Fresh Data on the Quaternary Animal Fossils and Stone Age Cultures from the Central Narmada Valley, India

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Introduction

The Narmada is one of those rivers in India which preserves rich geological, palaeontological, and archaeological remains. It has yielded the relics of human cultures from the Stone Age to mediaeval times. The Narmada rises near Amarkantak (20° 40′ N, 81° 46′ E) on the Maikala range in eastern Madhya Pradesh and flows through Madhya Pradesh, Maharashtra, and Gujarat for a total distance of about 1310 km before emptying into the Gulf of Cambay in the Arabian Sea near Broach in Gujarat. Its major tributaries from the southern flank are the Sher, the Shakkar, the Dudhi, and the Tawa. Only a few tributaries, such as the Hiran and the Sindhar, join the Narmada from the northern side.

Sleeman was the first to discover mammalian fossils from Jabalpur in 1830, and an account of his discoveries was published by Princep (1832). Subsequently, Princep (1833) and Spilsbury (1833, 1837, 1844) made rich collections of mammalian fossils though with no regard to stratigraphical control. The first account of systematic study of the Narmada beds was given by Theobald (1860), who, on the basis of invertebrate and vertebrate fossil evidence, divided these beds into two groups, Lower and Upper, and dated them to the Pleistocene period. J. G. Medlicott (1860), T. Oldham (1871), R. D. Oldham (1893), Blanford (1869), Lydekker (1880, 1882, 1884), Pilgrim (1905), and Vredenburg (1906) studied various aspects of Pleistocene deposits on the Narmada River.

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One of the important discoveries was made by C. A. Hacket, who recovered a prehistoric handaxe in red clay near Bhutra, 14 km north of Gadarwara. On the basis of this find, H. B. Medlicott (1873) dated the beds to the Early Pleistocene period. Pilgrim (1905) confirmed the date after a palaeontological study of the Godavari and Narmada deposits. De Terra and Paterson (1939) studied the geological, palaeontological, and archaeological aspects of Narmada from Hoshangabad to Narsinghpur and tried to correlate these deposits with the Siwaliks and the Narmada Stone Age industries with the Sohan Culture. After a long gap, Sankalia discovered Lower and Middle Palaeolithic tools around Maheshwar in the years 1953 to 1959. In 1958, Khatri started exploration in the Narmada Valley and discovered a number of palaeontological sites (Khatri 1966), and an industry which he named "Mahadevian" after a type site at Mahadeo Piparia. Sen and Ghosh (1963) listed more implimentiferous and fossiliferous sites from the valley. Supekar's explorations in the Central Narmada led to the discovery of several Lower and Middle Palaeolithic sites and fossiliferous localities (Supekar 1968). He could not, however, confirm the presence of Khatri's "Mahadevian" culture. More recently, Badam (1976) undertook detailed palaeontological study of the fossils collected from various sites between Narsinghpur and Hoshangabad, along with Stone Age tools from the Lower Boulder Conglomerate and sandy, pebbly gravels.

This river was reexamined by the writers with a view to locating the undisturbed fossil- and tool-bearing horizons. The details of the work done are given herewith.

DESCRIPTION OF THE SITES

Five new sites were discovered which yielded Lower Palaeolithic, Middle Palaeolithic, and Mesolithic artifacts as well as fossils (Fig. 1).

The sites discussed here are situated in the quartzitic and Deccan Trap areas. Singrampur is situated in the quartzitic area. The material available here is in the form of boulders and chunks from the *nala*s and hills nearby the village. Other sites, namely, Gopalpur, Bhedaghat, Tilwaraghat, and Bargi, are in the Deccan Trap area. The traps are generally intercalated with Intertrapean Beds consisting of clays, limestones, and sandstones. They also contain silicious minerals such as chalcedony, agate, and chert in the form of veins.

The sites belonging to the Mesolithic period are found in the alluvial plain near Bhedaghat, which is composed of gravels, silts, sands, and clays. The thickness of the alluvium is sometimes up to 200 m; its width, generally 50 km (Fig. 2).

The location of the sites and typological analysis is as follows.

Singrampur (23° 38′ N; 79° 50′ E)

This is a small village on the Jabalpur-Damoh road about 50 km from Jabalpur, district of Madhya Pradesh. A Lower Palaeolithic site was discovered here. Tools were collected from the three *nala*s near milestone 53/2.

Bargi Dam Site (23° 59′ N; 79° 53′ E)

This is a village about 26 km from Jabalpur on the Jabalpur-Seoni road. A dam known as Bargi Dam is under construction on the Narmada River about 4 km from the village and can easily be approached by a paved road. A Middle Palaeolithic

site was discovered here and tools were found in the extensive gravel near the bridge as well as in brownish clay in the cuttings of the dam site.

Tilwaraghat (23° 07′ N; 79° 53′ E)

This is a *ghat* on the Narmada barely 1.5 km away from Jabalpur Hospital (Pl. I). Sen and Ghosh (1963) have reported the discovery of implements from the river section at the *ghat*. The present writers explored along the river on both sides of the bridge and found tools from river gravel and also from the sections.

Bhedaghat (23° 08′ N; 79° 47′ E)

This is situated about 13 km southwest of Jabalpur, where the river makes a fall of about 9 m before flowing through gorges of marble rocks for a distance of about 4 km. The older alluvial deposits are seen upstream and downstream of the gorge.

