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Middle Stone Age Culture in India and Pakistan

Recent investigations show a distinct culture intermediate between the Early and Late stone ages.

H. D. Sankalia

The discovery of a distinct Stone Age period in the Indo-Pakistan subcontinent, with characteristic tools, faunal assemblages, river deposits, and inferred climatic conditions, is comparatively recent. Such a period was first recognized not more than a decade ago. The Age and its artifacts cover the period between the Early and Late stone ages—that is, from approximately the end of the Middle Pleistocene to the beginning, or even into the early part, of the Holocene.

The discovery was in a sense the natural consequence of an organized search for man's early beginnings, and subsequent development, in India. Until 1930, some two stone ages were discernible in India. These were the Paleolithic and the Neolithic. The latter included the microliths, though as early as 1906 Logan (*1*) had designated the period that intervened between these two stone ages the "Mesolithic." However, this classification into Paleolithic and Neolithic, proposed by Robert Bruce Foote (*2, 3*) who tried to arrange his discoveries of stone tools and pottery from several parts of India in some sort of chronological order, had become current. Foote's attempt at classification was soon followed by that of Coggin Brown (*4*), who dealt with a few Copper Age tools and weapons as well as Stone Age objects. However, no steps were taken to put this knowledge on a proper foundation, as Logan had urged and as Foote had tried to do. Even the discovery, in 1920, of the

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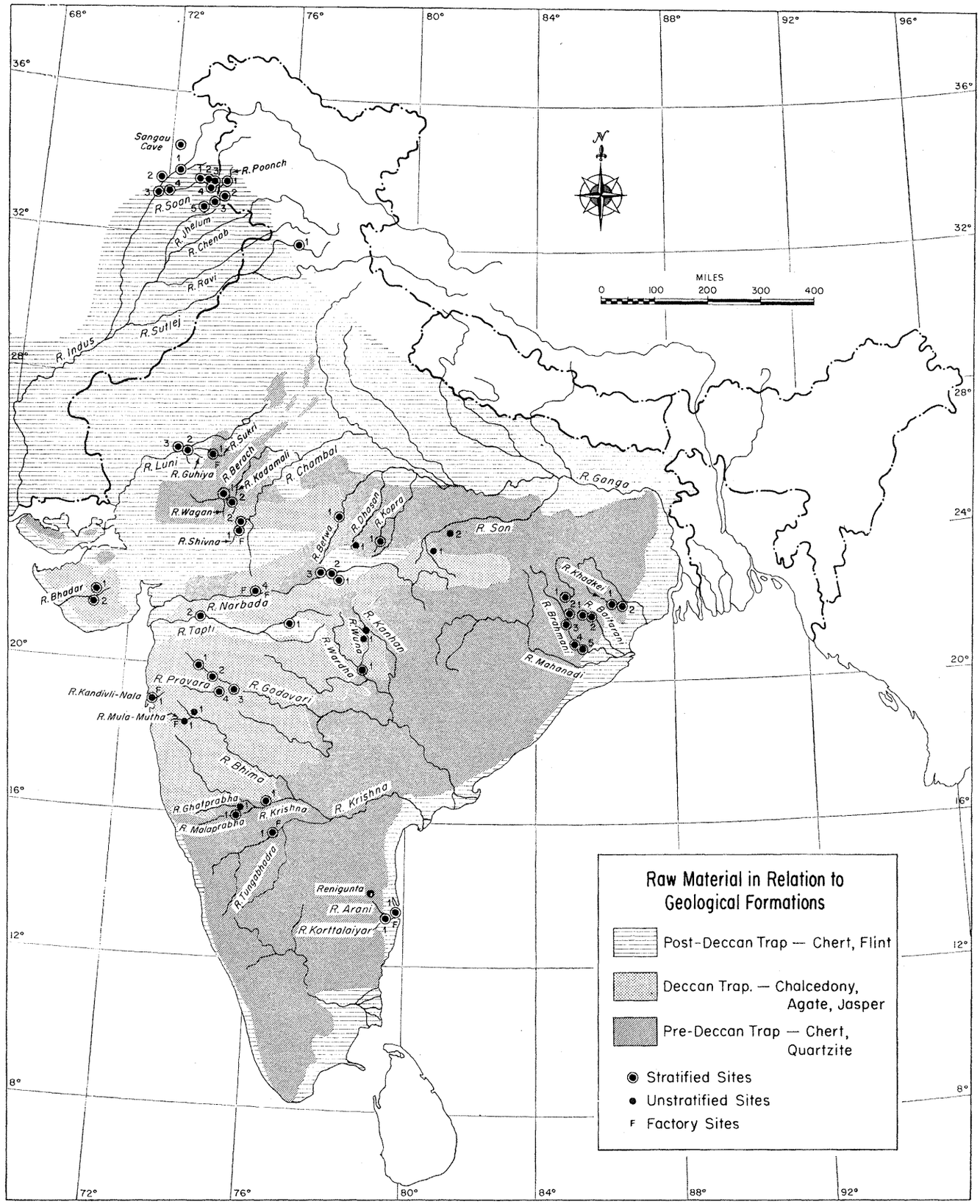

Fig. 1. Map of India and Pakistan showing important Middle Stone Age sites and their relative geological features and raw material. The map has been so designed as to give an idea of the important sites, stratified and surface, and their relation to the principal rock formations and the contained raw materials. The age of Deccan Trap is Cretaceous-Eocene.

River	No.	Site	District	State
Indus	1	Campbellpore	Attock	W. Pakistan
Indus	2	Khushalgarh	Kohat	W. Pakistan
Indus	3	Makhad	Kohat	W. Pakistan
Indus	4	Injra	Kohat	W. Pakistan
Soan	1	Rawalpindi	Rawalpindi	W. Pakistan
Soan	2	Malakpur	Rawalpindi	W. Pakistan
Soan	3	Chauntra	Attock	W. Pakistan
Soan	4	Chakri	Attock	W. Pakistan
Poonch	1	Kotli		
Jhelum	1	Rohtas	Jhelum	Kashmir
Sutlej	1	Ror	Kangra	E. Panjab
Sukri	1	Dhaneri	Pali	Rajasthan
Guhiya	2	Danasani	Pali	Rajasthan
Luni	3	Luni	Jodhpur	Rajasthan
Shivna	1	Mandasor	Mandasor	Madhya Pradesh
Shivna	2	Nahargarh	Mandasor	Madhya Pradesh
Wagan	1	Hajiakheri	Chitorgarh	Rajasthan
Kadamali	2	Nimbahera	Chitorgarh	Rajasthan
Betwa	1	Gonchi	Jhansi	Uttar Pradesh
Dhasan	1	Sihora	Jhansi	Uttar Pradesh
Kopra	1	Khojakheri	Damoh	Madhya Pradesh
Son	1	Gara	Sidhi	Madhya Pradesh
Son	2	Umaria	Shahdol	Madhya Pradesh
Narbada	1	Devakachar	Narsinghpur	Madhya Pradesh
Narbada	2	Barman Ghat	Narsinghpur	Madhya Pradesh
Narbada	3	Saguna Ghat	Narsinghpur	Madhya Pradesh
Narbada	4	Maheshwar	Nimad	Madhya Pradesh
Bhadar	1	Rojdi	Madhya	Saurashtra
Bhadar	2	Jetpur		
Tapti	1	Manjrod	W. Khandesh	Maharashtra
Tapti	2	Udhamgarh	W. Khandesh	Maharashtra
Godavari	1	Nandur Madhmeshwar	Nasik	Maharashtra
Godavari	2	Belpandhari	Ahmadnagar	Maharashtra
Godavari	3	Kalegaon	Ahmadnagar	Maharashtra
Pravara	4	Nevasa	Ahmadnagar	Maharashtra
Wuna	1	Nagpur	Nagpur	Maharashtra
Wardha	1	Patala	Wardha	Maharashtra
Bhima	1	Koregaon	Poona	Maharashtra
Mula-Mutha	1	Poona	Poona	Maharashtra
Kandivli-nala	1	Kandivli	Thana	Maharashtra
Krishna	1	Salvadgi	Bijapur	Mysore
Ghatprabha	1	Bagalkot	Bijapur	Mysore
Malaprabha	1	Taminhal	Bijapur	Mysore
Tungabhadra	1	Nittur	Bellary	Mysore
Ralla Kalava	1	Renigunta	Chittoor	Andhra
Arani	1	Vadamadurai	Chingleput	Madras
Korttalaiyar	1	Attirampakkam	Chingleput	Madras
Brahmani	1	Jhirpani	Sundergarh	Orissa
Brahmani	2	Kurhadi	Sundergarh	Orissa
Brahmani	3	Tumkelaghat	Sundergarh	Orissa
Brahmani	4	Harichandanpur	Dhenkanal	Orissa
Brahmani	5	Bhalitundi	Dhenkanal	Orissa
Baitarani	1	Jagannathpur	Sundergarh	Orissa
Baitarani	2	Ramla	Keonjhar	Orissa
Khadkei	1	Bijatala	Mayurbhanj	Orissa
Khadkei	2	Kandalia	Mayurbhanj	Orissa

