

EARLY ANIMAL DOMESTICATION IN INDIA - FACTS AND QUERIES

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Reports of domesticated forms of cattle, sheep/goat and pig from several excavated Mesolithic sites in India are critically reviewed. The criteria considered by previous authors for identifying domesticated forms from these mono-cultural sites are not convincing or reliable.

INTRODUCTION

The Mesolithic cultures of India have a wide surficial distribution but excavated sites are very few in number. The major sites, which are situated in Central India, Western India, the Ganga valley and the Vindhyan-Kaimur ranges, have yielded lithic tools predominantly based on a blade and bladelet technology, faunal remains (including sheep/goat and cattle), living floors and/or structures, hearths, occasional grindstones, bored stones, and also burials.

Despite the fact that these sites indicate semi-sedentary occupation and demographic increase in early Holocene times, the faunal remains have not been subjected to systematic evaluation to explicate the problems of animal domestication and herding.

An attempt is made here, based on the published literature, to evaluate critically the faunal remains from these excavated sites, in order to ascertain whether there is evidence for the incipient domestication/herding of sheep, goat, cattle and pig during the Indian Mesolithic phase, between approximately 6000 and 3000 bp.

THE SITES

The excavated Mesolithic sites are Bagor and Tilwara (Rajasthan), Langhnaj (Gujarat), Adamgarh and Bhimbetka (Madhya Pradesh), and Sahar-Nahar-Rai, Chopani-Mando and Mahadaha (Ganga and Belan valleys) (Figure 1). All except Bhimbetka have yielded rich collections of excavated animal bones. The paintings in the rock-shelters at Bhimbetka also furnish a good deal of information about the life of Mesolithic communities. The sites are briefly described here:

a) Bagor : The site of Bagor is situated on a sand dune close to the ephemeral River Kothari, in Rajasthan. The desertic landscape receives about 70 cm/year rainfall. An open woodland type of vegetation forms the habitat of wild mammal species which include Antelope cervicapra, Boselaphus tragocamelus, Lepus sp., Herpestes sp., Vulpes bengalensis, Canis aureus, and (rarely) Sus scrofa.