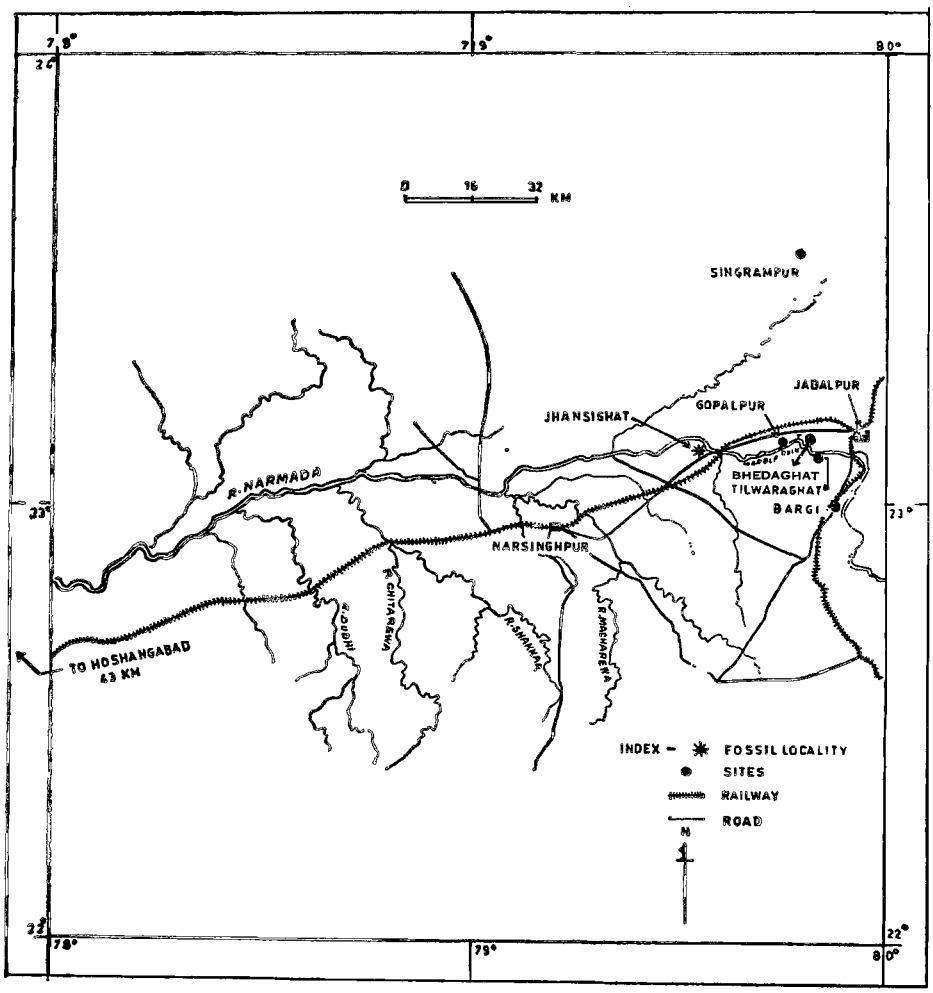

Fig. 1 Map of Jabalpur area showing the prehistoric and fossiliferous sites.

Plate I Tilwaraghat section from which a large collection of Middle Palaeolithic tools was gathered.

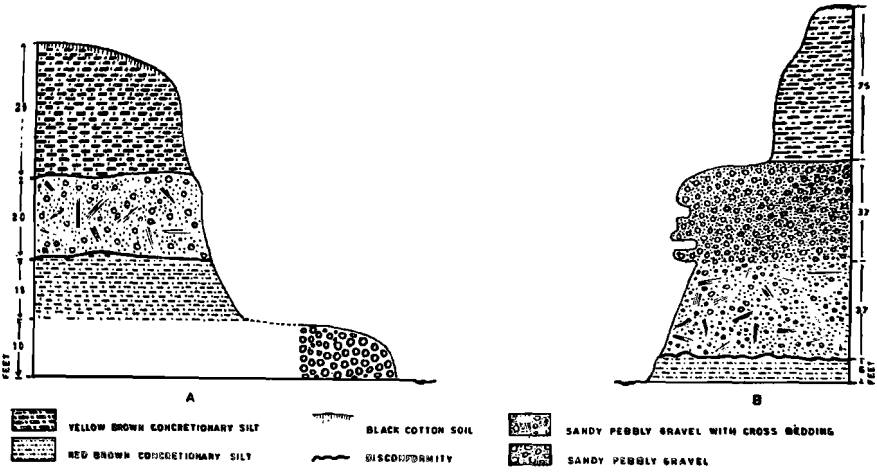

Fig. 2 Sections showing the Pleistocene stratigraphy on the Narmada River. (A = composite section; B = section at Bhedaghat.)

Allchin (1966) has reported a late Stone Age site around this area. Sen and Ghosh (1963) have listed it as an implimentiferous and fossiliferous site. The writers give a detailed description of the tools found just on the slope behind the Chausath Yogini Temple.

Gopalpur (23° 07′ N; 79° 49′ E)

This site is situated on the right bank of Narmada River barely 1.5 km west of Bhedaghat. Tools belonging to the Mesolithic period are found scattered on the old terrace here.

INDUSTRIES

Lower Palaeolithic, Middle Palaeolithic, and Mesolithic industries were found during the course of explorations. Twenty-six Lower Palaeolithic tools were recovered, while Middle Palaeolithic tools totaled 126. Fifty-four Mesolithic tools were collected (see Table 1). Detailed typological descriptions follow (Figs. 3, 4, 5).

A. Lower Palaeolithic

Raw materials and technique

The implements collected from Singrampur belong to the Lower Palaeolithic period. Twenty-six in number, they are made on fine-grained Vindhyan quartzite. The color is normally chocolate, but other shades such as dark and light brown also occur. This material is available in the form of chunks and boulders in the *nala*s and on the hills near the site.

The tools coming from Singrampur belong to the flake tool category. Most of them are made on flakes struck directly off the blocks and huge pebbles; these could have been detached by use of the heavy stone hammer technique. There is evidence of secondary flaking which might have been removed by application of the light stone hammer or cylinder hammer technique. The flakes generally have a plane platform; some were properly dressed before being detached from the cores.

TABLE 1. TOOLS FROM THE NARMADA VALLEY

TYPES	LOWER PALAEOLITHIC	MIDDLE PALAEOLITHIC		MESOLITHIC	
	SINGRAMPUR	BARGI	TILWARAGHAT	BHEDAGHAT	GOPALPUR
Core	2	1	5	3	3
End flake	10	1	9	4	3
Side flake	4	2	2	1	3
Indeterminate flake	—	1	2	—	—
Utilized flake	—	3	4	—	—
Truncated flake	—	1	1	—	—
Chip	—	—	—	5	11
Simple blade	—	—	3	3	4
One-margin retouched blade	—	2	2	—	—
Both-margin retouched blade	—	1	1	—	—
Utilized blade	—	2	5	—	—
Truncated blade	—	—	1	—	—
Handaxe	1	—	—	—	—
Cleaver	6	—	—	—	—
Concave scraper	—	3	8	1	1
Convex scraper	—	3	14	1	1
Side scraper	2	5	9	3	—
Round scraper	—	—	2	—	—
End scraper	—	—	1	—	—
Denticulate scraper	—	1	1	—	—
Transverse scraper	—	—	2	—	—
Notched scraper	—	3	8	2	—
Steep retouch scraper	—	—	1	—	—
Thumbnail scraper	—	—	—	1	—
Simple point scraper	—	—	1	—	3
One-margin retouched point	—	—	2	—	—
Both-margin retouched point	—	1	4	—	—
Borer	1	4	4	—	—
Burin	—	—	—	—	1
Total:	26	34	92	24	30