great Indus civilization (later called Harappan) did not enkindle a desire to search for its antecedents, which lay in the last phases of the stone ages. Miles Burkitt (*5*) then came forward with his classification, into four series, of tools collected by Cammiade from the southeast coast of India. The series were not specifically named, but it was definitely understood that the tools in series 1 were earlier than the rest, and that those in series 4 were the most recent. Burkitt further tried to correlate the series with certain climatic phases and corresponding soil formations on the east coast, with particular reference to Africa. De Terra and Paterson's (*6*) well-organized researches in the Kashmir Valley and adjacent foothills of the Himalayas lying partly in what is now West Pakistan brought to light stratified Stone Age industries. These were named, respectively, Pre-Soan, Early Soan, and Late Soan. It is now felt that the Late Soan can well be included in the Middle Stone Age (*7, 8*).

De Terra and Paterson also referred to, and illustrated, a flake-and-blade assemblage from Sukkur and Rohri in Sind, West Pakistan, roughly assigning it to a Late Stone Age period, and they vaguely mentioned, without describing or illustrating it, a proto-Neolithic industry (*6*, pp. 308, 320) from the Narbada Valley.

Just at this time, Todd (*9*) published a short account of his discoveries near Bombay, which, because of the wide span of the periods covered by the deposits (in spite of their limited thickness) and because of the variety of the industries, soon became a classic.

In 1943, after my co-workers and I had investigated the Sabarmati Valley and other river valleys of Gujarat (*10*), I began a search in the Deccan (Maharashtra), where no search for Stone Age tools had been previously made because the region was believed to have been unfavorable as a habitat for Stone Age man (*3*, p. 41). Here at Nandur Madhmeshwar in the Godavari Valley we found points, scrapers, and simple flakes on fine-grained, chalcedonic material from well-stratified gravel deposits (*11*). But this assemblage was quite different from assemblages I had previously investigated in Gujarat. Since its significance was not known, no further search was made at the time. Then, in 1954, we found exactly similar tools, in large numbers, at Nevasa (*12*) on the river Pravara, a tributary of the Godavari. Here we also found hand

axes, cleavers, choppers, and chopping tools on a fine-grained variety of basalt, occurring as dykes in the Deccan lavas. Since these two industries, differing markedly in type and depending on different raw materials, are stratigraphically separated as well, provisionally I called the hand-ax assemblage series 1 and the point-scraper assemblage series 2. Still another assemblage, from the surface and consisting of long whitish chalcedonic blades, I called series 3 (*12*).

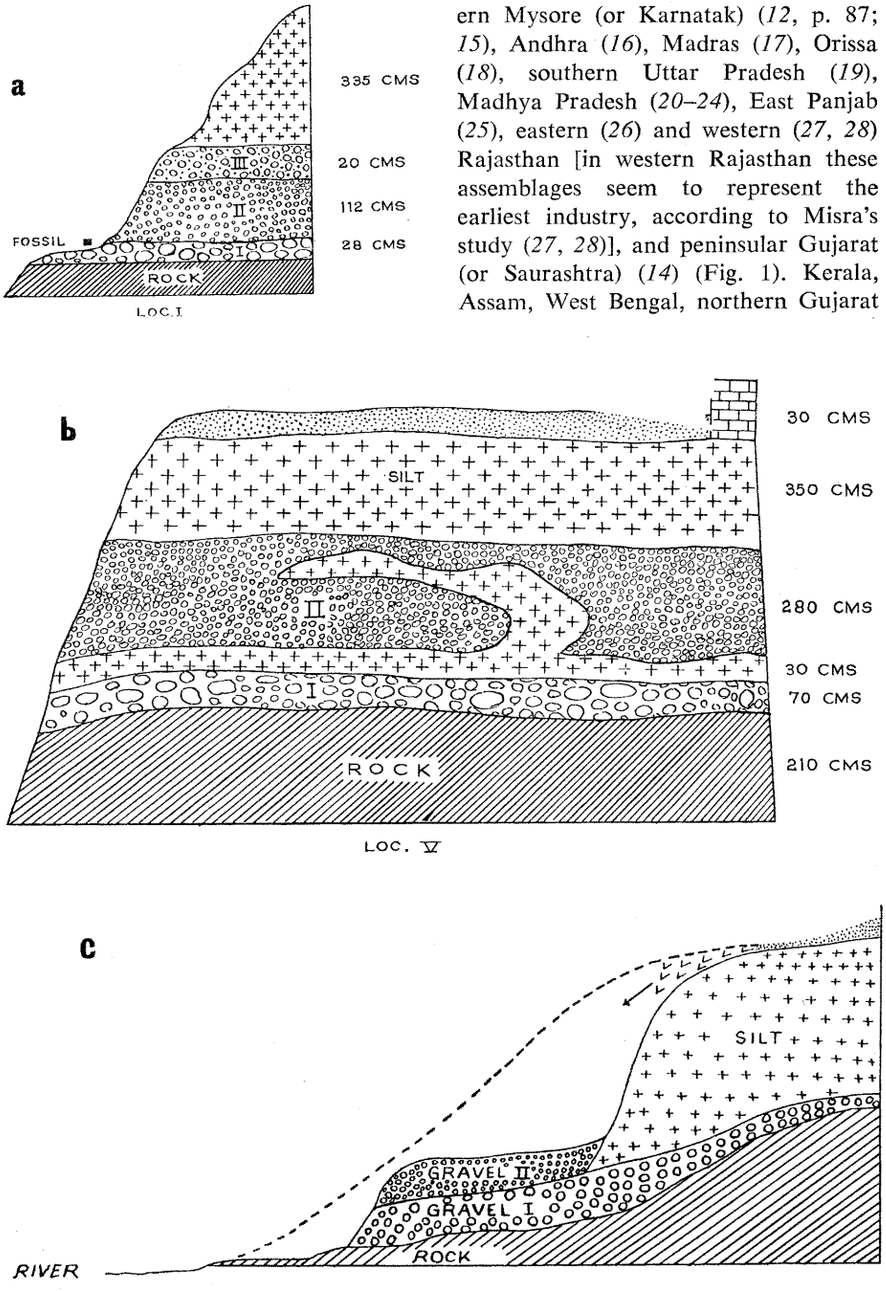

Fig. 2. (*a*) Section, locality I at Nevasa; (*b*) section, locality V at Nevasa; (*c*) suggested reconstruction of the section at locality V, Nevasa. I have observed and studied these sections, and those of Fig. 3, for a long time.

Geographical Extent of the Middle Stone Age Culture

With the clues supplied by the stratigraphy and tool typology at Nevasa, it soon became apparent that similar successions of industries could be found in many parts of India. Systematic searches by my students and colleagues, a few members of the Archaeological Survey of India, and other scholars have, to date, revealed such Stone Age assemblages in many regions. These include districts of Maharashtra (*13*; *14*, p. 108) (though not the coastal district of Ratnagiri), northern Mysore (or Karnatak) (*12*, p. 87; *15*), Andhra (*16*), Madras (*17*), Orissa (*18*), southern Uttar Pradesh (*19*), Madhya Pradesh (*20–24*), East Panjab (*25*), eastern (*26*) and western (*27*, *28*) Rajasthan [in western Rajasthan these assemblages seem to represent the earliest industry, according to Misra's study (*27*, *28*)], and peninsular Gujarat (or Saurashtra) (*14*) (Fig. 1). Kerala, Assam, West Bengal, northern Gujarat (*29*), and Kashmir Valley proper have not yet been explored from this point of view, but it is clear, nevertheless, that this Middle Stone Age culture has a very wide distribution—as wide as that of the Early Stone Age culture. Moreover, owing to the availability of the raw material and the comparative smallness of the tools, as well as to their character, the Middle Stone Age tools appear in greater profusion than the earlier artifacts.