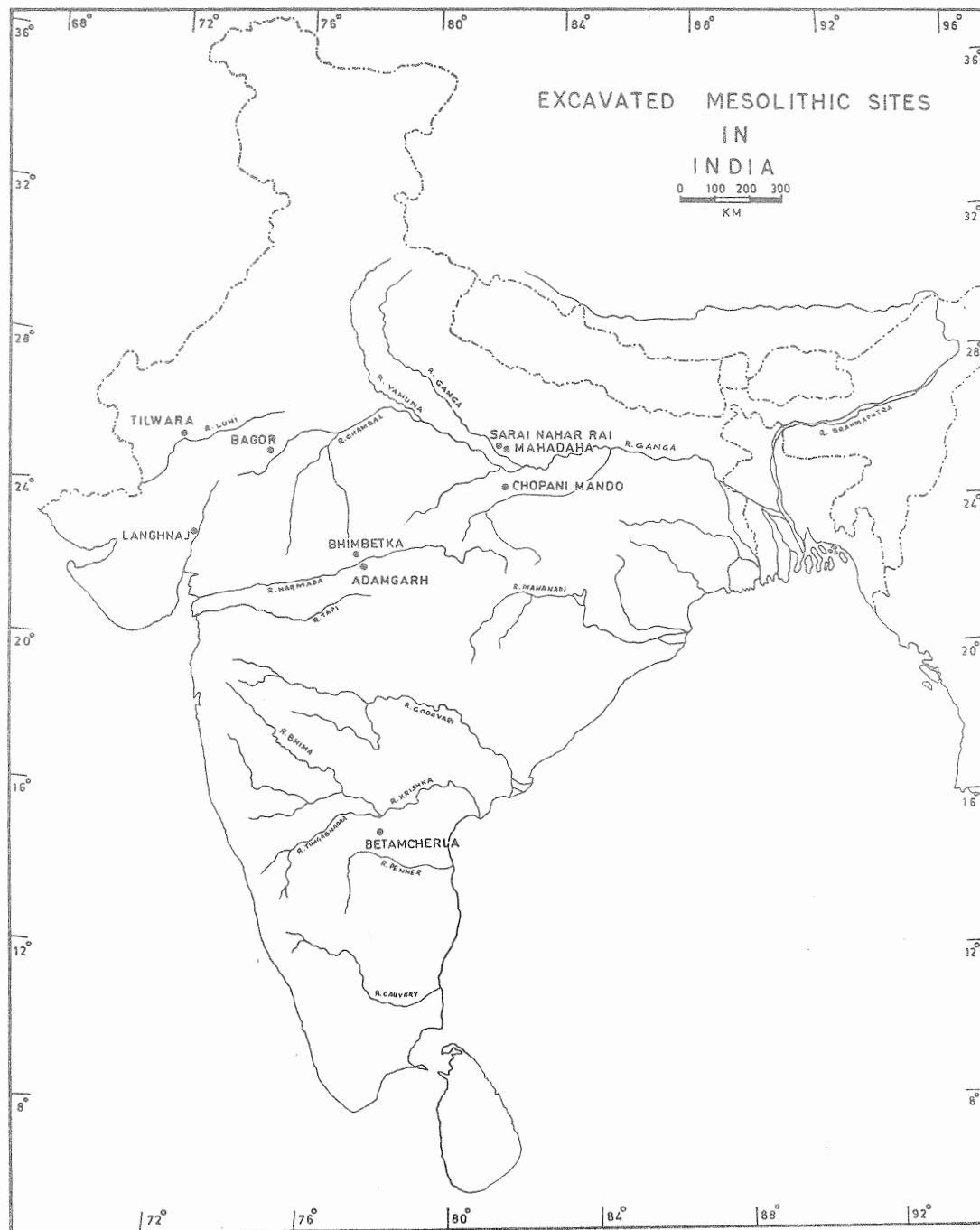


Figure 1. Map showing excavated Mesolithic sites in India.

Three cultural phases are represented at Bagor (Misra 1982). Phase I has yielded a large number of animal bones. The associated archaeological material comprises different types of blades, bladelets, scalene and isosceles triangles, trapezes, transverse arrowheads, rhomboids, crescents and points. On typo-technological criteria the tools can be assigned to the Late Mesolithic. Three radio-carbon dates (Misra 1973) for Phase I are :

6245 \pm 200 (6430 \pm 200) bp (TF- 786)
 5620 \pm 125 (5785 \pm 130) bp (TF-1007)
 5090 \pm 85 (5325 \pm 90) bp (TF-1012)

Phase II shows a decline in the numbers of microlithic tools and animal bones, but handmade pottery and copper objects make an appearance. Radiocarbon dates for this phase (Misra 1973) are:

4585 \pm 105 (4715 \pm 105) bp (TF-1009)
 3945 \pm 90 (4060 \pm 90) bp (TF-1005)

In Phase III a further decline in the numbers of animal bones and microliths is observed.

The identifiable domestic animals from Bagor include sheep, goat, zebu cattle and pig. The wild animals identified include Babalis bubalis, Cervus unicolor, Axis axis, Gazella gazella, Lepus nigricollis, Antilope cervicapra, Vulpes bengalensis, Herpestes edwardsi, Hystrix indica, and Rattus sp. (Thomas 1975). Sheep/goat dominate the Phase I assemblage, whereas cattle dominate in Phase II.

b) Tilwara : This site is situated on a sand dune near the River Luni, and witnesses low rainfall and sparse vegetation. Present game species are represented by Panthera pardus, Hyaena hyaena, Sus scrofa, Canis lupus, Cervus unicolor, Axis axis, Antilope cervicapra, Gazella gazella, Felis lynx, Canis aureus, Cuon alpinus and Vulpes vulpes. The Phase II assemblage of Bagor is very clearly represented at Tilwara. A microlithic industry, wheel-made pottery, iron objects, glass beads and bangles are found in this phase. The majority of the bones belong to Bos indicus. Other species identified include Ovis/Capra and there is a broken molar of Equus sp. and a metacarpal of Bubalis bubalis (Thomas 1975).

c) Langhnaj : This site is situated at the junction of the alluvial coastal strip and the foothill detrital deposit in northern Gujarat. It lies in an interdunal depression formed between hillocks of loess which retains monsoon water until March-April. The industry comprises lunates, triangles, trapezes, scrapers, borers, blades and burins. There are also miniature ground stone axes, a few potsherds, a copper knife and an iron arrow head. The fauna reported from the excavation includes Sus scrofa cristatus (wild boar), Boselaphus tragocamelus,

two species of deer (Axis axis, Axis porcinus), Antilope cervicapra, cattle and buffalo (Clutton-Brock 1965). Only one date from the site is available; 3875 ± 105 (3990 ± 110) bp (TF-744) (Thomas 1975).

