populations is only of its kind in the world. The 'People of India' project of the Anthropological Survey of India has identified as many as 4694 living communities in India (Singh 1998). Various attempts have been made to describe and explain this diversity in terms of different morphological, genetic, cultural and linguistic characteristics. Some claim an indigenous origin while a few other scholars attribute a considerable fraction of this variability to the large-scale immigrations into India in different time zones.

Over the last five decades scholars from diverse disciplines, including social and biological anthropology, archaeology, and molecular biology have attempted to explain the patterns of population movements in the Indian sub-continent, with an ultimate aim of identifying autochthones of the region. Most of these researches have been influenced by the hypotheses of linguistic origin. According to the studies dealing with the diversities

in terms of linguistic traits, there are around 325 spoken languages in Indian which are divided into four 'language families', viz. Austric (Austriatic), Dravidian, Indo-European and Sino-Tibetan (Pattanayak 1998). It is assumed that the speakers of the four language families represent at least four lineages. The problem of major concern among linguists is whether these language families developed within the country, or came in with migrations of people from outside the sub-continent. The geographical range of distribution of Austric, Indo-European and Sino-Tibetan speakers is extensive, while languages of Dravidian family are restricted largely to India. It is argued that Dravidian languages might have developed within India while migrants brought other languages to India.

The Aryan Problem

The subject matter of this article concerns with the migration hypothesis of the Indo-European speakers. The concept of Indo-Aryan group of peoples and their invasion has played a prominent role in explaining the cultural history of the Indian sub-continent. This concept can be traced back to as early as the 18th century (cited from Poliakov 1974). Max Mueller (1867) thrilled by the complexity of

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Indian culture coined the word “*Aryan Race*” and thus emerged an imaginary creature: “*Aryan Man*”. He propounded the theory that the Aryans, living somewhere outside India, invaded the Indian sub-continent around 1500 B.C. and after supplanting the indigenous powers and cultures settled in India. The Aryans were held responsible for the destruction of the earlier populations (esp. Indus valley civilization) and building of new cultures in the areas they invaded. The Sanskrit language and the Vedic religion was claimed to be their contribution to India. The Aryans spoke a language from which Sanskrit is derived. Originally Max Mueller used the words “*Aryan Race*” to indicate the 'Aryans' as a race with certain common genetic characteristics. He later changed his views (Max Mueller 1887) and said that he does not regard the 'Aryans' as a race in the genetic sense, but in linguistic sense. But Max Muller's subsequent amendment did not click. The word 'Aryan' continued to be used in the *racial* sense till very recently and consequently the concept of Indo-Aryan invasion in India had a decisive role in interpretive studies in South Asian protohistory.

The “Aryan problem” has many dimensions; the linguists have a theory based on the similarities in Sanskrit with Greek and Latin; the scholars of Vedic literature rely on text; the archaeologists look into archaeological evidence; and, the anthropologists depend on the mortuary data and study the burial deposits and the skeletal biology of their contents. This problem thus is of standing challenge to all those who are engaged in the research work of that period. Who were the Indo-Aryans and where did they come from? What are the reasons for the decline and fall of the Indus valley (Harappan) civilization? Can the 'Aryans' be held responsible for the mysterious disappearance of the Harappan civilization? Is there any archaeological evidence to identify the Indo-Aryans?

The physical anthropological data has the potential to provide certain kind of information which is not otherwise obtainable from historical, archaeological and ethnographic investigations. The subject of this paper is to examine the physical anthropological dimensions of the “Aryan

problem”. It must however be emphasized the human skeletal data cannot be and should not be used in isolation to infer on the 'Aryan Migrations'. The inferences will not be conclusive of its own but be treated as supplementary evidence for other kinds of investigations.

The physical anthropological perspectives of this problem are two fold: A. “foreign phenotypic element” in the later phases of Harappan culture, and B. the “massacre evidence” at Mohenjo-Daro.