"Middle Stone Age" or "Middle Palaeolithic"?

There has been some difference of opinion concerning the designation of this Stone Age industry. Many field workers began to call similar finds, very often unstratified, "series 2," in accordance with my terminology (*12*). But in every case, the horizon of the tools was not known. Secondly, in a vast country like India there are bound to be regional variations attributable to ecological, geographical, and other factors. So, with a view to including all the stratified and unstratified but typologically similar-looking assemblages, some scholars (*30*) proposed the name "Indian Middle Stone Age," and this name was provisionally accepted by the First Asian Conference on Archaeology, which met in New Delhi in 1960 (*14*, p. xv).

I myself preferred the term "Middle Palaeolithic" (*14*, p. 74), at least for those areas and assemblages where the occurrence of these tools could be definitely assigned to the second wet-and-dry cycle in the Peninsular rivers and where the tools were in all respects identical with those found at Nevasa and elsewhere in Maharashtra. Nevertheless, I accept the new terminology for the sake of avoiding confusion in nomenclature. Recently Misra (*31*) has advanced new and solid reasons for preferring the terms "Early" and "Middle Palaeolithic."

The Indian Middle Stone Age Culture, as it is known at the moment, has the following components and characteristics.

1) Stratified industries of scrapers, borers, and points on flakes and flake-like nodules from Nevasa and other sites in Peninsular India, Rajasthan, south Uttar Pradesh, and Orissa.

2) The Late Soan industry from West Panjab, Pakistan.

3) An industry from Sangav Cave

near Peshawar, West Panjab, Pakistan, recently excavated by A. H. Dani (see *32*).

4) An industry from East Panjab recently discovered by G. C. Mohapatra.

5) Unstratified collections from several other parts of India [Adilabad (*7*), Nalgonda District (*16*), Salvadgi (*33*), Bijapur District, and sites on the upper Son in the Sidhi and Shahdol districts (*19*)] which are typologically similar to the Nevasian (the industry from Nevasa).

Component 2 (the Late Soan industry) has been described and illustrated by De Terra and Paterson (*6*); the collections that comprise component 5 are unstratified; and Dani's cave material (component 3) and Mohapatra's recent East Panjab discoveries (component 4) have not yet been published. Thus, in this article I discuss only component 1 in any detail.

At the type site Nevasa (*34*) (Fig. 2, *a* and *b*) and at Belpandhari, Kalegaon, and Nandur Madhmeshwar (*11*) on the river Godavari, comparatively small tools (points, borers or awls, and scrapers of various types) of a fine-grained chalcedonic material, as well as chert and jasper, occur in fairly well stratified gravels. These gravels appear grayish white when freshly exposed, but on weathering they look dark gray and might be mistaken for basaltic rock itself. In constitution the gravel is more sandy than pebbly and contains nodules of secondary minerals such as jasper, chalcedony, chert, and zeolite, but rarely large pebbles of basalt. Cross-bedding is common.

This description applies to all the areas where the principal rock formation is of basalt [in Maharashtra (*13*), Saurashtra (*14*), and parts of Madhya Pradesh (*35*)]. In Kurnool (Andhra) (*5*, *16*), Bellary (Mysore) (*36*), western Rajasthan (*27*), and Orissa (*18*), the gravels vary in detailed composition and color, for these characteristics depend upon the parent rocks, but their sandy character remains unmistakable.

Superficially this gravel seems to (and in some cases actually does) *overlie* the older deposits, which consist of a coarser gravel, breccia and pebbles of basalt, dolerite, and other material, and observation of numerous sections in several rivers of Peninsular India has convinced me that the stratigraphical position is not as it appears, but is as follows.

Stratigraphical Position

All the major Peninsular rivers (except the Narbada) deposited, after their initial formation, a thick layer of coarse gravel and silt. This is generally 9 to 12 meters thick. [In the Narbada it reaches a height of 24 m (*14*) (see Fig. 3*c*).] The gravels of this phase contain a hand ax-cleaver industry of Acheulean type. For some reason—perhaps because of tectonic disturbances, the change of sea level, climatic changes, or a combination of such events—this deposit, laid down during a wet-and-dry phase, was cut, at times up to the bed rock. Then, during the next cycle, the rivers again filled up the river bed, but rarely did they reach the same height as before (see Fig. 2*b*). Hence, the new deposit does not overlie the earlier deposit but lies against it, thus reducing the size of the river valley. (This fact was noticed by De Terra and mentioned by him in discussing the stratigraphy of the Narbada Valley.) Normally this phenomenon results in the formation of two distinct terraces, a higher and older one, and a lower and younger one. At many places the deposits do not appear as distinct terraces, but

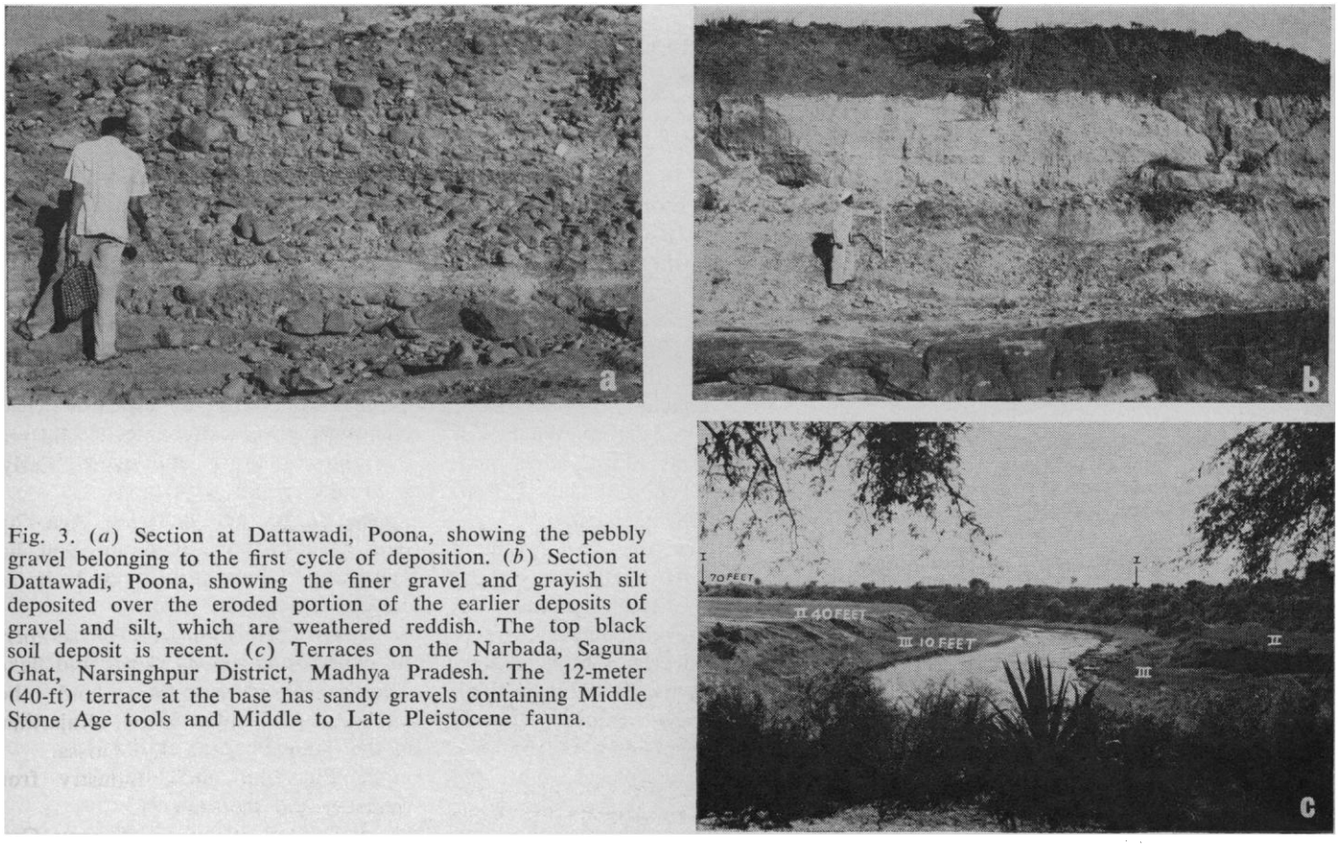

Fig. 3. (*a*) Section at Dattawadi, Poona, showing the pebbly gravel belonging to the first cycle of deposition. (*b*) Section at Dattawadi, Poona, showing the finer gravel and grayish silt deposited over the eroded portion of the earlier deposits of gravel and silt, which are weathered reddish. The top black soil deposit is recent. (*c*) Terraces on the Narbada, Saguna Ghat, Narsinghpur District, Madhya Pradesh. The 12-meter (40-ft) terrace at the base has sandy gravels containing Middle Stone Age tools and Middle to Late Pleistocene fauna.