d) Adamgarh : The rock-shelters of Adamgarh lie on a hill near Hoshangabad, on the left bank of the river Narmada. The Mesolithic deposits have produced geometric trapezes and triangles, haematite nodules, and rare occurrences of Chalcolithic pottery. The domesticated animals according to Nath (1967) include zebu cattle, buffalo, goat, sheep, pig and dog. Wild species include Varanus griseus, Hystrix cristata, Equus sp., Cervus duvauceli, Cervus unicolor, Axis axis and Lepus nigricollis. Two dates have been obtained for the Mesolithic layers at Adamgarh; 2765 ± 105 (2845 ± 105) bp (TF-116) and 7240 ± 125 (7450 ± 130) bp (TF-120) (Joshi 1978). The latter is most acceptable and the discrepancy in the former is explained as due to contamination.

e) Bhimbetka : The site complex of Bhimbetka in the Western Vindhya is situated on a hill covered by a woodland type of vegetation. The present day wild animal species found in the forest are : Panthera tigris, Panthera pardus, Melursus ursinus, Sus scrofa, Hyaena hyaena, Canis lupus, Vulpes bengalensis, Axis axis, Cervus unicolor, Cervus duvauceli, Boselaphus tragocamelus, Gazella gazella, Canis aureus, Presbytis entellus and Lepus nigricollis.

Based on archaeological findings the main excavated shelter has been dated from the Palaeolithic to the Mesolithic periods (Mathpal 1978). The wall paintings in other Bhimbetka rock-shelters have been dated to the Mesolithic period only. Despite the absence of faunal material in the excavation, the rock paintings offer a great deal of information about the wild fauna available in the surroundings. They depict tiger, leopard, ox, cow, wild buffalo, gaur, nilgai, sambar, swamp deer, chital, boar, monkey, elephant and horse. Various scenes of big game hunting and small game trapping are also depicted (Neumayer 1983).

f) The Ganga and Belan Valleys : The major Mesolithic sites in the Ganga and Belan valleys are Chopani-Mando, Sahar-Nahar-Rai, Mahadaha and Mahagara. All have been excavated (Sharma *et al.* 1980). Archaeologically, Chopani-Mando represents cultures ranging in age from Epi-Palaeolithic to Proto-Neolithic (Advanced Mesolithic). Phases IIA and IIB represent a true Mesolithic culture with geometric artifacts. The date obtained for Phase IIB is 8365 ± 110 bc (TF-1104). Phase III represents a Proto-Neolithic (Advanced Mesolithic) culture, and includes handmade pottery besides the microliths. This phase at Mahagara has been dated to 8080 ± 115 bc (SUA-1421), although this date has been doubted (Agrawal *et al.* 1978). The majority of the animal bones found in these sites (about 90%) have been retrieved from Phase III contexts.

The Mesolithic sites located in the Ganga and Belan valleys predate the other Mesolithic sites found so far in India. It is yet to be ascertained whether the cultures which extended from Rajasthan

to the Ganga Valley reveal any dissimilarities among themselves. Such studies would shed some light on the understanding of cultural development in India.

ON THE QUESTION OF INDIGENOUS DOMESTICATION IN INDIA

As mentioned above, bones of cattle, sheep, goat and pig have been reported from almost all excavated sites.

Cattle

Cattle (Bos indicus) are reported from all the excavated sites of India, and percentages of bones in total assemblages go as high as 15.71% at Bagor (Thomas 1977). Cattle in this site are represented by isolated teeth, fragmentary cranial and post - cranial remains, and horn cores. However, the fragmentary nature of the material at Langhnaj has restricted precise identifications (Clutton-Brock 1965). The cattle remains from Sahar-Nahar-Rai have been identified as wild by Alur (1980).

According to cranial studies the Pleistocene species Bos namadicus is considered to be the ancestor of the Indian zebu (Zeuner 1963; Grigson 1973). No distinguishing character has been noted between the two in post-cranial remains, except for a diminution in size (Grigson 1973). The distinction between Bos namadicus and its European counterpart Bos primigenius, on the basis of the position of the supracristal on the occiput (Grigson 1980), could be due to the static effects of horn shape, weight and direction (Epstein 1958 : quoted in Epstein and Mason 1984). The smallness of namadicus compared to primigenius, even in specimens of Holocene age, could be a function of climate and latitude (Grigson 1985). However, the depiction of Bos primigenius (humpless long-horned cattle) and humped cattle on the seals of Mohenjo Daro leaves no doubt that the two breeds existed together in the Indus region during the Harappan period (Zeuner 1963).