A. “Foreign phenotypic element” at Harappa:

Human skeletal material is recovered from many Harappan sites. This is an extensive skeletal series with a well documented record of cultural identity. The skeletal collection has been studied anthropologically in order to assess their *racial* affinities. The catastrophic termination of the Harappan culture is hypothesized by identifying a “foreign” element in mature Harappan phase. The “foreign” element supposed to have represented Aryans or other non-Harappan invaders. Guha (1935, 1944) in his attempt to classify the prehistoric and living population of India identified four racial elements at Mohenjo-Daro which he called Mediterranean, Proto-Australoid, Alpine and Mongoloid. This classification became a model for later studies of Harappan skeletons at other sites. Gupta et al. (1962) studied the skeletal collection from Cemetery R-37, Area-G, Area-AB and Cemetery-H at Harappa and classified the population on similar lines. According to this study the long-headed (dolichocranic) element is present in all the areas while the round-headed (brachycranial) element is identified only from the Area-G. There is no evidence of round-headed type in earlier period (Cemetery R-37) and therefore was considered to be a new type.

In the *racial* classification of the Harappan skeletal series, though based on bodily features, only a limited number of anatomical variables were used. For that matter, most researchers involved in skeletal analyses till 1980 in India traditionally relied on cranial dimensions for inferring on population distances. The dimensions or indices most commonly used include cranial index, facial index, nasal index and facial-nasal perspective in profile. In



the Harappan series specimens which departed from mean morphometric values were ascribed to “foreign” racial element (Sewell and Guha 1931; Gupta et al. 1962).

The reinterpretation of the cranial features of Indian protohistoric specimens belonging to a broad temporal span of pre-agricultural and agricultural phase gives interesting results (Walimbe 1998). As seen in an other incipient agricultural populations (for example, Larsen 1984), the cross-cultural comparisons in the Indian context show differences in the cranial features of the pre-agricultural and those of the early agro-pastoral populations, revealed by two significant changes in cranial morphometry. There is a gradual reduction in robusticity, and there are significant changes in skull shape. The mean cranial index of the hunting-gathering Mesolithic populations is dolichocranial (long headed), whereas the pooled values for Harappan and Neo-Chalcolithic specimens indicate a cranial index that falls in the medium-headed category, (mesocrany), with a tendency towards broad-head category (brachycrany) in the later levels. Other noticeable changes are a rotation of the facial region to a position more inferior to the cranium and a decrease in cranial length. In the context of the “Aryan problem” the question that needs to be addressed is whether the metric differences reflect new or modified genetic composition, or reflect the trends of micro-evolutionary processes operative during the agricultural transition. While genetic influences in determining a regional phenotype cannot be ignored, changes in cranio-facial morphology can better be explained non-genetically, and appear to be primarily due to subsistence changes and bodily mechanisms of adaptation. The differential functional demands on the body with early farming societies (inclusive of more sophisticated food preparation techniques) could be the main factor influencing changes in cranio-facial morphology (Walimbe 1998). Therefore, in sum, craniometric changes evidenced in the Harappan series can more convincingly be interpreted in terms non-genetic factors rather than using them to hint at new or modified genetic composition.

On the basis of recent re-evaluation of the Harappan skeletal collection and new approach of

interpretation (Kennedy 1982) it can be concluded that these populations do not exhibit any significant phenotypic diversity. Though the skeletal material at Harappa is coming from three different deposits, the population belongs to a single morphometric homogenous series. The variation in size and form is very much in the acceptable range and can better be understood as normal range of physical variability present in most urban populations, past and present.

An alternative explanation can also be given. As Kennedy (1982) further notes, if there exists any heterogeneity in the Harappan sample the same may be explained by continuous immigration of rural people to these urban centres. Peasant agriculturalists are made up of acculturated tribal populations from regions of relative genetic isolation. Thus it seems probable that the phenotypically heterogeneous urban populations received relatively homogeneous tribal elements. It is this process, rather than migratory invasions of “foreign” elements into Harappan urban centres, which explain the range of phenotypic diversity.

Given this background it would be relevant to evaluate the merits of using morphological data for taxonomic usage, and thereby for assessing prehistoric population movements. Morphological traits with little-to-no sexual dimorphism, having low susceptibility to environmental change, and lacking age-related morphological changes have been given increased attention in recent years in Indian anthropology (Hawkey 2002; Hemphil et al. 1991, 1997; Mushrif and Walimbe 2006; Mushrif et al. 2008, 2010). In comparison with the studies based on continuous traits, non-metric cranial discrete traits and dental occlusal morphological features appear to be more important and relevant for understanding population distances, and thereby to infer past population relationships and movements. Dental morphological features are particularly important since they remain unchanged during the development process.