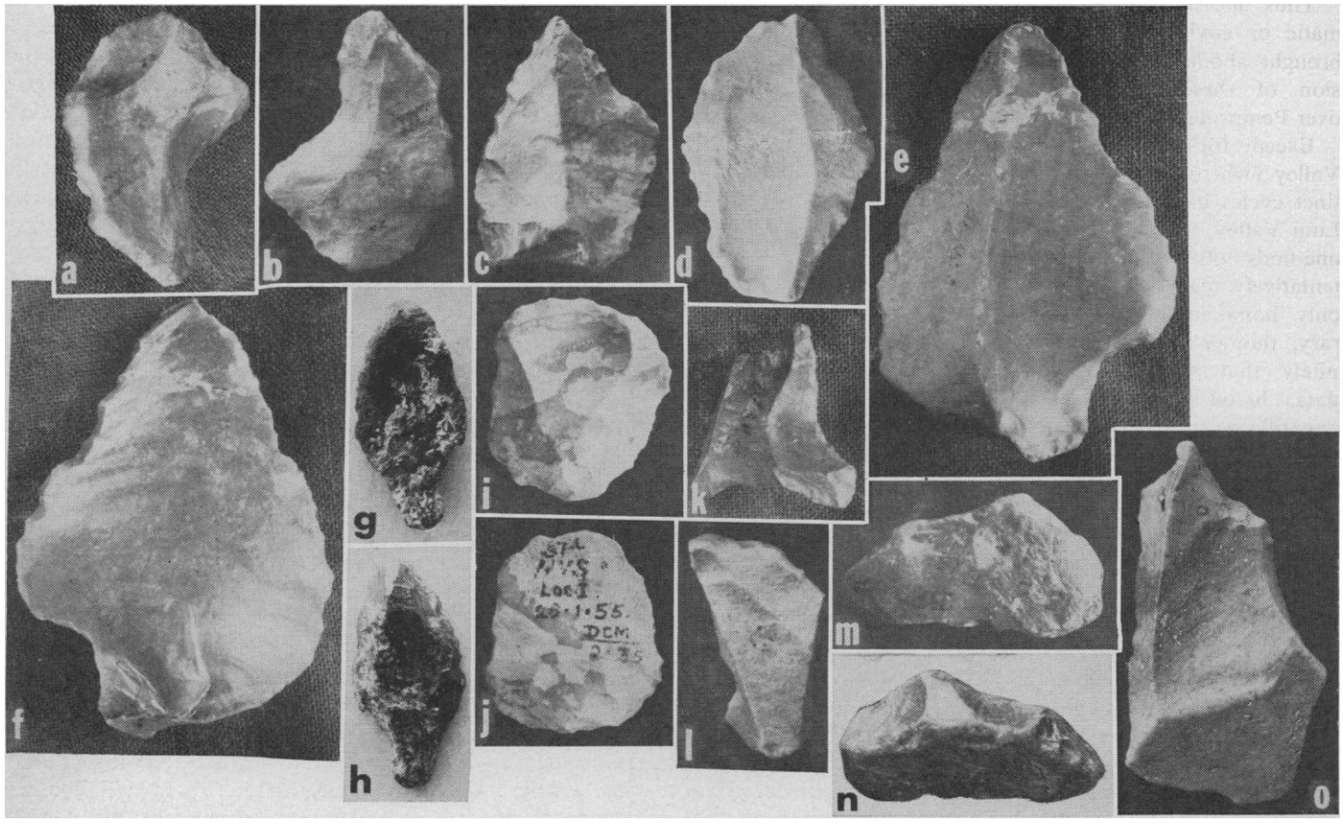

Fig. 4. Tools from Maharashtra. Since the majority of the tools of this culture are on flakes, the upper, or dorsal, surface is usually shown in the photographs, the under, or ventral, surface (the primary flake surface) being shown only in cases where it is of special importance (*44*). In this and Figs. 5–7 most of the important and recurring types of tools are shown; choppers, which are very rare, are not shown. (*a* and *b*) Semicircular hollow scraper, chalcedony. Nevasa. (*c*) Thick sub-triangular point, mottled green and red jasper. Kalegaon. (*d*) Thinnish true Levallois-like flake, brown jasper. Nevasa. (*e* and *f*) Large and thick point-with-convex-scraper, mottled red jasper. Chandoli. (*g* and *h*) Thick dull ovalish point on the bulbar end, with an intentionally made tang, greenish chalcedony. Nevasa. (*i* and *j*) Thinnish discoid scraper on a perfect Levallois flake, mottled green and yellow jasper. Nevasa. (*k*) Double hollow scraper-with-borer, red jasper. Nevasa. (*l*) Steep-ended scraper, green jasper. Nevasa. (*m* and *n*) Thick lunate-like blade, green jasper. Nevasa. (*o*) Borer, banded jasper or agate. Belpandhari.

the older deposit is partly or wholly eroded and its place is taken by the younger deposit. Or very often the second deposit lies completely eroded, and its gravel lies in the river bed. However, at a few sites I have been able to detect the terraces or all the deposits, and at others, the gravel of the second cycle, or its silt, resting clearly against the older silt (which is weathered reddish). Saguna Ghat, in Narsinghpur District, and Dattawadi, in Poona District, are examples of sites where all the terraces may be seen.

At Saguna Ghat (see Fig. 3*c*) the Narbada has exposed three terraces at heights of approximately 21, 12, and 3 meters. The lowest one is recent—the present flood plain. The middle one has a thick, well-cemented gravel bed at its base. This terrace rises here to a height of 4½ to 6 meters and contains both fossils and implements. This is the principal horizon of Middle Stone Age tools of Nevasian type (*37*).

Elsewhere in the basaltic regions the same type of gravel bed forms the base of a low terrace. Noteworthy sites are Belpandhari and Nandur Madhmeshwar (*11*) on the Godavari, Jetpur on the Bhadar in Saurashtra, and a site on the river Wagan in Chitorgarh District. Many other such sites have been reported, but I have not myself seen them.

Poona provides the best example of such a site. At Dattawadi on the right bank of the Mutha, coarse and pebbly, at times even bouldery, gravel is exposed for nearly 1½ kilometers (Fig. 3*a*). It is overlain by a thick deposit of silt, now weathered brownish red and full of lime concretions. It appears that, at places, both the gravel and the silt were wholly or partially cut away during the first erosion and later replaced by a finer gravel and a grayish silt, which does not reach to the height of the older deposit but rests against it (Fig. 3*b*). Because all four deposits are juxtaposed and the color differentiation between the two gravels and the corresponding silts is very marked, a reliable picture of the various climatic cycles and the river mechanism can be reconstructed.

In the still older land mass formed by granite, gneiss, and quartzites, now exposed in Kurnool and Chittoor districts (Andhra), in Belgaum, Bijapur, Bellary, and Dharwar districts (Mysore), and in Chingleput District (Madras), the gravels of this phase appear brownish, pellety, and loosely cemented. Well-exposed sections may be seen at Tandrepadu, opposite the town of Kurnool on the Tungabhadra, at Krishnapuram on the Bhavanasi, at Chintpalli on the Tigaleru, and at Vadamadurai on the Arani.

Thus one may postulate certain climatic or environmental factors which brought about the deposition and erosion of these gravels and silts all over Peninsular India.