The presence of a bifid spine (bifurcation of the dorsal spine of the thoracic vertebra) has been widely accepted as evidence for the domesticated form of zebu, although it is occasionally missing in some animals (Epstein 1955). Stallibrass (1983) has suggested "spina bifida" as an occasional expression of a recessive trait or congenital malformation in cattle. Grigson (1985) accepts it as a domestication character, but argues that it may have appeared in relatively recent times, and that the earliest domestic zebu may not have possessed it.

The poorly preserved bovid skull from the aceramic Neolithic levels of Mehrgarh, dated to 6500 bc, does not preserve any convincing morphological evidence for assignation to either namadicus or indicus (Meadow 1984). Therefore, the problem of whether namadicus and indicus existed together, or whether the former gave rise to the latter, either in the process of evolution or in the process of domestication, remains osteologically unresolved. Grigson (1985) strongly supports the indigenous origin of indicus either by

autochthonous domestication or by crossing between surviving namadicus and Bos taurus imported into India. She also propounds the hypothesis that namadicus must have survived into Mesolithic or even Neolithic times in India.

Some of the earliest evidence for cattle domestication in Asia comes from Belt Cave in Iran (6000 bc), from Catal Huyuk in Turkey (5800 bc), and from Tepe Sabz in Iran and Jarmo in northern Iraq (late 6th millenium bc) (Epstein and Mason 1984). The excavated sites of Ghar-i-Mar and Ghar-i-Asp in northern Afghanistan are claimed to have yielded domesticated cattle bones from aceramic Neolithic levels dated to circa 8600 bc (Shaffer 1978). The presence of two size ranges of bones at Mehrgarh could suggest husbandry in the earliest aceramic Neolithic levels, dated to 6500 bc (Meadow 1984).

Sheep and goat

The remains of sheep (Ovis aries) and goat (Capra hircus) dominate collections from most excavated sites; percentages of bones go as high as 64.43% in Phase I in Bagor (Thomas 1977). Both animals are represented by post-cranial remains, fragmentary horn cores, and damaged teeth. The close anatomical similarities in post-cranial remains of sheep and goat have restricted workers from distinguishing between the two species (Nath 1967; Thomas 1975; Alur 1980). Therefore, the percentages of each species from each site have not been calculated, except at Tilwara where the majority of the bones are reported to belong to sheep (Thomas 1977), although no precise numbers are given. Surprisingly, sheep and goat bones have not been found at Langhnaj. Wild varieties of sheep and goat have been identified from the Ganga Valley sites (Alur 1980), although the two species have not been separated. Both are missing from the paintings in the rock-shelters of Central India.

The ancestry of domestic sheep has been worked out in great detail. Based on chromosome numbers the mouflon is believed to have been a major source, but recent researches rule out the possibility that it could have been the sole ancestor. According to Ryder (1984) the domestic species could be the result of hybridization between the mouflon and other wild species, followed by selection for reduced chromosome numbers, or the mouflon itself could be a feral sheep.

Claimed evidence for sheep domestication from Zawi Chemi Shanidar in Iraq, dating back to 9000 bc, is based on the high proportion of young animals. Other sites of early sheep domestication include Jarmo in Iraq (7000 bc) and Tepe Sarab in Iran (8000 bc). Domesticated sheep are dated in Afghanistan to before 7000 bc, and the earliest in the Indus valley (6500 bc) are believed to have been introduced from Afghanistan (Ryder 1984).

The finding of bezoar (Capra aegagrus) in association with Upper Paleolithic tools in late Pleistocene deposits in Lebanon and Southern Jordan led Zeuner (1963) to regard it as the ancestor for the domestic goat. Evidence for domestication of the goat in the Zagros foothills

before 7000 bc remains disputable, because of the difficulty in distinguishing domesticated and wild forms (Mason 1984). More definite evidence for goat domestication comes from Cayonu (Turkey), Jarmo (Iraq), Belt Cave (Iran), Hassuna (Iraq) and Iskenderun (Turkey), all dating back to the 7th millenium bc (Epstein 1971; Bokonyi 1976). It has been suggested, on the basis of the small size of the goat at Mehrgarh, that the animal was perhaps brought to the Indian sub-continent from elsewhere in the domesticated form (Meadow 1984). Evidence for domestic sheep/goat also comes from the aceramic Neolithic of Afghanistan, dated to circa 8600 bc (Shaffer 1978).

