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The Palaeolithic sequence at Umgababa Ilmenite Diggings

by

O. Davies

(Natal Museum, Pietermaritzburg, South Africa)

SYNOPSIS

The upper part of the fossil dune at Umgababa, 35 km south of Durban, was excavated twenty years ago to recover ilmenite. The stratification revealed was bright red sand, fairly consolidated, to below the floor of the workings, probably extending downwards some 35 m to rock; above this sand there had been left by the miners a hill of cross-bedded calcarenite about 8 m thick, and overlying this there had been further red sand up to close to the surface. In this paper are described the artefacts found at various levels or derived from them. About one metre below the interface of the lower red sand and calcarenite were pieces of very late Acheulian with picks which indicate a transition to the Tugela Industry. The interface had been a surface on which were many terrestrial molluscs, traces of bushes and a few pieces of the Tugela Industry. Within the upper red sand was a layer of nodules with artefacts of the Pietersburg Industry. In a valley which had been eroded and apparently refilled by slumping was a collection of Late Stone Age artefacts, and another collection, probably not *in situ* but dumped by the miners, seemed to belong to a different Late Stone Age industry. On the surface of the dune were middens with Iron Age pottery.

The section is interpreted geochronologically. The lower red sand was probably deposited by wind during the Penultimate (Riss, Saale) Glaciation while sea-level was dropping, and was perhaps calcified from the associated beach-shell. To this stage belongs the end-Acheulian Industry. In the warm and wet Last Interglacial (Eem I) the dune was decalcified and slumped, so that the industry it contained no longer rested on a marked land-surface. The surface of the dune became vegetated and was occupied by the Tugela Industry. As sea-level dropped after Eem I sand again accumulated on the dune and became calcified. The top of the calcarenite member is not clearly exposed. At some stage it ceased to accumulate, and later more red sand was deposited on it, perhaps from an old dune rather than from the beach which would be far to the east. This must have taken place in the first half of the Last Glaciation (Würm, Weichsel); and during an interval in the deposition a Middle Stone Age Industry occupied a surface. The later industries defined were presumably deposited at times during the Holocene.

INTRODUCTION

The Berea Red Sand Formation, as defined by the South African Committee for Stratigraphy of the Geological Survey (1980: ch. 7, 9), consists of one or more cordons of bright red fossil dune-sand, usually becoming grey in depth. A preliminary map of the cordons was published by Davies (1976*a*); minor additions have since been made. The fossil dunes extend along the Natal coast from the Msikaba River in northern Transkei into Mozambique. They have been much eroded, and their present thickness varies from a very few metres to at least 40 m.

In Natal and as far north as the Mlalazi River there appears nearly everywhere to be a single cordon; at Uvongo probably two cordons can be traced, separated by about 300 m free of sand. North of the Mlalazi River four or five cordons have been traced, apparently constructed at times of high sea-level in the course of a long Pleistocene regression. None of these cordons has been dated radiometrically; but *termini a quibus* may be deduced from artefacts found in littoral gravels on which they rest. The oldest are at the latest Early Middle Pleistocene, more probably Lower Pleistocene.

Seaward of the outermost of these cordons is another cordon of calcarenite, defined as the Bluff Sandstone Formation. It immediately overlooks the present beach, and is found continuously north of the Mlalazi River, on Durban Bluff as far south as Amanzimtoti and at Umdloti beach. On Durban Bluff it overlies a beach at +8,1 m and rises to +106 m; this beach is thought from its altitude to have been constructed in Eem I. The calcarenite continues beneath the beach to −90 m (Anderson 1906). Out to sea there are reefs in places. Aliwal shoal off Green Point is composed of calcarenite and is thought to be either a continuation of the Bluff cordon (McCarthy 1967: 137) or perhaps the remains of another cordon constructed during a glacio-eustatic low sea-level.

Examination of the main Berea cordon has generally been impossible owing to lack of exposures. However, a large sand-pit at Umwabi Road, Isipingo (29° 58′37″S 30° 55′18″E) revealed its base resting on marine terraces at +33 and +45 m. Much more informative have been diggings for ilmenite at Umgababa (30° 07′55″–30° 08′33″S 30° 50′24″–30° 50′06″E), in which archaeological industries have been found stratified at several levels. The site has been visited on several occasions; in February 1980 the South African Committee for Stratigraphy authorised the author to conduct a full survey of the exposures, and this paper deals with the archaeological material collected.