A recent study by Hawkey (2002) on 29 dental morphological features using a large sample size of 4,198 individuals is the most comprehensive account in this line of research. Major findings of this research are noteworthy. The study confirms



that the Indus communities share similarities with Indian Mesolithic hunter-gatherers. According to this study, the inhabitants of the Indus Civilization appear most likely to have been descendants of the indigenous hunter-gather populations of South Asia, rather than intrusive (and genetically distinct) populations from the West.

Importantly, this study also concluded that there is no biological support to the argument that the Indus civilization belongs exclusively to the Dravidians. “The confusing of a linguistically-defined population (Dravidian) with a biological population (Indus) has plagued Indian population affinity research for many years” (Hawkey 2002:194). The peoples of the Indus Civilization are dentally similar not only to modern Dravidian-speakers (of South India, Sri Lankan Tamil), but also to the Indo-European (Afghanistan/Pakistan, Bengal, Sri Lankan Sinhalese), and Austro-Asiatic (East India) groups as well. The dental data supports the hypothesis that the Indus population was multilingual, and probably ethnically diverse (Hawkey 2002:155).

Therefore, it would be unreasonable to call the few broad headed specimens at Mohenjo-Daro or Harappa as intruders and those with rugged facial features as “low caste” populations of peasant stock (Guha's successors called them “sweepers”!). It may be concluded that the hypothesis of incursions of “foreign” people within the periods of time associated with the Harappan decline cannot be documented by the skeletal record.

B. “Massacre evidence” at Mohenjo-daro (figs. 1 & 2)

The mature Harappan civilization lasted till about 1500 BC when the Indo-Aryans invaders are said to have put an end to it. Besides the presumed “foreign phenotypic element” in the later phases of this culture, the “massacre evidence” was often posed as a proof of 'Aryan' invasion. At Mohenjo-Daro, the southernmost of the two major cities of Harappan civilization, an evidence of death of a group of people has been recovered. These skeletons, unlike those found in other Harappan sites, were collected from the residential area or streets of this ancient

city. There is no evidence of a cemetery so far found at the site. The earlier evidence comprised of a total of 37 skeletons, or parts thereof which are recovered from the nine years excavation (1922-31). Of these 22 skeletons belong to Marshall (1931) series while 15 skeletons are from Mackey's (1938) collection. In addition the excavations in 1964 yielded 5 more skeletons (Dales 1965). Some of these were found in contorted positions and groupings. Many skeletons are either disarticulated or incomplete. Marshall (1931) attributed plague, famine and 'sudden' death as causes of death. Mackey (1938) suggested that these individuals had been slain by raiders while attempting to escape from the city during a military attack.

Dales (1965) supported the possibility of traumatic event but raised some objections. Earlier anthropological works (Sewell and Guha 1931; Guha and Basu 1938) also claimed that the 'fractures' on these skulls were diagnostic of wound marks and were directly related to the cause of death. Wheeler (1968), thrilled by the in orderly disposal of dead



Fig. 1: Mohenjo-Daro skeletons, scene 1

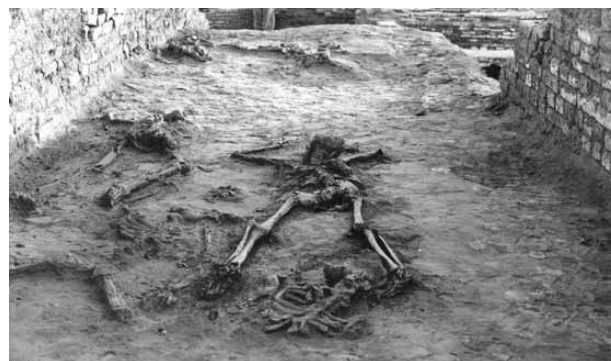


Fig.2: Mohenjo-Daro skeletons, scene 2



bodies and having supported by then anthropological inference, indicated that the massacre was a specific event in the Late Harappan phases at Mohenjo-Daro when armed foreign invaders destroyed the city and liquidated its citizens.