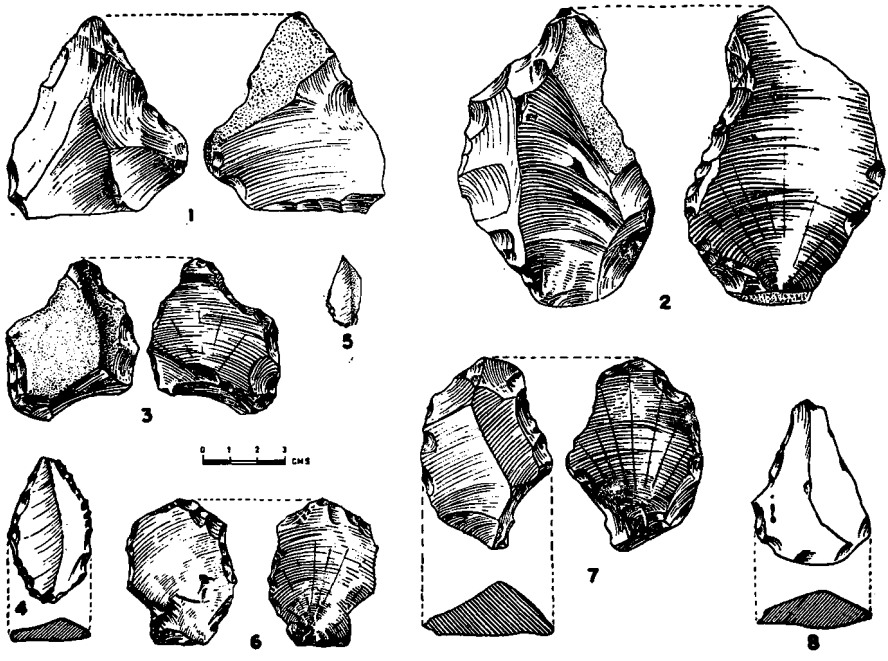

Fig. 3 Tools from Narmada Valley.

(1) Concave scraper made on brown chert flake, triangular in shape, having retouches on one of the concave margins. Fresh (7.00 × 6.04 × 2.07 cm).

(2) Concave scraper, fully flaked on dorsal surface, leaving small patch of cortex. On the other surface it has a prominent bulb and is regularly retouched on the concave portion. Fresh (10.05 × 5.07 × 1.09 cm).

(3) Borer, retouched on both margins, leaving cortex portion in the center. Borer tip has been achieved by the removal of flakes just below the tip. Fresh (5.09 × 4.03 × 3.00 cm).

(4) Point made on very thin brown chert flake, retouched on both margins and forming a pointed tip. Fresh (5.02 × 2.08 × .07 cm).

(5) Point made on chalcedony blade and having pointed tip. Fresh (2.05 × 1.01 × .04 cm).

(6) Convex scraper, made on brown chert, having prominent bulb on the ventral surface. Other surface is retouched along the periphery at the distal end. Fresh (5.01 × 3.07 × 1.02 cm).

(7) Convex scraper, retouched on convex portion on one side; other side is fully flaked. Fresh (6.08 × 4.06 × 2.01 cm).

(8) Point, made on chocolate-colored flake with a ridge in the center. Retouched on the left margin and has a pointed tip. Fresh (5.08 × 4.08 × 1.04 cm).

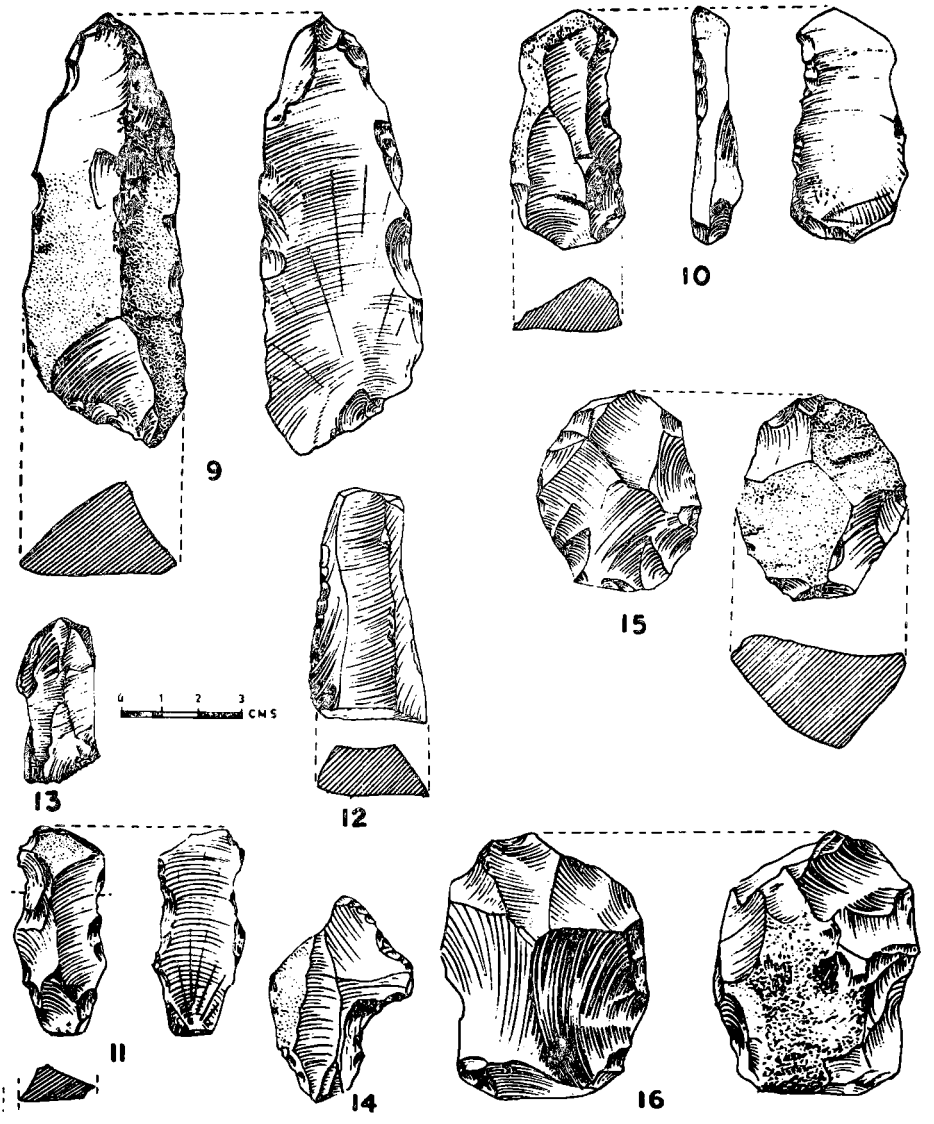

Fig. 4 Tools from Narmada Valley.