GEOLOGICAL STRATIFICATION OF THE UMGABABA DUNE

Though several authors have described the Berea Red Sand Formation, the only printed description of the Umgababa diggings is a discussion by Frankel & McCarthy (1967) on McCarthy's paper (1967) in the same volume; the paper itself contains no reference to the site. There are also field-notes in the Natal Museum of a visit by myself and Mr R. C. Walsh in 1973, and some details remembered by Mr Walsh and Mr J. MacDonald who saw the diggings while being worked about 1957–1963. There are no records by the last mining company, the Anglo American Corporation; nor is there any trace of the artefacts collected during mining.

The diggings extended for about 1 250 m, west of and parallel to the coast road, to a width of about 350 m. McCarthy claims that the red sand extended east of the road, and east of the railway was overlain by white sand of a recent dune. After abandonment there were remains of the red dune on the eastern and western edges of the area and a calcified ridge 20 m high in the centre, from the south end of which there projects a platform about 5 m long, marking the top of the Lower Red Sand. In general the sand has been irregularly stripped.

Mr De Decker made a stratigraphical cross-section as visible in 1980 (Fig. 1), roughly at right angles to the coast, at which time much of the Upper Red Sand had been removed. His section must have been close to Frankel's, which indicates the highest point of the dune at 239 ft (+72,7 m). These would have been about 200 m south of the spot-height of 255 ft (+76,5 m) on the 1968 edition of the 1/50 000 Topographical Survey (based on air-photos taken in 1959), which was probably the highest point on the dune before mining. Frankel's long section disagrees markedly with the Topographical map and must be rejected.

Mr De Decker's section does not represent the total thickness of the stratigraphic unit, since both the upper and the lower boundaries were not visible.

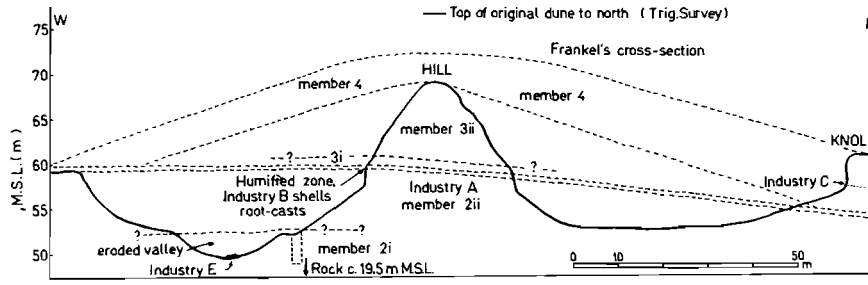


Fig. 1. Berea Red Sand Formation: Umgababa ilmenite diggings, cross-section by Mr De Decker.

Frankel and McCarthy recorded bedrock (Ecca Group sediments) in three boreholes sunk for mining, all outside the area mined. It was at +5,5 m west of the railway, at +7,6 m west of the road and at +19,5 m west of the calcified ridge; boreholes in the highest part of the dune failed to reach rock. Frankel's long section, taken probably east of the ridge-crest, records rock in six boreholes at about +14 m. Both authors reconstruct rock-surface as a gentle upward slope without marine terraces, for which the only evidence would be circumstantial from other parts of the Natal coast. West of the third borehole they sketched the rock-surface as dipping down to +9 m into a tributary valley of the Msimbazi River.

Member 1 is a boulder-bed recorded on rock by McCarthy. There is no indication whether it consisted of rubble, marine-rolled pebbles or other material. It can have been exposed only in boreholes and is now nowhere to be seen.