Except for deposits in the Narbada Valley (where one finds three such distinct cycles instead of two) and in the Luni Valley, western Rajasthan (where one finds only one such cycle), one may tentatively regard these deposits as not only homotaxial but even contemporary, though before one can say definitely that they are, more positive data, based on intensive and more scientific and detailed study of each major river valley, are needed. Hence the present correlation, based on stratigraphic position of the gravels, their composition, and the tools they contain, should be regarded as strictly provisional.

Principal Tool Types

The industries of this culture comprise the following types of tools.

1) Scrapers of various types on (i) simple flakes, (ii) flakes with prepared platform, (iii) flakes with prepared platform and from prepared cores, and (iv) simple flat nodules: hollow or concave (Fig. 4, *a, b* and *k*; Fig. 5, *e* and *f*); convex (Fig. 4, *e* and *f*; Fig. 6*e*; Fig. 7*g*); concavo-convex (Fig. 5, *e* and *f*); side, on square, rectangular, or crescentic flakes (Fig. 4, *m* and *n*; Fig. 5, *a, b*, and *h*; Fig. 6*e*).

2) Borers or awls (Fig. 4, *k* and *o*; Fig. 5*g*; Fig. 6*e*; Fig. 7*i*) on material similar to that described for type 1.

3) Points (Fig. 4, *c* and *e–h*; Fig. 5, *c, d*, and *j*) on material similar to that described for type 1.

4) Scraper-borers (Fig. 4*k*; Fig. 5*g*; Fig. 7*g*), on material similar to that described for type 1.

5) Blade-like thick flakes (here called "flake knives"), square, rectangular, or crescentic (Fig. 4, *m* and *n*; Fig. 5*h*; Fig 6, *d* and *f*; Fig. 7, *d* and *h*).

6) Choppers.

7) Small Acheulean-type hand axes or bifaces on jasper, flint, and other fine-grained rocks (Fig. 6*b*; Fig. 7*e*).

These tool types are associated with three kinds of cores: (i) amorphous, with deep flake scars; (ii) discoidal, with deep or flattish flake scars, or both (Fig. 6*a*); (iii) cores showing previous preparation of the platform; (iv) "tortoise" cores, from which one flake is taken out, showing previous preparation of the core.

The nature of the flakes has been indicated, but I must emphasize again that most of the flakes in any collec-

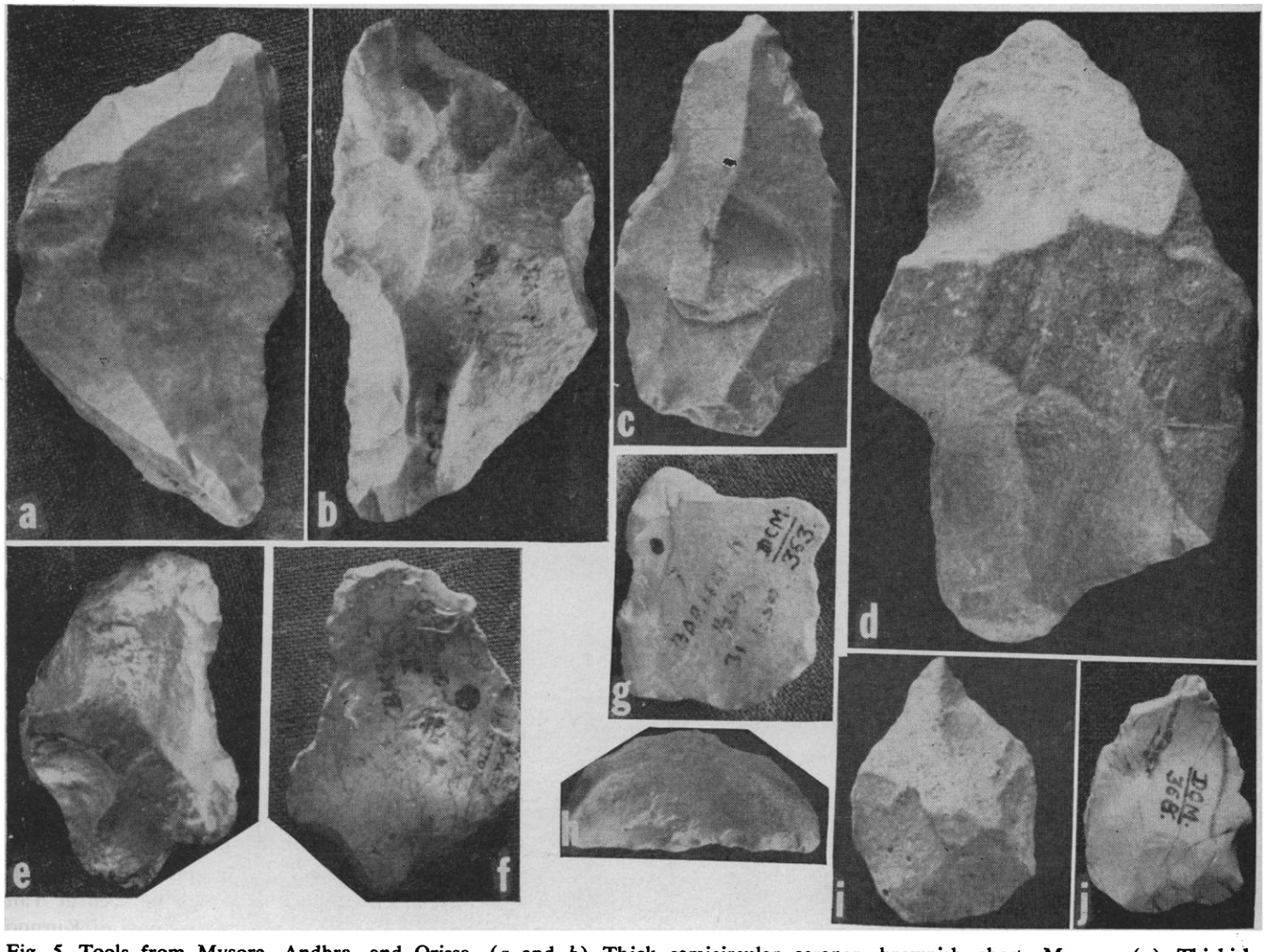

Fig. 5. Tools from Mysore, Andhra, and Orissa. (*a* and *b*) Thick semicircular scraper, brownish chert. Mysore. (*c*) Thickish point, quartzite. Andhra. (*d*) Large thick point, quartzite. Andhra. (*e* and *f*) Scraper with an incipient tang, chert. Mysore. (*g*) Squarish scraper-borer, brownish jasper. Orissa. (*h*) Thick blunted blade or scraper, quartzite. Andhra. (*i*) Point, no retouch, patinated sandstone. Andhra. (*j*) Point, bluish chert. Orissa. [Photographs *c, d, h*, and *i* were taken by N. Isaac; *g* and *j*, by G. C. Mohapatra]

tion that I have seen are of the unprepared type, showing a bulb (sometimes quite prominent) and a flat platform at an angle. Flakes with prepared platform and flakes also showing work on the back, as in true Levalloisian flakes (Fig. 4, *i* and *j*), are indeed few.

No genuine burins or gravers and fluted cores have yet been found in a stratified deposit of this period, though some writers (*18, 22*) have included such tool types in their lists of Middle Stone Age Tools.

Thus, from a study of the cores and a large number of flakes in any collection, it may be said that prepared-core and discoid-core techniques and the stone hammer were used for the removal of flakes. However, the one concern of the maker was to have a flake, or even a nodule, with a flattish surface (Fig. 4, *l* and *o*) so that he could convert it into a point, a borer, or a scraper, with minimum retouch; he often left the main part of the material completely untouched, sometimes even with uneven cortex (Fig. 4, *g* and *h*; Fig. 7, *g–i*). Thus, though the flakes are in a majority in any collection, and the Middle Stone Age industry or culture might be designated a 'flake culture,' still it should be pointed out that the flake was not a prerequisite, as possibly it was in other flake cultures, like the Clactonian and the Levalloisian. Likewise, the retouch on scrapers, points, and borers, and on occasional tanged specimens, is neither regular nor definite, though it is at times quite fine, and the specimen, with its symmetrical outline, can be a thing of beauty (Fig. 4*c*). Undoubtedly, Middle Stone Age man in India could produce an artistic tool which occasionally shows definite traces of an incipient tang (Fig. 4, *g* and *h*; Fig. 5, *d–f*; Fig. 7, *a* and *b*).