(9) End flake, made on brown chert. Ventral surface has truncation on the margins; dorsal surface is left cortex except the removal of two flakes. Slightly rolled (10.09 × 3.08 × 2.03 cm).

(10) Scraper on blade having prominent bulb and retouching on one of the margins on the ventral surface. Other surface is fully flaked, leaving a patch of cortex. Fresh (5.08 × 2.08 × 1.4 cm).

(11) Notched blade, having prominent bulb and truncation on the left margin. On the other surface, it is fully flaked, leaving a small patch of cortex at distal end. Fresh (5.02 × 2.01 × 1.00 cm).

(12) Blade of green chert, retouching on left margin. Fresh (5.07 × 2.08 × 1.02 cm).

(13) Core made on chalcedony nodule trimmed to obtain the blades. Fresh (4.01 × 1.09 × 1.02 cm).

(14) Concave scraper made on brown chert prominently retouched on concave portion; also retouched on the right margin toward the top. Fresh (5.02 × 3.05 × 1.00 cm).

(15) Core made on river pebble. One side is fully flaked; other side, except for a few flake scars, is left unworked. Fresh (4.09 × 4.03 × 2.08 cm).

(16) Core, made on chalcedony pebble, flaked on both surfaces leaving a small cortex portion on one of the surfaces. Fresh (6.04 × 4.09 × 3.08 cm).

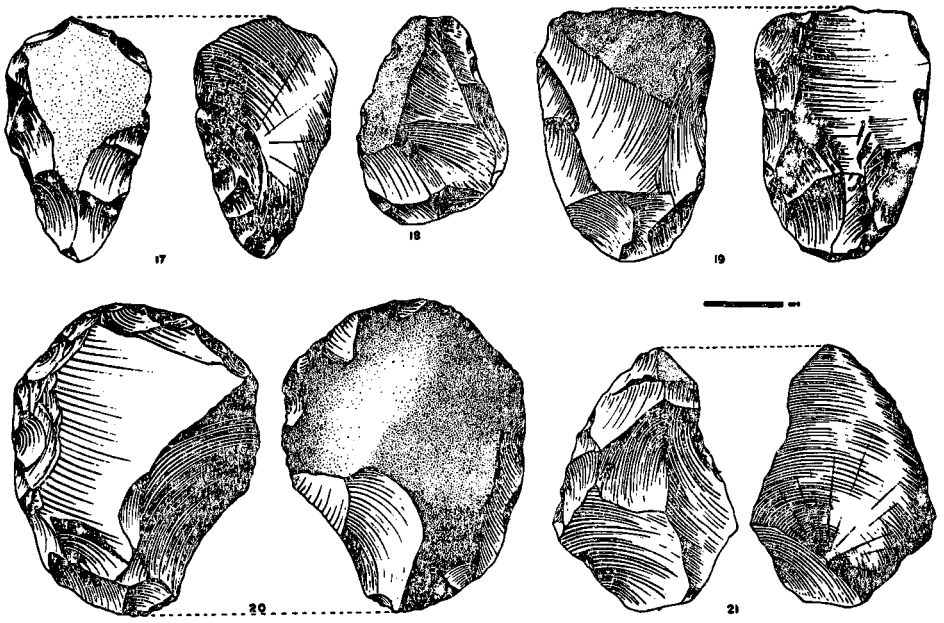

Fig. 5 Tools from Narmada Valley.

(17) A finely worked cleaver made on a side flake, showing pointed butt and convex cutting edge. Slightly rolled (15.01 × 8.01 × 4.04 cm).

(18) Flake which is fully flaked, leaving a small portion of cortex on its left margin. Fresh (13.05 × 9.01 × 2.03 cm).

(19) Cleaver, finely worked on both surfaces, leaving triangular portion as a cortex. Shows rounded butt and straight cutting edge. Fresh (16.05 × 10.09 × 5.02 cm).

(20) Core with centrally directed flake scars. One side is fully flaked; other side, except for a few flake scars, is left cortex. Fresh (19.02 × 18.01 × 6.01 cm).

(21) Flake that is triangular in shape and has a prominent bulb on one side; other side is completely flaked. Fresh (15.7 × 11.01 × 4.02 cm).

Most of the tools in the collection are fresh, while a few are rolled to some extent. A few of them are also weathered.

Tool types

Handaxe. There is only one handaxe in the collection from Singrampur. It is flaked extensively on both surfaces; it is flaked from the margins toward the center and shows a mid-ridge. The handaxe has a thick and rounded butt which is left unworked.

Cleavers. In all six cleavers, the cortex portion is generally left near the cutting edge. The cleavers can be divided into three groups: (1) rounded butt with straight cutting edge (Fig. 5, no. 19); (2) rounded butt with convex cutting edge; and (3) pointed butt with convex cutting edge (Fig. 5, no. 17).

Among them, three cleavers are made on end flakes and the other three are on side flakes. The flaking on the cleavers is sometimes deep and sometimes shallow. All the cleavers are worked on both margins.

Scrapers. There are two scrapers in the collection. The larger one has a length of 16.03 cm, a breadth of 21.09 cm, and a thickness of 5.04 cm. The other one is comparatively small, with a length of 9.09 cm, a breadth of 14.02 cm, and a thickness of 3.07 cm. Both surfaces are made on side flakes and retouched on the longer axis opposite the bulbs. The scrapers have been detached directly from cleaved blocks. One side shows prominent bulbs; the cortex is on the other surface.

Borer. Only one specimen belongs to this category. On the dorsal surface, it is fully flaked from the sides toward the center; on the ventral surface, it is plain. The boring tip has been achieved by removal of two small chips just below the tip.

Flakes. As stated earlier, this industry is mainly a flake industry. All the tools except a handaxe are made on the flakes. There are 14 flakes in the collection, ten end flakes and four side flakes. Some flakes are detached directly without preparation while others have been carefully prepared prior to detachment from the core and have the marks of a faceted platform. Bulbs of percussion of the flakes are generally prominent (Fig. 5, no. 21), showing the use of the heavy stone hammer technique for detaching the flakes. The flake platforms are generally wide, though some flakes have narrow platforms.