Several disassociated causes, including enigmatic absence of a formal mortuary area at the site, were taken as supporting evidences for this “massacre” and the “massacre” idea was immediately ignited as awful proof of the invasion of the sub-continent by the 'Aryans'. Wheeler (1968) while accusing the Aryans for destroying the cities of the Harappan civilization and for the “massacre” at Mohenjo-Daro cited the Vedic texts describing that the 'Aryan' were brave, efficient and dreadful warriors who knew bow-arrow; horses were used to pull their chariots; they were protected by armour and shields.

Archaeological assessment of the massacre theory remained debatable for a long time. Dales (1964, 1965) noted that his skeletal collection and that the Marshall's and Mackey's series did not represent a single archaeological time frame. Some specimens can chronologically be datable to a mature Harappan phase while some are definitely of later antiquity or of uncertain temporal and cultural context. Thus the case cannot be urged for a single tragedy. Dales (1964) also pointed out that on purely chronological grounds no definite correlation between the end of Indus civilization and the “Aryan invasion” cannot be established. There is no material evidence to substantiate the supposed invasion and the massacre. There is no evidence of burned fortress, arrowheads, weapons, pieces of armour, smashed chariots and bodies of invaders and defenders. The “massacred” set of skeletons was found in the residential area and not in the area of fortified citadel where one would reasonably expect the final defense of this thriving capital city to have been made.

There is no unconditional proof of an armed conquest and destruction on the supposed scale of “Aryan invasion”. On the other hand in recent years, the decline and disappearance of the Indus civilization has been attributed to many factors, including climatic decline, environmental

degradation due to excessive use of soil and plant resources, tectonic movements (Mughal 1990; Ratnagar 1999; Dhavalikar 2002; Agrawal and Kharakwal 2003). To some extent pressure from floods and climatic changes may have been responsible (Tripathi et al. 2004). If the Indo-Aryans are a factor in this last phase, their hostility could only have a contributory effect in accelerating the end of that remarkable civilization. But in reality there remains a grave doubt whether these invaders could be connected at all with the collapse of the Harappan culture.

However, as Kennedy (1984) puts it what appears to have been overlooked in a critical reassessment of the biological data. Any conclusion to traumatic stress should rest on indisputable skeletal evidence. The Harappan skeletal collection has been restudied by Kennedy (1984) in the light of the new methodological approaches in the field of forensic anthropology and palaeopathology. He offers a very critical judgement in this regard.

Kennedy (1984:427) states “when present, marks of injury are quite specific in their appearance, both microscopic and macroscopic analyses revealing tell-tale features which are not to be confused with abrasions or other marks of erosional and post-mortem origin.....To be sure, individuals victimized by trauma may not bear the marks of their assailant or his weapons on their skeletal tissue (as with cases of drowning, strangulation, poisoning, cardiac arrest due to fright, etc.); but in cases of genocide (like military engagements, mass executions, ritual sacrifices) where multiple victims are involved it is usual for some individuals of a group to reveal marks of traumatic stress on their bones and teeth”. Death by an axe or sword may not be registered on the bone if the wound is superficial and if only the soft parts are traumatised. But it is reasonable to expect actual wound-marks in case of unceremonious slaughter.

Lesions on the Harappa Area-G skeletal collection may also be interpreted on similar lines. Of the 23 crania recovered from Area-G at Harappa, Gupta et al. (1962 p.81) reports cut marks, injuries and abrasions on many of them. Restudy (Kennedy 1984) however reveals different story. According to this study only one specimen had convincing and



irrefutable signs of trauma which may be the cause of death. All other reputed wound marks appear to be erosional in origin or are cases of successfully healed lesions unrelated to circumstances and places of burial.

The proposition of a traumatic demise of Harappan culture (Mohenjo-Daro in particular) is based on essentially an archaeological evidence of disorderly disposal of dead rather than on the skeletal evidence of trauma. In this case the problem of interpreting the disarray of skeletons becomes more complicated. This haphazard mode of disposal of dead might have had some social implications rather than solely pathological. Anthropology or archaeology has no conclusive answer to this puzzle at present.