Member 2 is defined as the Lower Red Sand, the top of which has been removed throughout the diggings. Its surface beneath the calcified ridge in the cross-section is at +59,5 m; it dips gently to the east and south, to about +45 m one kilometre to the south. In the exposed western face of the calcified ridge were found two artefacts, a flake at 1,0 m and a large pick at 1,8 m below the surface of the red sand (80/7; Figs 11, 15). Pieces were found also in the section at the western edge of the diggings (80/11; Figs 10, 16); and one piece 1 m deep in a mound a short way south of the calcified ridge (80/8; Fig. 7); this mound was Lower Red Sand, but its surface at +53 m must have been close to the original contact with Member 3. These artefacts lay at rather irregular depths (1–3 m) below the surface of Member 2. The original floor on which they lay had presumably been disturbed by slumping and will be discussed below. The artefacts, along with others collected unstratified from the floor of the diggings (but typologically or because of red staining belonging to the same industry), are grouped as Industry A.

McCarthy recorded a few flakes from the same horizon, but failed to realise that they were *in situ*. In this way he was able to maintain that Members 2 and 3 are Pliocene. He failed to take account of any archaeological evidence, and relied on foraminifera which, if really Pliocene, must have been derived.

The platform at the south end of the calcified ridge marks the summit of Member 2. The top half-metre is a reworked, humified zone of a fossil land-

surface, browner and darker than the underlying sand. It contains numerous shells of terrestrial molluscs; genera identified are *Archacatina*, *Opeas*, *Tropidophora*, *Gulella*, *Nata*, *Edouardia* and *Trachycistus*. On the surface were calcified root-casts, fragments of bone and artefacts of Industry B (73/20).

At the south end of the diggings, about 1 km south of the platform, is a high dune on the east rising to about +49 m, and west of it a depression and a level ridge rising to about +45 m, much gullied. This ridge consists of the sand of Member 2, yellower than farther north, covered with plaques of calcarenite which must have come from Member 3 mined away; with them were many unbroken quartzite pebbles and a few artefacts (80/10), some stained by red sand. They include four shale hand-axes, a few pebble-picks, one granite push-plane, one quartzite chopper and a few small flakes. Except for Figs 9 and 13, there is no means of deciding whether they belong to Industry A or B, so they have not been listed in the section on the industries.

Member 3 is a grey calcarenite which forms the main part of the surviving ridge. It is about 8 m thick where measured, with surface at +68,8 m. The upper part consists of planar-crossbedded units dipping in various directions. Irregular vertical columns cut across them, due to downward percolation of water. It is composed of quartzitic sand-grains, some heavy minerals and polished shell fragments. Industry B lay on the land-surface at its base, but no complete bones, shells or artefacts were found in it.

Member 4 is an Upper Red Sand, decalcified and without structure. Only traces of it survive on the calcified ridge; but a knoll 90 m to the east is composed entirely of it, resting on the humified surface of Member 2 with molluscs and root-casts, where Member 3 has pinched out.[1] McCarthy records the thickness of Member 4 as 3–9 m; nowhere did I see as much as 9 metres surviving. On the knoll, about 1,5 m from the lower boundary of Member 4, is a horizon of black nodules of heavy minerals and artefacts of Industry C, which McCarthy wrongly calls Sangoan.

Just west of the calcified ridge is a depression extending about 300 m south, with now a small stream-bed. It is not shown on the 1942 Trigonometrical Survey map or on Frankel's cross-section; but as at its bottom there is a floor of dark, slightly indurated sand carrying rubble and many artefacts of Industry E, the depression must be an anciently eroded valley, refilled by slumping probably from the sand of Member 4, and mined out recently perhaps for the high ilmenite content. The floor with Industry E must be *in situ*, so the depression cannot be an artefact of the mining.

At the southern end of the depression, 200 m south of the calcified ridge, was a scatter of artefacts of Industry D and pellets of calcarenite. The archaeological material is not typologically identifiable, and the site seems to be a dump from the mining.

Industry F consists of a number of fairly recent sites on the dune-surface. McCarthy mentions shell-middens; I saw Bantu pottery and in the Natal Museum is a grindstone (73/22).

[1] McCarthy wrongly extends Member 3 too far eastward.