Cores. There are two cores in the collection, roughly round or oval in shape. They measure 13.00 cm and 17.06 cm in diameter and 6.07 cm and 5.04 cm in thickness, respectively. Generally, blocks or huge pebbles are used for striking off the flakes. Flake scars are centrally directed; this way, both surfaces of the core are flaked. The periphery of the cores has become sharp due to the removal of flakes toward the center. Flake scars are generally shallow, but a few of them are also deep. One of the cores is fully flaked on both surfaces and the other one has a cortex on one surface (Fig. 5, no. 20).

B. Middle Palaeolithic

Raw materials and technique

The Middle Palaeolithic sites at Tilwaraghat and Bargi yielded 126 tools. Out of these, 16 were made on chalcedony and the others on chert, in such different shades as red, brown, chocolate, yellow, and black. The material for manufacturing the tools is found in the form of veins in the hills near the sites and in the form of pebbles in the river.

Generally, the tools are fresh. Only a few pieces show some amount of rolling, indicating that they have not been transported much from their original places. Some tools give a glazy appearance.

The majority of the implements are made on flakes. They generally have a narrow platform and defused bulbs of percussion. Occasionally, bulbar scars are also found near the bulbs. By the nature of flaking and flake scars, it can be said that these flakes were struck off by the application of the small stone hammer technique. Only in some cases flakes having prominent bulbs and broad striking platforms indicate heavy blows. Some flakes which indicate preparation of cores before striking off the flakes might have been detached by prepared core technique. Some blades in the collection have probably been detached by the punch technique.

Tool types

Scrapers. Scrapers are the characteristic tools of the Middle Palaeolithic period. These are found in great numbers at both sites, Bargi and Tilwaraghat. They can be divided into two main groups, core scrapers and flake scrapers. Core scrapers are in a significant minority. These types of cores have been made by working along the periphery, which gives a suitable edge to the specimens. Except for a few of these core scrapers, most of the scrapers belong to the flake scraper group. This group is dominant and has varied subtypes such as concave (Fig. 3, nos. 1, 2), convex (Fig. 3, nos. 6, 7), side, end, round, denticulate, transverse, notched (Fig. 4, no. 11), and steep retouched scrapers.

In the flake scraper category, the convex type of scraper is dominant; side scrapers come next in that order. The smallest numbers were represented by end and steep retouched scrapers, with only one of each represented in the collection.

Borers. After scrapers, borers are the standard tools of the Middle Palaeolithic period (Fig. 3, no. 3). All the borers in the collection are made on flakes. The borer tips have been achieved by preparation of notches just below the tips, either on one side or on both. The borers here are divided into two main groups: (1) single-shouldered borers and (2) double-shouldered borers.

Double-shouldered borers are more common in the collection. There is also a specimen which has more than two borer tips.

Points. There are six points in the collection, generally made on subtriangular flakes. On the basis of retouch, they are divided into three subtypes.

1. *Simple points.* In this group are included only those pieces which do not have any type of secondary working and which have pointed tips, sometimes with used marks.
2. *Points with single-margin retouch.* This group comprises the specimens having secondary work on one of the margins and forming a pointed tip (Fig. 3, no. 8).
3. *Points with double-margin retouch.* Specimens retouched on both margins and forming a pointed tip are included in this group (Fig. 3, no. 4).

Flakes. The Middle Palaeolithic produces basically a flake industry. Most of the tools in the collection are made on flakes. Tools on flake blades and blades also occur in small numbers. Flakes are generally removed from the pebbles, but in some cases they are detached from blocks also. They are generally removed directly but are also struck off after careful preparation.

Large flakes show a size of 8.06 × 5.08 × 3.00 cm; medium, 5.08 × 4.08 × 2.02 cm; and small, 2.04 × 2.03 × 1.09 cm. The flakes show variation in length, breadth, and thickness according to their size. End flakes are more numerous than side flakes. Some Levalloisian flakes are also present. One flake is thick on one margin; another, which is retouched, could have served as a stone knife.

Blades. There are 17 blades in the collection ranging from a length of 7.02 cm, breadth of 2.03 cm, and thickness of 1.06 cm (longest) to a length of 2.07 cm, breadth of 1.03 cm, and thickness of .05 cm (smallest). Most of the blades have a mid-ridge on the dorsal surface. Sometimes the blades are very delicate and can be compared with the Wainganga B industry (Joshi 1966) of Central India. Four blades are retouched on one margin (Fig. 4, no. 12), two on both margins, seven

have utilization marks, and one has been truncated. The blades retouched very regularly are classified in the scraper group (Fig. 4, no. 10).

Cores. There are six cores in the collection. By the nature of their flake scars, the cores are divided into three groups.

1. *Flake cores.* There are four specimens in this group. Generally, pebbles and tabular pieces are selected for striking off the flakes. In most cases, they are flaked along the periphery and have centrally directed flake scars. Sometimes they are flaked on both surfaces to get sharp edges which could have served as core scrapers (Fig. 4, no. 16).
2. *Blade cores.* There is only one core in this group. Few blades are detached from the core, which shows shallow scars (Fig. 4, no. 13).
3. *Discoidal cores.* This type is represented by only one piece in the collection. It has a rounded shape with small flake scars.

C. *Mesolithic*

Raw materials and technique

Microliths were found at Bhedaghat and Gopalpur. Most of them are made on chalcedony, though a few are made on chert material. Almost all the tools are fresh. Among them, a few are slightly patinated, producing a greenish appearance.

The tools here are generally made on flakes or blades, sometimes having a small portion of cortex which indicates the removal of flakes or blades from the pebbles. The pebbles were generally found in the river bed. They might have been removed by the application of the bone hammer or punch techniques. All pieces in the collection have plain platforms.

Scrapers. Scrapers are of two varieties: (1) scrapers made on flakes and (2) scrapers made on nodules.

There are four flake scrapers and five scrapers on nodules. Three scrapers are made on chert and the other six on chalcedony.

Points. There are three points in the collection, all from Gopalpur. They are simple points, made on chalcedony material. Two points are made on blades (Fig. 3, no. 5) and one on nodules.

Burin. There is only one burin in the collection, and it comes from Gopalpur. This is made on a chalcedony blade with a length of 2.07 cm, breadth of 1.01 cm, and thickness of 0.06 cm.

Flakes. Altogether, 11 pieces are in the collection. On the bases of make and type, they are divided into two main groups:

1. *Side flakes.* There are four pieces in this category, made on chalcedony and chert material. All the pieces have very prominent but small bulbs on their longer axes.
2. *End flakes.* Flakes having bulbs on the shorter axis fall in this group. They are seven in number, some of them having prominent and some having diffused bulbs. Among them, four are made on chalcedony while the other three are on chert.