No research is conclusive. The scope of palaeopathology as of today does not go beyond identifying some basic traumatic infections or nutritional stress on human remains. However, methods and techniques are being tested and applied in this field of science. The Harappans probably had some physiological stress in their later phases. It may be noted that the Deccan Chalcolithic cultures also experienced a similar catastrophic decline. This enigmatic extinction of this culture can, to some extent, be explained by physiological stress resulting from sedentism, over population, under/malnutrition and increased infections (Lukacs and Walimbe 1984, 1986; Lukacs et al. 1986, Walimbe 1990; Mushrif and Walimbe 2006). Similar conclusions however cannot be inferred for Harappan decline. Nonetheless diseases like porotic hyperostosis have been noticed in Harappan collection and the etiology of this lesion is related to rickets, calcium deficiency, vit.C deficiency, sickle-cell anaemia, thalassaemia and other haematologic disorders. Possibility of jaundice or plagues or other diseases of epidemic proportions cannot be ruled out. Therefore a social approach for such diseases may probably explain the aberrant mode of disposal of dead at Mohenjo-Daro. A more rigorous palaeodemographic study on the extensive Harappan skeletal collection is essential. Re-evaluation of this entire series may provide some clues for interpreting demographic and social problems related with Harappan decline.

Comments:

This paper examines the enigma of the Aryan invasion in the Indian sub-continent on the basis of the human skeletal evidence. Re-assessment of the skeletal record strongly indicates that the hypothesis of identification of "foreign phenotypic element" or unceremonious slaughter of native Harappans is not supplemented by bone evidence.

It would be interesting to note that, human population genetics data corroborates some physical anthropological inferences, concluding that there is no material evidence for any large scale migrations into India over the period of 4500 to 800 BC. Basu et al. (2003) examine genetic variation in 44 geographically, linguistically, and socially disparate ethnic populations of India and use U2 frequencies to infer the existence of 'Aryan' movements. U2 comprises two sub-lineages, U2e (European-specific sub-lineage) and U2i (Indian-specific sub-lineage). Basu et al. (2003) have shown that U2e is not present in the Indian tribal groups, but only among castes. The U2e frequency is therefore more important in estimating the number of Aryan-speaking people entering India. Such evidence showed a much smaller estimate of migrants, though the actual number is difficult to estimate. Aryan speakers possibly came into India in small bands over a long period of time, as opposed to in a single wave of migration.

In all probability therefore it was not 'invasion' of large mass of migrants. No doubt there were increasing and long lasting trade contacts of the Indus people with those of the Mediterranean region. The domestication of animals and plants that was initiated in the subcontinent around 6500 BC led to increase in the population. At around 4000 Ybp farming became the primary mode of food procurement, especially in the North India where land is fertile, which resulted in Urbanization era (Indus Valley civilization). Surplus agricultural economy induced increased trade contacts with others (esp. to the West). The increasing trade relations probably persuaded people to adopt the Indo-Roman language for business purpose. Change to agriculture was slow in the South India, but animal domestication was proving profitable, as seen in the rural-based Neolithic-Chalcolithic



cultures. Because of difficult terrain of the South trade contacts remained limited. Therefore, usage of the Dravidian languages continued effectively.

Though the anthropological data cannot be used in isolation to explain the Harappan decline, it stresses the need to re-evaluate the archaeological evidence independently without any linguistic bias. With the availability of molecular knowledge there could be better understanding of population movements in the past. The approach demands proper synthesis of genetic, archaeological and anthropological data.

Epilogue

The concept of Indo-Aryan group of peoples and their presumed invasion in the Indian sub-continent had played a prominent role in shaping the anthropological, sociological, and political thinking for decades. The purpose of publishing the recent physical anthropological perceptions in the *Iranian Journal of Archaeological Studies* is to create awareness in Iranian archaeology about the research potential of human skeletal data in verifying the theories that may dominate the social scientific thinking of the region. The insights seen in area discussed are important for Iranian archaeology as well. Restudies on Harappan and other contemporary skeletal collections are useful for having clearer identity of the Harappans and the biological scenario during c. 2500-1500 BC. It may be noted that on the basis of certain metric and statistical observations, the Harappan skeletal record showed close affinity with the Tepe Hissar, Iran and Sakkara, Egypt (Dutta 1984). These populations belong to the same temporal period but diverse geographical situations and cultural backgrounds. Frequent trade relations of the Harappans and the populations of the Iranian Plateau have been suggested. Therefore restudy of Iranian protohistoric human skeletal collection using the same methodological protocol is extremely necessary. Archaeological evidence of more than 1300 burials recovered from Iran represents a wide cultural span from the Mesolithic to Iron Age and later to the Islamic period. However, there is general paucity of the anthropological data on the biological aspects of the bygone Iranian populations. High quality information is available