THE INDUSTRIES

Industry A

There are grouped together pieces found *in situ* in the upper part of Member 2 (Lower Red Sand), pieces with red sand adhering to both faces but found unstratified, and pieces collected from the floor of the workings which seem typologically to belong to the group. A few pieces which have been illustrated (Davies 1976*b*: 890, Figs 1–3) are not again illustrated here. Common are thin hand-axes and cleavers of shale, roughly made owing to the intractability of the material. It is assumed that these pieces were dropped on a land-surface within the red sand during a single period; but it is not impossible that more than one stage is represented. The sand was subsequently decalcified and the surface slumped. Possibly before the slumping further sand covered this surface. Professor Yaalon has told me that calcification of a dune does not take place if the sand contains little broken shell or other calcareous material. It is likely, however, that dunes on the windy Natal coast would contain much fragmentary marine shell and would be occupied by numerous terrestrial molluscs. The climate has probably been fairly constant throughout the Pleistocene.

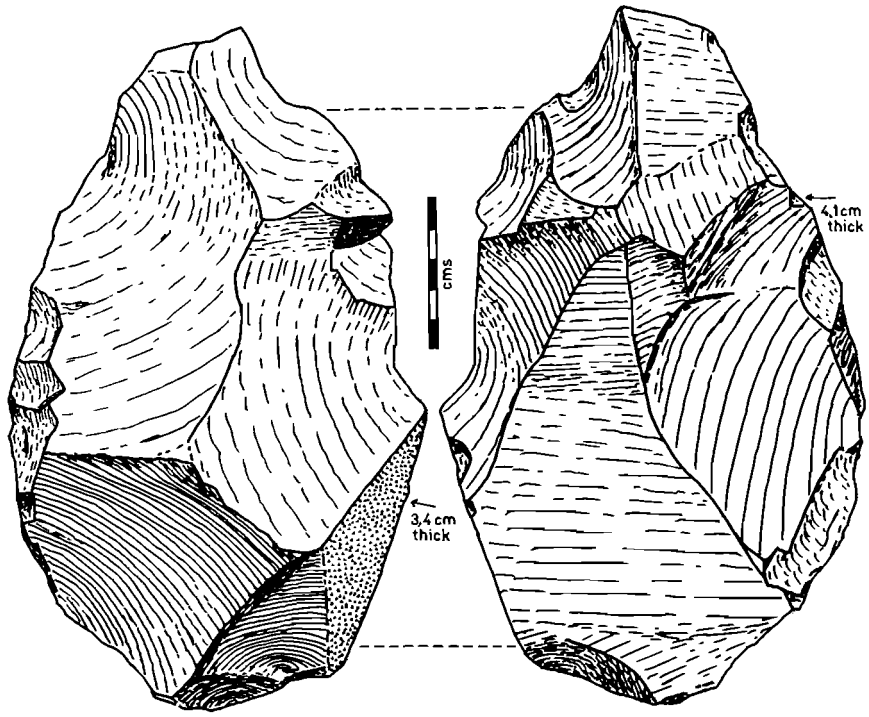
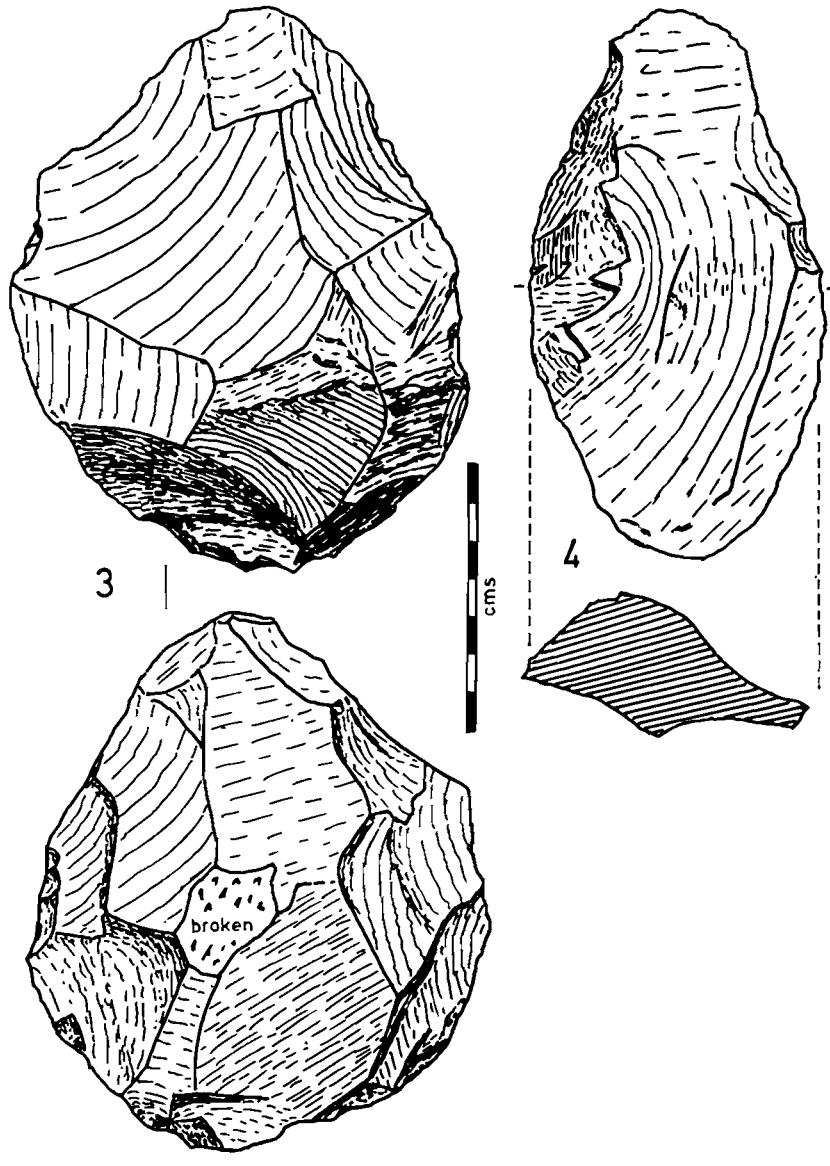
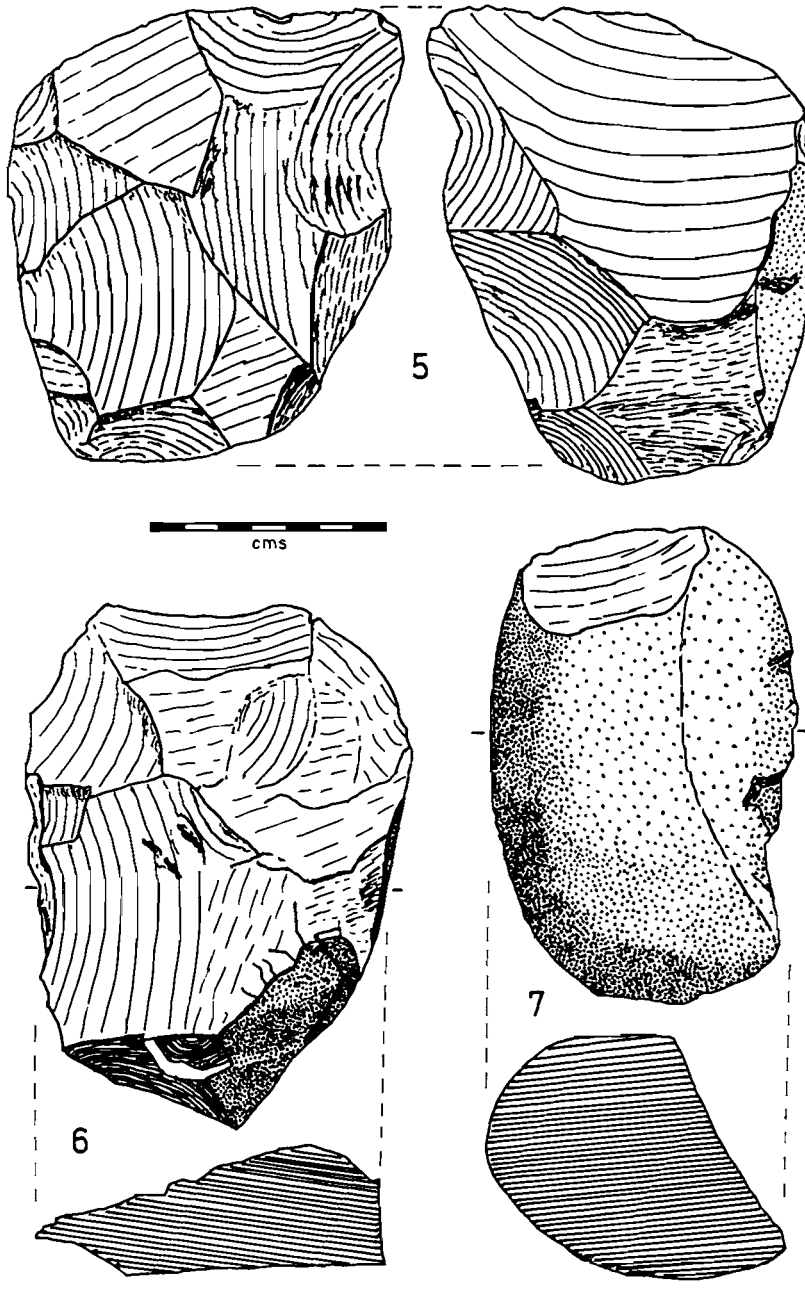