Some of the flakes are too small and sometimes very crude to serve as a tool. They number 16 and are classified as chips.

Blades. Seven blades are in the collection. Most of the pieces have mid-ridges on the dorsal surface of their blades and were struck off by the application of the punch technique. They are simple blades with no retouch or utilization marks. A few very small pieces in the collection can be called microblades.

Cores. In the collection of Mesolithic tools, two types of cores are found: (1) blade cores, and (2) flake cores. The former group comprises four cores which are generally made on nodules. One piece among them has been trimmed in a double direction. Two cores in the collection are kept in the flake-core category. One piece is fully trimmed while the other is trimmed on half the portion, the rest of the portion having been left as cortex. Out of six cores, two are made on jasper and the other four are on chalcedony.

FAUNAL MATERIAL

A large number of fossils has been collected during the course of investigations in the Narmada Valley, especially in the Narsinghpur District (Fig. 6). Prominent fossiliferous sites include Devakachar (Sher, Umer, and Varu-Rewa River Valleys), Barman ghat (Pl. II), and Kerpani, which have preserved a wealth of mammalian fossils second only to the Siwaliks of northwest India. In addition to the fauna recovered earlier *(Equus namadicus, Bos namadicus, Bubalus bubalis, Bubalus palaeindicus, Cervus unicolor, Hexaprotodon palaeindicus)*, the following species of reptiles have been collected in the course of the present investigations (see also Pl. III): (1) *Crocodylus palaeindicus,* (2) *Gavialis* sp., and (3) *Trionyx* sp. In view of the general paucity of reptilian fossils in the Narmada Valley, the present collection assumes great importance. In this paper, however, only the description of *Stegodon insignis,* collected *in situ* from near Jhansighat (38 km east of Jabalpur) from the sandy, pebbly gravel, is given, in view of its proximity to the implementiferous sites, discussed earlier in the paper. A detailed study of other faunal material is in progress and will be published in due course.

SYSTEMATIC PALAEONTOLOGY

Class	Mammalia
Order	Proboscidea Illiger
Suborder	Elephantoidea Osborn
Family	Elephantidae Gray
Subfamily	Stegodontinae Osborn
Genus	*Stegodon* Falconer
Species	*Stegodon insignis* (Falconer and Cautley)

SYNONYMY

1846–1847 *Elephas insignis* Falconer and Cautley; *Fauna Antiqua Sivalensis* pts. 1–7

1880 *Stegodon insignis,* Lydekker; *Pal. Ind.,* series 10, vol. 1, p. 268

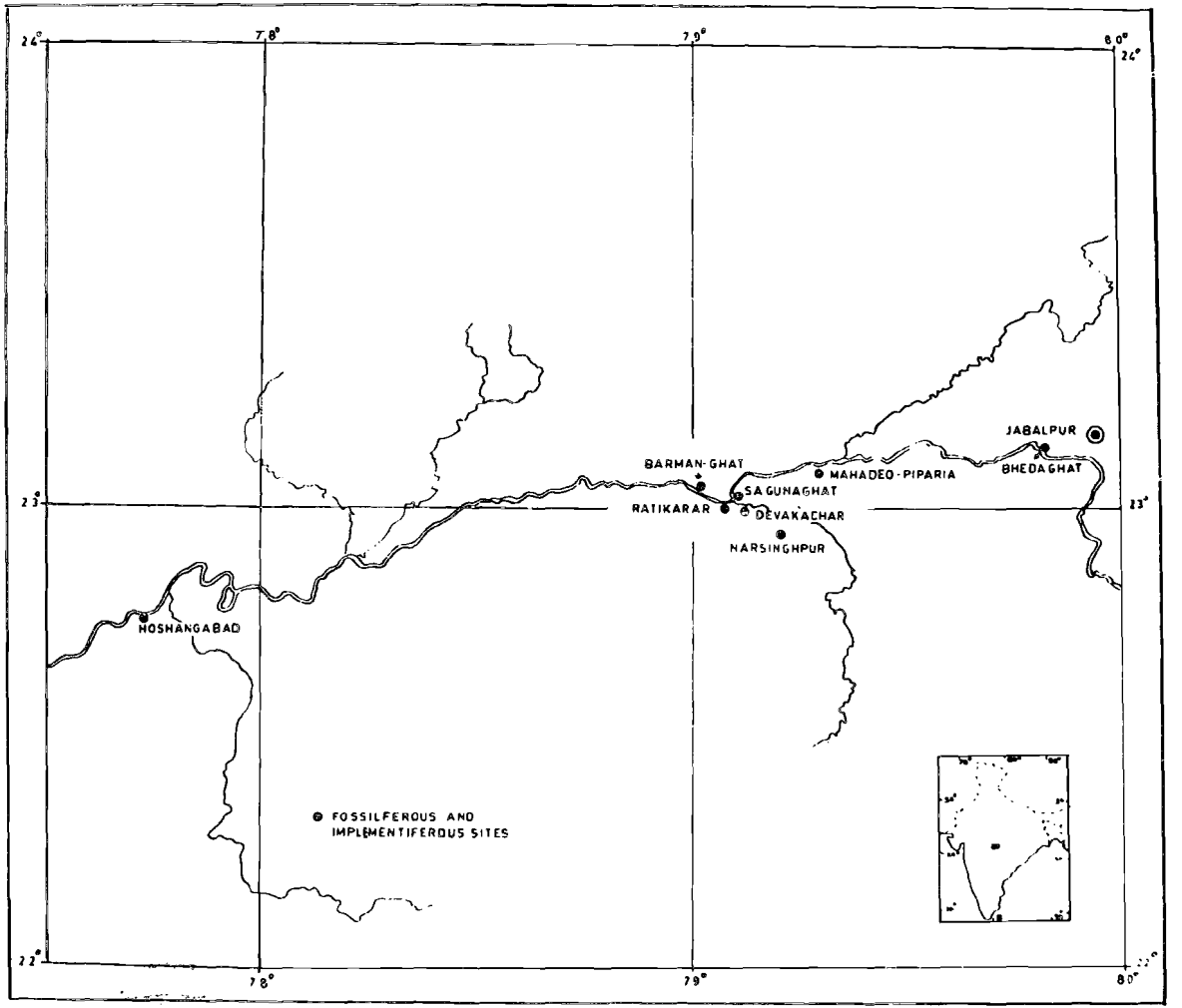

Fig. 6 Map of Narsinghpur District, Madhya Pradesh, showing fossiliferous and implimentiferous sites.