It may be seen that the large hand axes, cleavers, choppers, chopping tools, and scrapers which characterize the Early Stone Age, and the tiny lunates, trapezes, and backed blades of penknife type, as well as the genuine fluted cores, which are features of the Late Stone Age, do not figure in these Middle Stone Age industries. There are, no doubt, some scrapers on thick crescentic flakes (Fig. 4, *m* and *n*; Fig. 5*h*), but these are quite different typologically from the thin lunates of the Late Stone Age.

Function of Tools

What did Middle Stone Age man do with these tools? Their function can only be guessed (*38*). The straight-edged scrapers may have been used for dressing skins and barks of trees; the hollow or concave scrapers, for smoothing the hafts of spear or arrowheads (?); the knives, for cutting and chopping; and the pointed tools, for pierc-

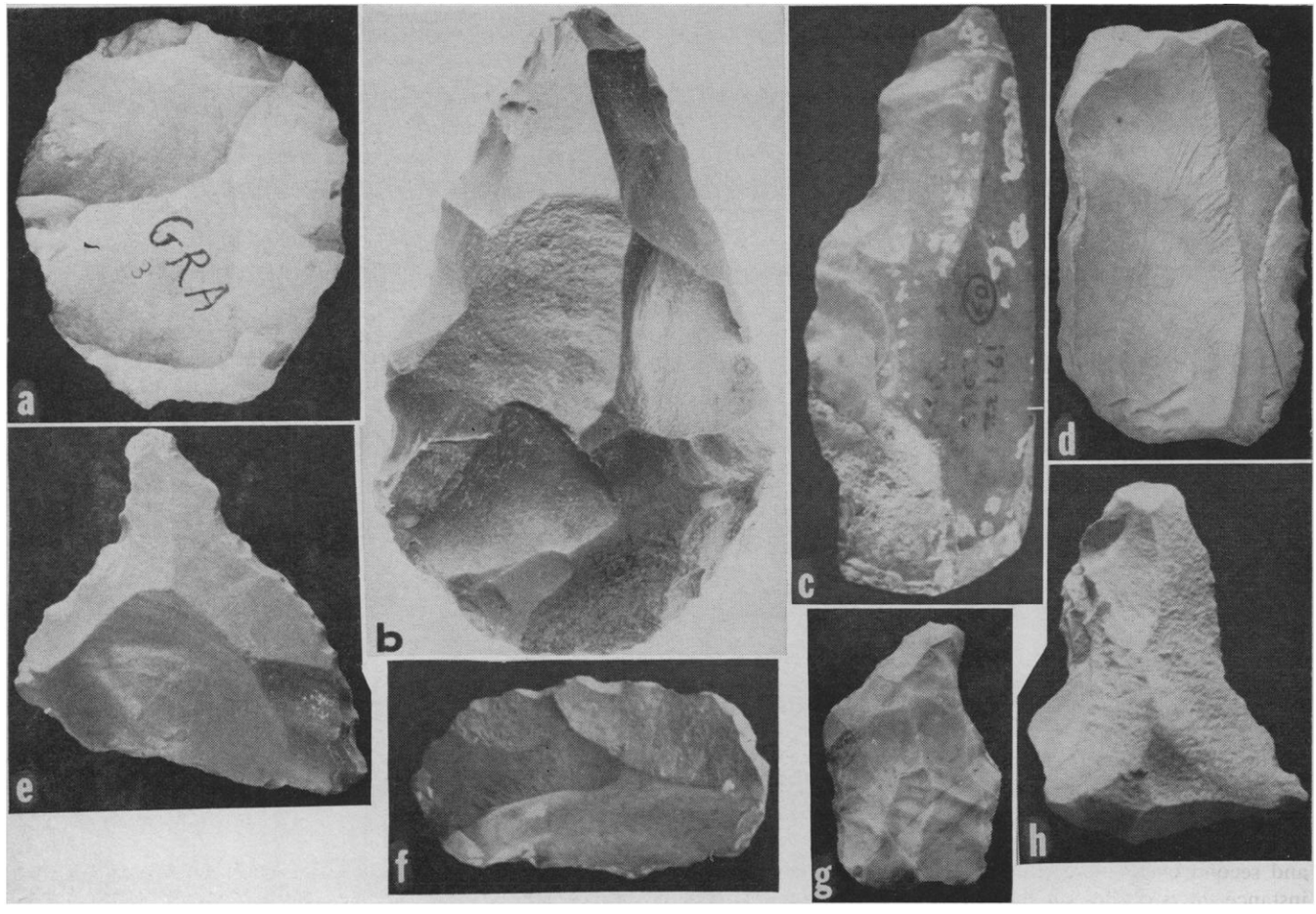

Fig. 6. Tools from Madhya Pradesh and East Panjab. (*a*) Discoid scraper, whitish chert. Madhya Pradesh. (*b*) Hand ax or biface, mottled green and brown jasper. Madhya Pradesh. (*c*) Knife or chopper, patinated cherty flint. Madhya Pradesh. (*d*) Knife or side scraper on thick flake, chert. Madhya Pradesh. (*e*) Hollow scraper-with-borer, brownish chert. Madhya Pradesh. (*f*) Side scraper, patinated brownish chert. Madhya Pradesh. (*g*) Beaked tool, chert. Madhya Pradesh. (*h*) Point, bluish chert. East Panjab. [Photographs *a*, *b*, and *d–g*, N. Ahmed; *c*, R. Singh; *h*, G. C. Mohapatra]

ing [in wood, bone, and soft stone (?)]. It may therefore be inferred that at this period there were larger tools and weapons of more perishable materials, such as bone and wood (*39*, *40*), in the preparation of which these small tools were used. That many of these small tools, including scrapers, were hafted in a primitive way is obvious from the presence of small tangs on points, borers, and scrapers, made by notches and occasionally by retouching of concavities.

Since the gravels and silts are permeable to air and water, no pollen grains could survive in them, on account of oxidizing environments. So no true idea of the vegetational environment is likely to be had. It no doubt varied from one major geographical region to another, as it does today; still, on the whole, it may be said that Middle Stone Age man, wherever his tools have been found in abundance, lived in lightly forested regions where game was readily available and where there was water close by, in the form of a lake or river. In the basaltic regions he no doubt preferred the foothills, for here raw material in the form of veins of agate, chalcedony, quartz, and jasper was close at hand. I have seen many "workshops" around Poona, at Choli and Dongargaon near Maheshwar on the Narbada, at Mandasor on the Shivna, and at Dhaneri, Pali District, Rajasthan. At Choli a mottled and banded jasper occurs in the form of huge outcrops. The area is strewn with thousands of cores of all sizes, but, among these, finished tools are few. At Dhaneri limestone outcrops run in a chain for nearly 65 kilometers. The whole area is full of nodules of chert and flint, from which Misra (*27*, *28*) collected his tools. Findings at Salvadgi on the Krishna, Bijapur District, Mysore, are similar.

Climate

The climatic conditions, too, have to be inferred from the nature of the deposits. Wherever deposits of all four types—the gravels and silts of the first and second cycles—are juxtaposed (for instance, at two sites on the Mutha at Poona, at sites on the Pravara beyond Akola, at Maheshwar on the Narbada, at Nittur on the Tungabhadra, at the junction of two small rivers near Renigunta, and at Vadamadurai on the Arani), marked differences in the color and composition of the gravels and silts are seen. The first or earliest gravel has large pebbles, even boulders and angular slabs, of basalt and dolerite (at Maheshwar, beautifully rounded pebbles of quartzite); it has weathered to a reddish color and is full of lime concretions, owing to leaching. On the other hand, the second gravel (at Maheshwar, this is the third) is, except for the redeposited material, grayish, sandy, and marked by cross-bedding. The silt which overlies it and rests against the older deposits is darkish or whitish gray and comparatively less full of lime concretions. The climatic conditions which brought about these marked differences must have been different; pending laboratory tests, these changes in the deposits may be attributed to a cycle of heavy wet phase followed by a drier phase. This cycle was followed, in turn, by a lighter wet phase, during which subaerial denudation of the surrounding hills, as we see it today, began; the resultant mass of sandy gravel was carried to the river, which in turn aggraded gradually as the climate became drier. Over this gravel was