Fig. 2. Thin hand-axe, typologically Late Acheulian, 73/19. Thicknesses indicated are the maxima on the lines across the piece. Unstratified; but right face is red-stained and there are traces of red staining on the other face; so from Member 2.



Figs 3–4. Thick biface hand-axes, shale; unstratified and unstained, but typologically Late Acheulian. 3. 73/19. 4. 73/18.



Figs 5–7. Cleavers, typologically Late Acheulian. 5. Unstratified and unstained, 73/19. 6. Unstratified, red sand only on ventral face, 80/9. 7. Stratified below surface of Member 2 (cleaver or push-plane) 80/8.

The following types of this industry can be distinguished:[2]

(a) Thin hand-axes (five in all)

73/19, unstratified but probably Late Acheulian, collected from all parts of the floor of the diggings which is about 4 m below the former surface of Member 2. Fig. 2 is the largest piece found, and has traces of red staining on both surfaces. It was made from an unrolled block of fine sandstone. A second piece, made of shale, in Davies (1976*b*: 890, Fig. 1).

80/9, three further hand-axes without definite evidence of provenance, probably of Industry A, two of shale and one of fine sandstone.

(b) Thicker hand-axes of shale (three in all)

73/19, unstratified. Fig. 3 without traces of red staining, one face much patinated, probably when exposed after deposition. A second piece in Davies (1976*b*: Fig. 2).

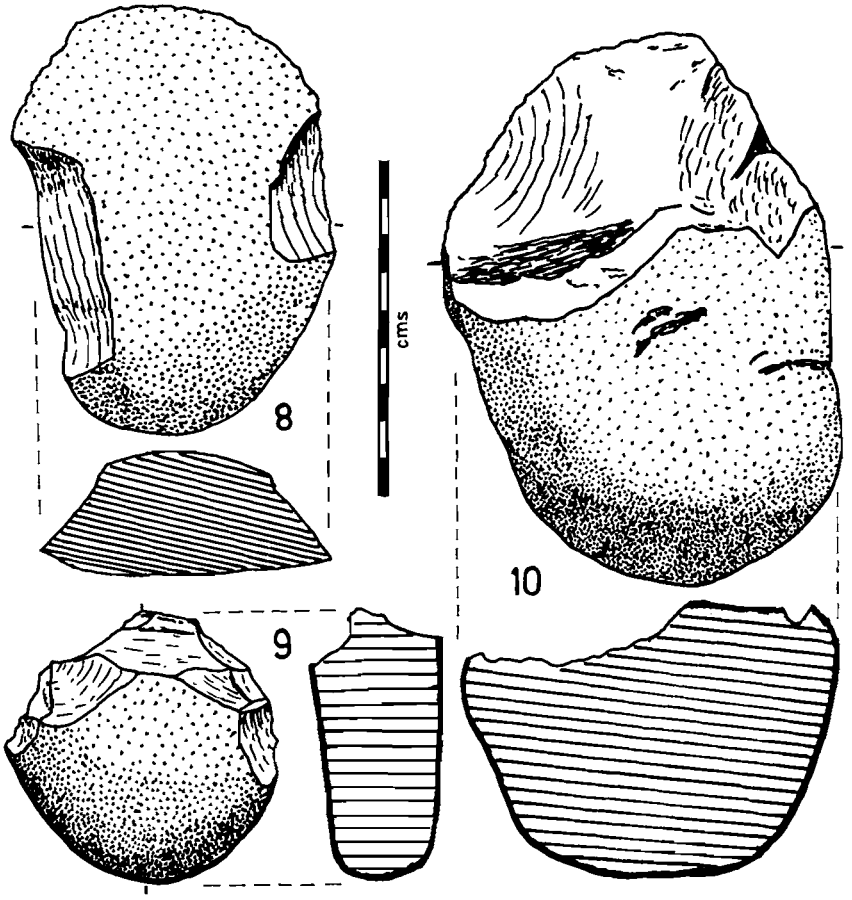
73/18, Fig. 4, unstratified piriform hand-axe, reddish-brown but without signs of red staining.