Plate II A general view of the sections at Barmanghat. A large number of Lower and Middle Palaeolithic tools and fossils of elephants and cattle were collected here.

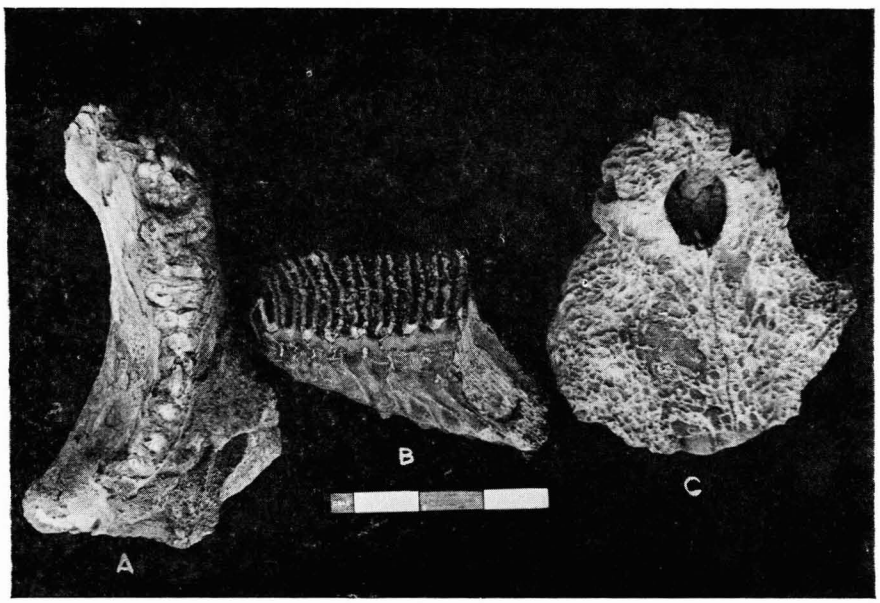

Plate III Some of the fossils doscovered during the previous and recent explorations in the Devakachar area. *(a)* jaw of *Hexaprotodon palaeindicus; (b)* molar of *Elephas hysudricus; (c)* partial skull of *Crocodylus palaeindicus.*

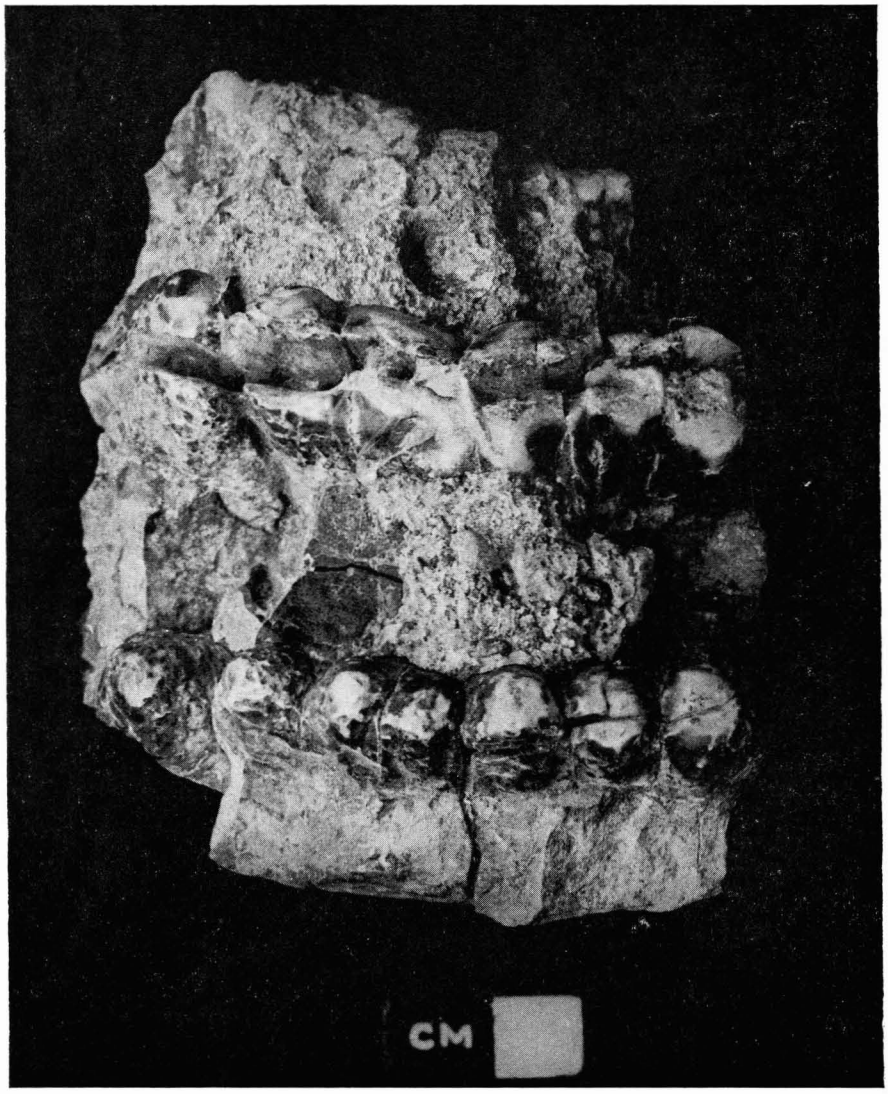

Plate IV A partial molar of *Stegodon insignis*.

1942 *Stegodon insignis-ganesa* Osborn; *Proboscidea*, vol. 2, p. 874

1954 *Stegodon (platystegodon) insignis* Deraniyagala; *Proc. Tenth Ann. Sess. Ceylon Assoc. Adv. Sci.*, p. 25

Description

The specimen is a brachyodont partial molar of *Stegodon insignis* with only two plates present (Pl. IV). Its root is broken. The tips of the ridges gradually slope down toward the lateral sides; consequently, the ridges in the central part are elevated. Some of the conelets have undergone cracking, possibly as a result of subaerial drying. When seen in side view, the anterior ridge is inclined forward while the posterior one is almost erect.

The first ridge from behind is the larger of the two, consisting of seven conelets diminishing in height from the lingual to the buccal side. The grooves separating these conelets are very shallow. The lingual and the buccal ridges are mildly converging. The second ridge has five conelets that are almost equidimensional. This plate is widely broken up transversely; the lingual and buccal ridges converge steeply.

Seen from the front, both lingual and buccal ridges of the specimen are slightly convex from the top downward. The base is not straight but forms an upward point in the middle and is slightly curved upward at either end. There is not much cement on the tooth, indicating that the cement did not extend upon the lingual and buccal edges of the ridges and left the conelets exposed.