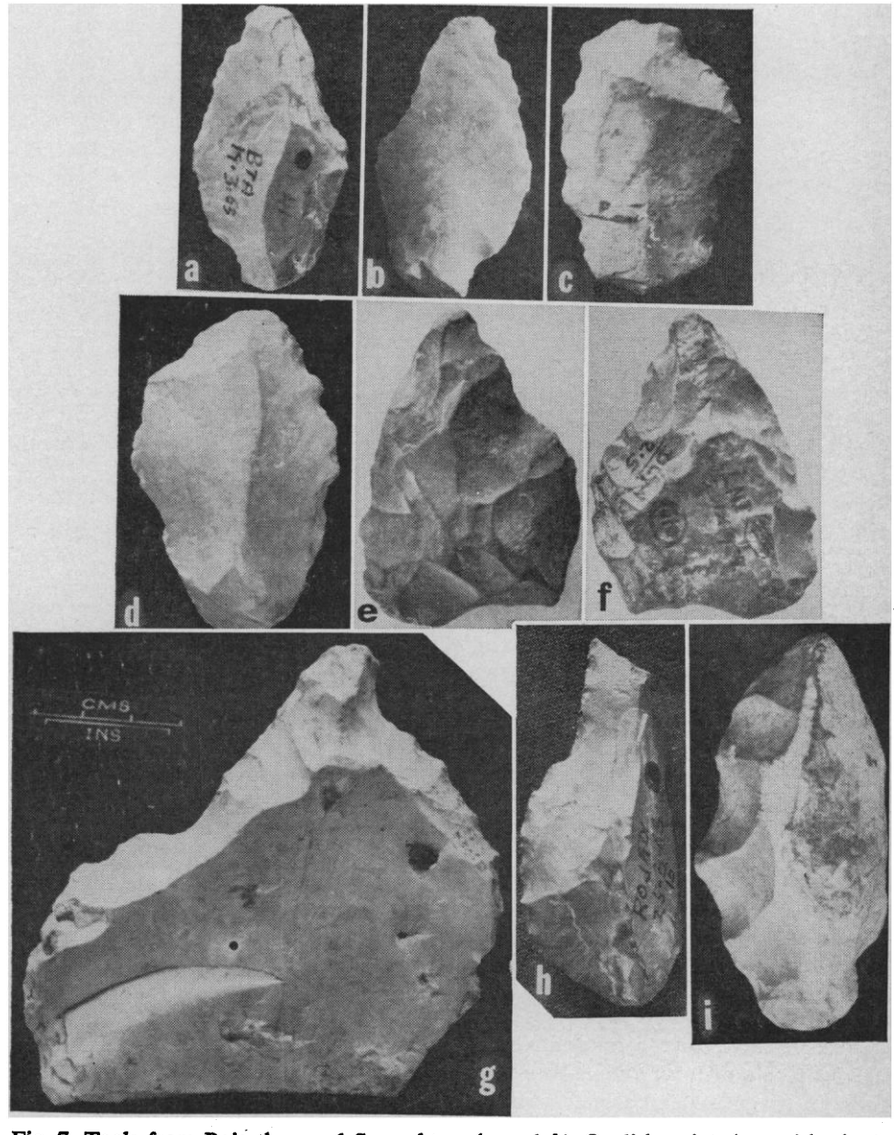

Fig. 7. Tools from Rajasthan and Saurashtra. (*a* and *b*) Ovalish point, brownish chert. Eastern Rajasthan. (*c*) Ovalish scraper on Levallois flake, brownish jasper. Eastern Rajasthan. (*d*) Ovalish flake, patinated cherty flint. Western Rajasthan. (*e* and *f*) Thick bifacial point or tiny hand ax, gray chert. Western Rajasthan. (*g*) Borer-scraper. Western Rajasthan. A large Levallois type core from Rajasthan is not shown. (*h*) Scraper on a convex end-flake, chocolate chert. Saurashtra. (*i*) Unifacial side scraper, patinated chert. West Rajasthan. [Photographs *a*–*g*, *h*, and *i*, V. N. Misra]

deposited a fairly thick layer of darkish or whitish silt, when the river remained sluggish for some time.

In such an environment—not very humid and not thickly wooded—*Bos namadicus* Falconer (or Lydekker) and even *Elephas antiquus*, which have hitherto been regarded as characteristic Middle Pleistocene fauna, seem to have flourished and to have served as game for Middle Stone Age man. Ansari and I (*14*) found a complete skull of *Bos namadicus* Falconer (or Lydekker) (*41*), with the upper jaw and horns, deeply embedded in the gravels at Kalegaon on the Godavari. These gravels are rich in tools, and a few tools were found in the ox's skull itself. Recently my colleagues G. G. Mujumdar and S. N. Rajguru discovered the remains of an elephant tusk at Chandoli, near Poona. We have collected a large number of fossils from fields, thinly overlain with silt, near Devakachar, and we extracted another fossil from the highly cemented gravels at Saguna Ghat on the Narbada. Many more fossils have been previously recovered from this area. All these await scientific identification.

This Middle Stone Age culture (if it be permissible to call the industry by this more comprehensive term), like its predecessor the Early Stone Age culture and its successor the Late Stone Age culture, has been inadequately known and dated. The presence of a fauna hitherto regarded as typically Middle Pleistocene in gravels which belong to terrace 2 or 3 in Peninsular India, as well as the occurrence in some regions (western Rajasthan, Madhya Pradesh, Andhra, Maharashtra) of small hand axes, suggests a relationship of this period and its few industrial elements with the Early Stone Age and its artifacts (*42*). However, the typical flake nature of the Middle Stone Age industry and the use of a totally new raw material, which is invariably silicious and fine-grained, implies the arrival or existence of different cultural forces. It is these which give an individuality to the culture and which seem to have given rise, later, to the microlithic industries, again all over India. However, it must be emphasized that such a course of development is nowhere stratigraphically documented (probably because not much work has been done). It is therefore premature to seek affinities between the Middle Stone Age culture and African (including the Egyptian) or European stone age cultures (*43*).

Summary

For the present we may only note (i) the special features of this flake culture, consisting predominantly of scrapers, points, and borers on any fine-grained material, (ii) its relationship to certain river deposits and factory sites on or near foothills, and (iii) its distribution over almost the whole of Peninsular India. Its maker, Middle Stone Age man, and his vegetational environment are unkown, though we do have a faint idea of the contemporary fauna.