only for few skeletal collections, while more than 60% of the material remains unreported or under reported. Further most of the studies so far undertaken dealt only with craniometry of well-preserved individuals. Data on the non-metric variables, dentition and pathology is virtually lacking. Morphometric skeletal variables are important both to establish identity of the population and understand the biological adaptations of the by gone populations to the lifestyle, and in broader sense to understand the micro-evolutionary changes during the last 8000 years of human history. Pathological database is recommended to reinterpret the history of human health in the Iranian region. During this period, human health and welfare were transformed enormously by the transition from foraging to farming, the rise of cities and complex forms of social and political organization and increasing trade relations. It is highly desired to take-up anthropological studies on available the human skeletal collections in Iran.

References

- Agrawal, D. P & J. S. Kharakwal.
2003 *Bronze and Iron Ages in South Asia*. New Delhi: Aryan Books International.
- Basu, A; N. Mukherjee; S. Roy; S. Sengupta; S. Banerjee; M. Chakraborty; B. Dey; M. Roy; B. Roy; N.P. Bhattacharyya; S. Roychoudhury & P.P. Majumder.
2003 Ethnic India: A Genomic View, with Special Reference to Peopling and Structure. *Genome Research*: 2277-2290.
- Dales, G.F.
1964 The Mythical Massacre at Mohenjo-Daro. *Expedition* 6(3):36-43.
1965 New Investigations at Mohenjo-Daro. *Archaeology* 18:2.
- Dhavalikar, M. K.
2002 *Environment and Culture: A Historical Perspective*. Pune: Bhandarkar Oriental Research Institute.
- Dutta, P.C.
1984 Biological Anthropology of Bronze Age Harappans: New perspectives. In L.R.Lukacs (ed.) *The People of South Asia: The Biological Anthropology of India, Pakistan and Nepal*: 59-75. New York:



- Plenum Press.
- Guha, B.S.
1935 The Racial Affinities of the People of India. *Census of India 1931*. 1:III-A:2-22.
1944 Racial Elements in the Indian Population. *Oxford Pamphlets on Indian Affairs* No.22. London: Oxford University Press.
- Guha, B.S & P.C. Basu.
1938 Report on the Human Remains Excavated at Mohenjo-Daro in 1928-29. In E. J. H.Mackey (ed.) *Further Excavations at Mohenjo-Daro*: 613-638. New Delhi: Government of India.
- Gupta, P; P.C.Dutta & A.Basu.
1962 *Human Skeletal Remains from Harappa*. Calcutta: Anthropological Survey of India.
- Hawkey, D.E.
2002 The peopling of South Asia: Evidence for Affinities and Microevolution of Prehistoric Populations from India / Sri Lanka. *Spolia Zeylanica* 39: 1-300.
- Hemphill, B.E; J.R. Lukacs & K. A. R. Kennedy.
1991 Biological Adaptations and Affinities of Bronze Age Harappans. In R.H. Meadow (ed.) *Harappan Excavation 1986-1990: A Multidisciplinary Approach to Third Millennium Urbanism*: 137-182. Madison: Prehistory Press.
- Hemphill, B.E; A.F. Christensen & S.I. Mustafakulov.
1997 Trade or Travel: An Assessment of Interpopulational Dynamics among Bronze Age Indo-Iranian Populations. In R. Allchin and B. Allchin (eds.) *South Asian Archaeology 1995*, Vol.2: 855-871. New Delhi: Oxford & IBH.
- Kennedy, K.A.R.
1982 Palaeodemographic Perspectives of Social Structural Change in Harappan Society. In S.Pastner & L.Flam (eds.) *Archaeology of Pakistan: Recent Socio-cultural and Archaeological Perspective*: 211-218. Cornell: Cornell University South Asia Program.
1984 Trauma and Disease in the Harappans. In B.B. Lal & S.P.Gupta (eds.) *Frontiers of the Indus Civilization*: 425-436. New Delhi: Books and Books.
- Larsen, C.S.
1984 Health and Disease in Prehistoric Georgia: The Transition to Agriculture. In M. N. Cohen & G.J. Armelagos (eds.) *Paleopathology at the Origins of Agriculture*: 367-392. New York: Academic Press.
- Lukacs, J.R & S.R. Walimbe.
1984 Palaeodomography at Inamgaon: An Early Farming Village in Western India. In L. R. Lukacs (ed.) *The People of South Asia: The Biological Anthropology of India, Pakistan and Nepal*: 105-132. New York: Plenum Press.
1986 *Excavations at Inamgaon: Vol II: The Physical Anthropology of Human Skeletal Remains. Part i: An Osteobiographic Analysis*. Pune: Deccan College.
- Lukacs, J.R; R.K.Bogorad; S.R.Walimbe & D.C.Dunbar.
1986 Palaeopathology at Inamgaon: A Post-Harappan Agrarian Village in Western India. *American Philosophical Society, Proceedings* 130(3):289-311.
- Mackay, E.J.H (ed.)
1938 *Further Excavations at Mohenjo-Daro*. New Delhi: Government of India.
- Marshall, J.
1931 *Mohenjo-Daro and the Indus Civilization*. London: Probsthain.
- Muller, F. M.
1867 Chips from a German Workshop. *Essay on the Science and Religion* Vol.1.
1887 *Biographies of Words and the Home of the Vedas*.
- Mughal, M. R.
1990 Archaeological field research in Pakistan since independence: An overview. *Bulletin of the Deccan College Post-Graduate and Research Institute* 49:261-78.
- Mushrif, V. & S.R. Walimbe.
2006 Human skeletal remains from Chalcolithic Nevasa: Osteobiographic Analysis. *BAR International Series 1476*. London.
- Mushrif, V; Jamir Tosi & S. R. Walimbe.
2008 *Human skeletal remains from Jotsoma*. Kolkata: Centre for Archaeological Studies and Training, Eastern India.
- Mushrif, V; K. Rajan & S. R. Walimbe.
2010 *Megalithic Builders of South India: Biological Anthropology of Kodumanal Population*. Bhopal-Pune-New Delhi: Indira Gandhi Rashtriya Manav Sangrahalaya, Centre for Ancient Human Skeletal Studies, and Aryan Books International.



- Pattanayak, D.P.
1998 The Language Heritage of India. In D. Balasubramanian & N. Appaji Rao (eds.) *The Indian Human Heritage*: 95-99. Hyderabad: University Press.
- Poliakov, L.
1974 *The Aryan Myth*. New York: Basic Books.
- Ratnagar, S.
1999 Back to the Bones. *Man and Environment* 23:101-15.
- Sewell, R.B.S & B.S. Guha.
1931 Human Remains. In J. Marshall (ed.) *Mohenjo-Daro and the Indus Civilization*: 599-684. London: Probsthain.
- Singh, K.S.
1998 The People of India: Diversities and Linkages. In D. Balasubramanian & N. Appaji Rao (eds.) *The Indian Human Heritage*: 78-86. Hyderabad: University Press.
- Tripathi, Jayant K; K. Tripathi; Barbara Bock; V. Rajamani & A. Eisenhauer.
2004. Is River Ghaggar, Saraswati?: Geochemical Constraints. *Current Science* 87 (8).
- Walimbe, S. R.
1998 Bio-cultural Adaptations in Cranial Morphology among the Early Farming Chalcolithic Populations of the Deccan Plateau. In M.K. Bhasin & S.L. Malik (eds.) *Contemporary Studies in Human Ecology: Human factor; Resource Management and Development*: 25-40. Delhi: Indian Society for Human Ecology.
- 1990 Human Skeletal Remains. In M. K. Dhavalikar; V.S.Shinde & S.Atre (eds.) *Excavations at Kaothe*: 111-231. Pune: Deccan College.
- Wheeler, R.E.M.
1968 *The Indus Civilization*. 3rd ed. Cambridge: Cambridge University Press.