Remarks

Falconer and Cautley (1846–1847) gave the names *Stegodon insignis* and *Stegodon ganesa* to three isolated molars collected from the Upper Siwaliks. In view of the close similarity of the teeth, these molars could not be distinguished; hence, the two names were later combined as *Stegodon insignis-ganesa* by Osborn (1942). Subsequently, Deraniyagala (1956) gave the name *Stegodon insignis* to an elephant with a flat-topped skull and feeble tusks and the name *Stegodon ganesa* to an elephant with a domed head and enormous tusks. According to him, the two species differ subgenerically.

Stegodon insignis is characterized by a higher ridge formula, greater dimension of length and width, plane of wear of molars from the anterior to prosterior side, and greater amount of cement filling the intervals between the ridges (Wadia 1925). Falconer (1868) thought *Stegodon ganesa* to have been derived from *Stegodon insignis* by a greater differentiation in certain cranial regions and by development of large tusks. It may also be added that these characteristics indicate nothing more than sex distinction and that *Stegodon ganesa* represents the male and *Stegodon insignis* the female of one and the same species (Hooijer 1955). The markedly large size of the tusks in *Stegodon ganesa* is an additional proof in support of this fact. Hence, the cranial and tusk differences between the two species are attributable to differences in age or sex of the individuals as well as the effect of environment, and these features fall well within the variation limits of *Stegodon insignis*.

Hooijer (1960, 1962) found some teeth similar to those of *Stegodon insignis* in the Middle Pleistocene of the Near East which he named *Stegodon mediterraneus*. He

believes (Hooijer 1964), however, that it might eventually turn out to be "but a terminal population in the range of the Southeastern Asiatic species, the earliest available valid name of which is *Stegodon insignis.*" This indicates the very wide range the species once occupied in Asia.

This species is represented in the faunas of the Pinjor Stage (Badam and Sharma 1973) and also the Narmada beds, thus ranging in age from the Lower Pleistocene to the Upper Pleistocene. The presence of index fossils like *Equus, Elephas,* and *Bos* along with *Stegodon* in the Pinjors and the Narmadas is an additional proof in support of their ages referred to earlier.

Chronology and Environment

While trying to build a relative stratigraphical time scale for the Early and Middle Stone Age cultures of the Central Narmada Valley on the basis of fauna, Badam (1976) suggested that the Red Clay/Boulder Conglomerate horizon (Gravel I) which has yielded Early and Middle Palaeolithic tools along with typical Middle Pleistocene fauna, may be dated between 40,000 and 150,000 B.P. (late Middle Pleistocene to early Upper Pleistocene). The overlying cemented sandy gravel (Gravel II) and the yellowish or pink crossbedded sand and silt (yielding Middle Palaeolithic tools along with Upper Pleistocene fauna) date from 40,000 to 10,000 B.P. In fact, the sandy gravel around Devakachar (Upper Narmada group) gives a C-14 date of 31,750 ± 1625 B.P. (Agrawal and Kusumgar 1974) based on freshwater molluscan shells. The topmost subrecent black alluvium and gravel containing semimineralized bones is Early to Mid-Holocene. Though at present only a single date is available from the valley, it is important from the point of view of general chronology of the Upper Pleistocene in the Central Narmada. Considering the lapse of time involved in the degree of postdepositional diagenetic changes and the erosional processes following them, the dating of the lower group of the Narmada to the time limit of 40,000–150,000 B.P. appears to be within the expected range.

The upper part of the Upper Pleistocene of Narmada (post-33,000 B.P.) can be correlated with the deposits of the Godavari, Ghod, and Pravara Valleys, from which we have a score of C-14 dates more or less of the same range, along with identical fauna. Morphologically, the fauna from the Lower Narmada group (pre-33,000 B.P. and associated with the Boulder Conglomerate) appears to be older than that recovered from the Ghod, Pravara, and Manjra Valleys in Maharashtra. Based on the recent palaeontological study of Narmada alluvial deposits, it appears that for the greater part they belong to the Upper Pleistocene.

Until recently, the Narmada alluvium and the fossils therein have been considered as the standard for post-Villafranchian deposits of India. The present faunal studies, however, indicate that the fossils hithertofore considered as an index for the Middle Pleistocene *(Equus namadicus, Bos namadicus, Elephas hysudricus, Stegodon insignis-ganesa)* in fact range from Middle to Late Pleistocene. Other species, like *Elephas maximus, Cervus duvauceli, Rhinoceros unicornis,* and so on, range from the Late Pleistocene to the Holocene, and only *Hexaprotodon namadicus* and *Sus namadicus* are today considered as index fossils for the Middle Pleistocene (Badam 1977). Some fossils found in the Narmada definitely represent the forerunners of the present-day animals, as can be gleaned from the well-preserved

features of the dentition and other osteological parts. The total complex of the late Pleistocene remains indicates that the valley was a vast savannah land punctuated by floodplain lakes and swamps, in which flourished a vast assemblage of hooved mammals and reptiles. It may be emphasized, however, that there were no significant departures from the existing tropical climate in the area and therefore the valley provided a favorable ecosystem in which some of the animals that migrated from the northwest because of climatic rigor in the glacial periods of the Early Pleistocene could survive up to almost 20,000 years ago.

Details of the chronological and cultural stratigraphy of the central Narmada Valley are given in Table 2.

TABLE 2. CHRONOLOGICAL AND CULTURAL STRATIGRAPHY OF THE CENTRAL NARMADA VALLEY*

APPROXIMATE AGE	LITHOLOGICAL UNITS	APPROXIMATE THICKNESS (IN METERS)	CULTURAL AND ARCHAEOLOGICAL MATERIAL
Early to Mid-Holocene (10,000–4000 B.P.)	Dark brown moderately consolidated silt and gravel		Semimineralized bones; Mesolithic
Late Upper Pleistocene (40,000–10,000 B.P.)	Yellowish brown calcreted silts, sands, and gravels†	10–13	Middle Palaeolithic and Upper Pleistocene fauna
Late Middle Pleistocene to early Upper Pleistocene (150,000–40,000 B.P.)	Reddish brown calcareous silt and well-cemented boulder gravels	3–8	Early Palaeolithic and Middle Palaeolithic (only a few) + Middle Pleistocene fauna

* After Badam 1976.

† Richest zone in fossils. The cemented sandy gravels around Devakachar (Upper Narmada group) give a C-14 date of 31,750 ± 1625 years B.P. (Agrawal and Kusumgar 1974) based on freshwater molluscan shells.

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