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14. H. D. Sankalia, *Prehistory and Protohistory in India and Pakistan* (Univ. of Bombay, Bombay, 1962–63).
15. K. D. Banerjee, thesis, Deccan College, 1957.
16. N. Isaac, thesis, 1960; Isaac mentions some 40 sites. Recently Shri Nagabhushana Rao has found tools on flakes in Nalgonda District.
17. A few tools, which I have seen, were collected by the late Dr. B. Subbarao from terrace 3 at Attirampakkam, near Madras; Paterson (see *6*, p. 327) also refers to a series of small tools from this region. I visited the two sites of Attirampakkam and Vadamadurai. Two terraces are clearly visible at both the sites, and typical tools such as the borer-scraper were found on the surface.
18. G. C. Mohapatra, *Stone Age Cultures of Orissa* (Poona, 1962), pp. 43, 46, 49.
19. Here tools of various materials—flint, fine chert, and jasper—have been collected by Shri Nisar Ahmad from the valleys of the Son and its tributaries, which flow through the districts of Sidhi and Shahdol in Madhya Pradesh.
20. A. P. Khatri, thesis, University of Poona, 1958.
21. ———, *Asian Perspectives* **6**, 169 (1963).
22. ———, *Proc. Prehistoric Soc.* **28**, 191 (1962).
23. ———, *Anthropos* **57**, 519 (1961).
24. Shri Rameshwar Singh has been working in eastern Madhya Pradesh in the valleys of the Betwa and its tributaries. He has found very interesting material. The best treatment in a short article is by R. V. Joshi, *Ancient India* **17**, 5 (1961).
25. Here small tools on grayish chert have been recently collected by Dr. G. C. Mohapatra (Panjab Univ., Chandigarh) from terrace 4 at Ror, Kangra District.
26. Tools on chert and jasper were found by my colleagues Dr. Z. D. Ansari and Shri S. N. Rajguru, and by me, from the Wagan Valley, Chitor District, in 1962. Subsequently Dr. V. N. Misra made a larger collection.
27. V. N. Misra, "The Stone Age cultures of Rajputana," thesis, University of Poona, 1961.
28. ———, *Bull. Deccan College Res. Inst.* **21**, 85 (1962).
29. Recently some tools have been reported from Kapadvanj on the river Mahi, but these do not seem to belong to this cultural assemblage [K. V. Soundara Rajan, *J. Oriental Inst. Baroda* **10**, 166 (1960)].
30. B. Subbarao, *The Personality of India* (Baroda, 1958), p. 39.
31. V. N. Misra, *Eastern Anthropologist* **15**, 113 (1962).
32. Professor A. H. Dani has kindly sent me a manuscript copy of his report, now in press, for which I am indeed grateful.
33. The tools were first reported by Dr. Seshadri of Mysore University. Later I inspected the site with Shri Nagaraja Rao. There is no doubt about the existence here of a typical Middle Stone Age industry; a beautiful flint-like chert is available in the local limestone.
34. See H. D. Sankalia *et al., From History to Prehistory at Nevasa* (Deccan College, Poona, 1960), ref. 39.
35. H. D. Sankalia *et. al., Excavations at Maheshwar and Navdatoli* (1952–53) (Deccan College, Poona, and Baroda Univ., Baroda, 1958), pp. 38-41.
36. R. V. Joshi, *Pleistocene Studies in the Malaprabha Basin* (Univ. of Poona, Poona, 1955), p. 37.
37. De Terra and Paterson (see *6*) distinguished between the various alluvia or river deposits on the Narbada. According to them there was an older alluvium (type I) and a new alluvium (type II). Type I was divisible into a Lower and an Upper group. The Lower was coarser (that is, more pebbly), well cemented, and overlain by a red silty clay with lime concretions. The Upper was less coarse (that is, it was gravelly and sandy), not very well cemented, and much thicker. It was overlain by a thick bed of yellowish pink clay which was less full of lime concretions than the clay overlying the Lower alluvium. Alluvia of both types I and II contained Middle Pleistocene fauna and tools of Abbevillian, Acheulean, and pre-Soan type, but tools of Late Soan type were said to occur in the Upper group only. The gravel of the newer alluvium was formed principally of trap and chalcedonic nodules and "soft cross-bedded sand." In both types I and II, De Terra and Paterson noticed flakes, blades, and scrapers of jasper and other material; these they vaguely assigned to a protoneolithic period. The gravel was overlain by a brown silty clay. The entire deposit was said to rest against the slopes of older channels. De Terra's observations were challenged by Khatri (see *20–23*), who also made a number of remarks regarding the position of series 2 (Middle Stone Age) tools. My colleagues from the Deccan College—Dr. Z. D. Ansari, Dr. V. N. Misra, and Shri S. N. Rajguru—and I have checked in the field the observations of De Terra and those of Khatri. Also, I have had an opportunity to compare these observations with observations of the Narbada stratigraphy around Maheshwar, made by the late Dr. Subbarao and myself in 1953–54 and 1957–58. In the main, De Terra's observations appear to be correct, though the various sections reproduced by him for sites between Hoshangabad and Narasinghpur are indeed reconstructions, for nowhere does one see the laterite at the base of a section or find all four deposits of the older alluvium at one place. On the other hand, at Maheshwar one finds all four deposits, as well as the latest phases of river aggradation containing loose sand. Khatri has unquestionably made extensive observations along the Narbada and elsewhere, but his statements seem to be contradictory, and nowhere is

a clear stratigraphical picture given. At the recent Seminar in Prehistory held at Poona it was decided to organize an expedition to undertake a fresh study of Narbada stratigraphy.

38. S. A. Semenoy [*Prehistoric Technology*, translated from the original Russian by M. W. Thompson (London, 1964)] has tried to infer more definite function of these tools from traces of manufacture and wear seen with the help of a microscope and other devices.
39. See J. Desmond Clark, *Current Anthropol.* 1, 319 (1960).
40. ——— and F. E. Zeuner, *Environment of Early Man* (Univ. of Baroda, Baroda, 1963).
41. The late Professor Zeuner (see *40*, p. 21) suggests the alternative species.
42. Dr. R. V. Joshi, to whom this article was sent for comments, says that the industry might have evolved (in part) from the Early Stone Age, as on the river Wainganga, Nagpur, where he has a better evolutionary series.
43. Joshi, in a paper presented before the 50th Indian Scientific Congress, in 1963, draws attention to the close similarity between the tools from the younger terrace gravels on the Zambezi, Southern Rhodesia, now exhibited in the Musée de l'Homme, Paris, and the Middle Stone Age tools from India. Professor A. H. Dani (*32*) believes that the Indian Middle Stone Age culture derives from western Asia through western Pakistan.
44. Line drawings (three views) of many of the tools are given in H. D. Sankalia, *Prehistory and Protohistory in India and Pakistan* (Univ. of Bombay, Bombay, 1962–63).
45. In the preparation of this article I am indebted to several of my pupils (some of whom are now colleagues), for I have drawn on their unpublished works, and to my entire staff of the Department of Archaeology, University of Poona.

Racial Differences and the Future

Racial differences in intelligence and ability should be investigated rather than assumed not to exist.

Dwight J. Ingle

This article is a review of a few of the problems related to the struggle of minority ethnic groups, especially the American Negroes, for equal rights and advancement. It considers possible genetic and environmental bases of the problems, tenable means of achieving equal rights with a minimum of conflict, and the possible replacement of weakly effective efforts to alleviate biosocial problems by methods which would prevent their occurrence; and it makes a plea for freedom of debate and inquiry. All that follows is open to debate and criticism; this is an expression of ideas that is intended to be heuristic, not self-validating or fully documented. I use the word "race" in its popular sense, recognizing that all ethnic groups represent mixed origins and that there is no known physical or behavioral trait which is found exclusively in one "race."

The struggle by individuals and groups throughout the world for special rights and privileges is opposed more strongly than ever before by faith in man's worth as an individual and in his freedom to pursue self-fulfillment and happiness as indispensable goals of life. But one individual's drive for self-fulfillment may conflict with another's; hence society adopts laws, customs, and ethics which attempt to define rights and freedoms and thereby guide human conduct.

Most scientists accept the principle of equal legal and moral rights for the individual regardless of race or religion and support the right of each individual to advance according to his abilities, drives, and behavioral standards. But the equality of man is a social, legal, and ethical, rather than a biological concept, for among living things nothing is equal to or identical with anything else. Even if we were to achieve equal civil rights and equal opportunities, complex problems would remain.

Some ethnic groups, the Negroes especially, are handicapped by a substandard culture. Centuries of slavery and racial discrimination have left some, though not all, Negroes with a cultural handicap which begins to be transmitted from adult to child in the earliest formative years. Do genetic handicaps occur more frequently among Negroes than among other ethnic groups? Racists claim that the Negro race is genetically inferior to other races in intelligence, while equalitarians claim that all races are equally endowed with intelligence. Both groups support their respective dogmas by spurious argument and emotionalism. Although it is common to speak and write of intelligence as a unitary quality of mind, it is surely complex (*1*) and is indirectly and imperfectly measured by standardized tests. Both racists and equalitarians claim special knowledge about the relative importance of native endowment and of environment in determining the level of intelligence. The conventional wisdom of the times is that biological differences among races are of no significance from the standpoint of social action. The climate of opinion in our courts, universities, and public press is not favorable either to further inquiry into the question or to debate of the issues. Even those who recognize that the question is unresolved claim that science must stand aside in the struggle for social values.

The problems of other American minorities, such as several Asian groups and the Jews, each of which is subject to segregation, bias, and discriminatory laws, have largely been solved. Each group has a cultural heritage which has facilitated self-fulfillment and successful competition with other groups. Is the average genetic endowment of these groups better than that of the Negro? Despite discrimination against these groups, on the average they perform better than Negroes in the classroom and on objective tests of intelligence and achievement. Many individuals among other minority groups, such as the American Indians and Puerto Ricans, are underprivileged, as are a substantial number of native-born whites who do not suffer from racial prejudice.

The Biology of Race

Several points relevant to the biology of race seem clearly established. (i) There is extensive overlap in the intelligence of whites and Negroes; the generalization made by racists that all whites are superior to all Negroes is false. (ii) The scholastic and intelligence-test performance of Negroes is

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