Pig

Reports of pig come from Adamgarh, Langhnaj and Bagor, but the representation is very low. The identifications are based on fragmentary teeth and on mandibles with premolars and canines. The pig from Langhnaj has not been described as a domesticated form. In the Ganga Valley, the swine bones belong to immature animals (Alur 1980), probably wild. The rock paintings at Bhimbetka and Lakhajor depict the hunting of wild boar.

The earliest reports of domesticated pig are from Cayonu (Turkey) dated to 7000 bc (Reed 1977), from Amouq (Iskenderun) dated to 5730 bc (Reed 1960), and from Jarmo dated to the late 6th millenium bc. The pig from the pre-pottery Neolithic of Jericho belonged to a wild variety. The pig is not reported from the Upper Palaeolithic or aceramic Neolithic levels in north-western Afghanistan (Shaffer 1978). Reports of pig from the Indus valley at the end of 3rd millenium bc are doubtful (Piggott 1952), but the pig from Mehrgarh, dated to the mid 6th millenium bc, is morphologically and metrically indistinguishable from the pigs of later periods (Meadow 1984).

DISCUSSION AND CONCLUSION

As noted above, the animals from Mesolithic sites in India are not represented by complete skulls or horn cores, from which one could detect the presence of domesticated forms. The archaeological context alone, therefore, has been relied upon by earlier workers for the inference of domestication. But the archaeological context alone cannot be useful unless a continuous lineage through to modern forms can be established, or unless incontrovertible evidence for domestication is reflected in the cultural remains (Berry 1969). Developments in tool technology from Epi-Palaeolithic to Proto-Neolithic at Chopani-Mando suggest a transition from hunting and gathering to a settled mode of life, probably based on incipient agriculture (Sharma *et al.* 1980) and incipient animal domestication. But the absence of qualitative studies on the fauna from the site does not assist recognition of incipient animal domestication.

The factor of diminution in the size of bones of cattle and sheep/goat from Indian Mesolithic sites should be considered in relation to the fauna from preceding cultures. Since most excavated Mesolithic sites are mono-cultural, such criteria should be used

cautiously. However, this criterion is inapplicable for cattle in India, because namadicus was smaller than primigenius in size (Grigson 1985). Also, the reduction in size of the third molar of pig as a domestication feature (Badam 1984) is questionable in light of the fact that the genus Sus has a tendency to retain shortness of cheek teeth in the process of phylogenetic evolution (Colbert 1935).

It is possible that the warming of climate between 6000 and 4000 bc in Western Rajasthan (Wasson et al. 1983) might have provided enough pasture for domesticated animals to be transferred into Western India. It is during this period that Mesolithic cultures in India existed contemporaneously with the established Neolithic cultures of Pakistan and Afghanistan, where the domestication of animals had already gained a foothold.

It can therefore be stated that previous identifications of animals as domesticated from Indian Mesolithic sites are open to question. More osteological evidence, especially cranial, is required to support Bos namadicus as an ancestor of indicus, and to ascertain if namadicus survived until the Holocene. The absences of extant wild sheep and goat in India, and fossil evidence for them from Pleistocene deposits, add further to controversies concerning the indigenous or exotic origins of these animals. On the other hand, the wide distribution of sheep/goat in Mesolithic and Neolithic cultures in South India strongly suggests the possibility of the existence of a wild sheep/goat progenitor in this region.

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REFERENCES

- Agrawal, D.P., R.V. Krishnamurthy, S. Kusumgar and R.K. Pant. 1978. Chronology of Indian prehistory from the Mesolithic period to the Iron age. Journal of Human Evolution 7:37-44.
- Alur, K.R. 1980. Faunal remains from the Vindhya and the Ganga Valley. In Beginnings of Agriculture (eds. G.R. Sharma et al.), pp.201-27. Allahabad:Abinash Prakashan.
- Badam, G.L. 1984. Holocene faunal material from India with special reference to domesticated animals. In Animals and Archaeology (eds. J. Clutton-Brock and C. Grigson), pp.339-353. Oxford:BAR International Series 202.
- Berry, R.J. 1969. The genetical implications of domestication in animals. In The domestication and exploitation of plants and animals (eds. P.J. Ucko and G.W. dimbleby), pp.207-18. London: Duckworth.

- Bokonyi, S. 1976. Development of early stock rearing in the Near East. Nature 264:19-23.
- Clutton-Brock, J. 1965. Excavations at Langhnaj, 1944-63. Part II, the fauna. Deccan College Silver Jubilee Series 27:1-41.
- Colbert, E.H. 1935. The phylogeny of the Indian Suidae and the origin of Hippopotamidae. American Museum Novitates no. 799:1-24.
- Epstein, H. 1955. Phylogenetic significance of spina bifida in Zebu cattle. Indian Journal of Veterinary Science 25:313-316.
- Epstein, H. 1958. Die Unbrauchbarkeit einiger anatomischer Merkmale für die Rassengeschichte europäischer Langhornrinder, Zeitschrift für Tierzucht und Zuchtungsbiologie 71(1), 59-68.
- Epstein, H. 1971. The origin of domestic animals of Africa. New York: African Publ. Corp.
- Epstein, H. and I.L. Mason. 1984. Cattle. In Evolution of domesticated animals (ed. I.L. Mason). Longman.
- Grigson, C. 1973. The comparative craniology of Bos taurus, Bos indicus, Bos primigenius and Bos namadicus. Ph.D. thesis. University of London.
- Grigson, C. 1980. The craniology and relationship of four species of Bos. 5: Bos indicus L. Journal of Archaeological Science 7:3-32.
- Grigson, C. 1985. Bos indicus and Bos namadicus and the problem of autochthonous domestication in India. In Recent Advances in Indo-Pacific Prehistory (eds. V.N. Misra and P. Bellwood), pp.425-428. New Delhi:Oxford and IBH.
- Joshi, R.V. 1978. Stone age cultures of Central India. Deccan College, Pune.
- Mason, I.L. 1984. Goat. In Evolution of domesticated animals (ed. I.L. Mason). Longman.
- Mathpal, Y. 1978. Prehistoric rock paintings of Bhimbetka, Central India. Ph.D. Thesis, Poona University.
- Meadow, R.H. 1984. Notes on the faunal remains from Mehrgarh, with a focus on cattle (Bos). In South Asian Archaeology 1981 (ed. B. Allchin), pp. 34-40, Cambridge University Press.
- Misra, V.N. 1973. Bagor - a late Mesolithic settlement in north west India. World Archaeology 5(1), 92-110.

- Misra, V.N. 1982. The Archaeological setting. In Bagor and Tilwara; Late Mesolithic cultures of NW India. Vol. I, The human skeletal remains (eds. J.R. Lukas et al.). Pune: Deccan College,
- Nath, B. 1967. Animal remains from Adamgarh rock shelter. Bull. Indian Museum II:29-37.
- Neumayer, E. 1983. Prehistoric Indian rock paintings. Oxford Univ. Press.
- Piggott, S. 1952. Prehistoric India. Penguin Books.
- Reed, C.A. 1960. A review of the archaeological evidence on animal domestication in the prehistoric Near East. In Prehistoric Investigations in Iraqi Kurdistan (eds. R.J. Braidwood and B. Howe), pp.119-45. Univ. of Chicago Press.
- Reed, C.A. 1977. Origins of agriculture. The Hague: Mouton.
- Ryder, M.L. 1984. Sheep. In Evolution of domesticated animals (ed. I.L. Mason). Longman.
- Shaffer, J.G. 1978. The late prehistoric periods. In The Archaeology of Afghanistan (eds. F.R. Allchin and N. Hammond), pp. 71-185. Academic Press.
- Sharma, G.R., V.D. Misra, D. Mandal, B.B. Misra and J.N. Pal, 1980. Beginnings of Agriculture. Allahabad: Abinash Prakashan.
- Stallibrass, S. 1983. A bifid thoracic vertebral spine from a bovine in the Roman Fenland. Journal of Archaeological Science 10(3):265-266.
- Thomas, P.K. 1975. Role of animals in the food economy of the Mesolithic culture of western and central India. In Archaeozoological studies (ed. A.T. Clason), pp. 322-8. North Holland Publ. Co.
- Thomas, P.K. 1977. Archaeozoological aspects of the prehistoric cultures of Western India. Ph.D. Thesis. Poona University.
- Wasson, R.J., S.N. Rajaguru, V.N. Misra, D.P. Agrawal, R.P. Dhir, A.K. Singhvi and K.K. Rao, 1983. Geomorphology, stratigraphy and palaeoclimatology of the Thar dunefield. Zeitschrift fur Geomorphologie, Supplementary volume, 45:117-151.
- Zeuner, F.E. 1963. A history of domesticated animals. London: Hutchinson.