(c) Cleavers (three in all)

73/19, unstratified, Fig. 5; no traces of red staining; made from an unrolled block of fine sandstone, thickness 3,5 cm.

80/9, unstratified, Fig. 6; from foot of the calcified ridge; made from a block of fine sandstone and red-stained on one face. Another is a crude cleaver of quartz, not illustrated.

80/8 (? Cleaver? or Push-plane), Fig. 7; stratified near top of red sand of Member 2, 150 m south of the main calcified ridge; made from a rolled quartzite pebble; arrises much blunted but probably not rolled.



Figs 8–10. 8. Waisted piece, 80/9; doubtful red stains on both faces. 9. Uniface pebble-chopper, unstratified but red-stained on both faces, 80/10. 10. Uniface pebble-chopper, stratified, 80/11. Thick outlines indicate rolled pebble-surface.

[2] Numbers refer to entries in the Natal Museum register.

(d) Waisted piece

80/9, unstratified from the foot of the calcified ridge; Fig. 8, made from a split quartzite pebble and probably utilised round the edge.

(e) Uniface pebble-choppers

80/11, stratified 2 m below the surface of Member 2 at the west side of the diggings, along with a flake of type g. Fig. 10, made from an irregularly rolled pebble of quartz-breccia, an unusual material in the coastal dunes.

80/9, unstratified from the foot of the calcified ridge, with traces of red sand.

80/10, unstratified but red-stained on both faces, Fig. 9; found at the south end of the diggings where Member 3 has been mined away and Member 2 to several metres depth.

73/19, unstratified, made from a rolled quartzite pebble; Davies (1976*b*: Fig. 3).

(f) Uniface pebble-butted picks

80/7, Fig. 11; stratified 1,8 m below the surface of Member 2 on the west face of the calcified ridge. Made from a rolled older artefact from a quartzite pebble. The older flaking is shallow; the later flaking is unabraded.

80/12, Fig. 12. Unstratified below the edge of the dune on the west side of the workings, but red-stained on both faces and so almost certainly from the same level as 80/11. Made from a rolled quartzite pebble, perhaps fluvial.

(g) Flakes

80/7, stratified 1,0 m below surface of Member 2 on the west face of the calcified ridge, Fig. 15; made of greenish siltstone and used on one edge.

80/11, stratified from the west edge of the diggings, in red sand of Member 2, 2 m below present surface; Fig. 16.

80/10, unstratified from the south end of the workings, red-stained on both faces. Fig. 13, made of sandstone, perhaps of the Ecca series; not retouched and perhaps a trimming-flake.

73/18, unstratified but lightly red-stained on both faces. Fig. 14, made from a quartzite pebble, a flake probably used as a blade.

Industry A appears to be Latest Acheulian. This attribution is strongly suggested by the hand-axes and cleavers. Many shale hand-axes have been found on bedrock in Pietermaritzburg, and one on the surface of a lower red dune at Umwabi Road, Isipingo, overlain by massive upper red dune. Picks, utilised flakes and pebble-choppers, listed above, have not certainly been recorded in Late Acheulian assemblages from Natal, but hardly any sealed sites are known. They have been found in 18-metre and 30-metre marine gravels and in a gravel at 9 m above river at Hluhluwe railway bridge, which may be an estuarine gravel at 18 m above the mouth into False Bay. The waisted pebble (type d) is very rare in South Africa; it may indicate a primitive method of protecting the hand with a pad of grass or hide before the handle was invented; one piece is known from Hluhluwe, and one piece from a Late Acheulian gravel at Mfolozana Drift north-west of Empangeni (Davies 1968).

Industry B

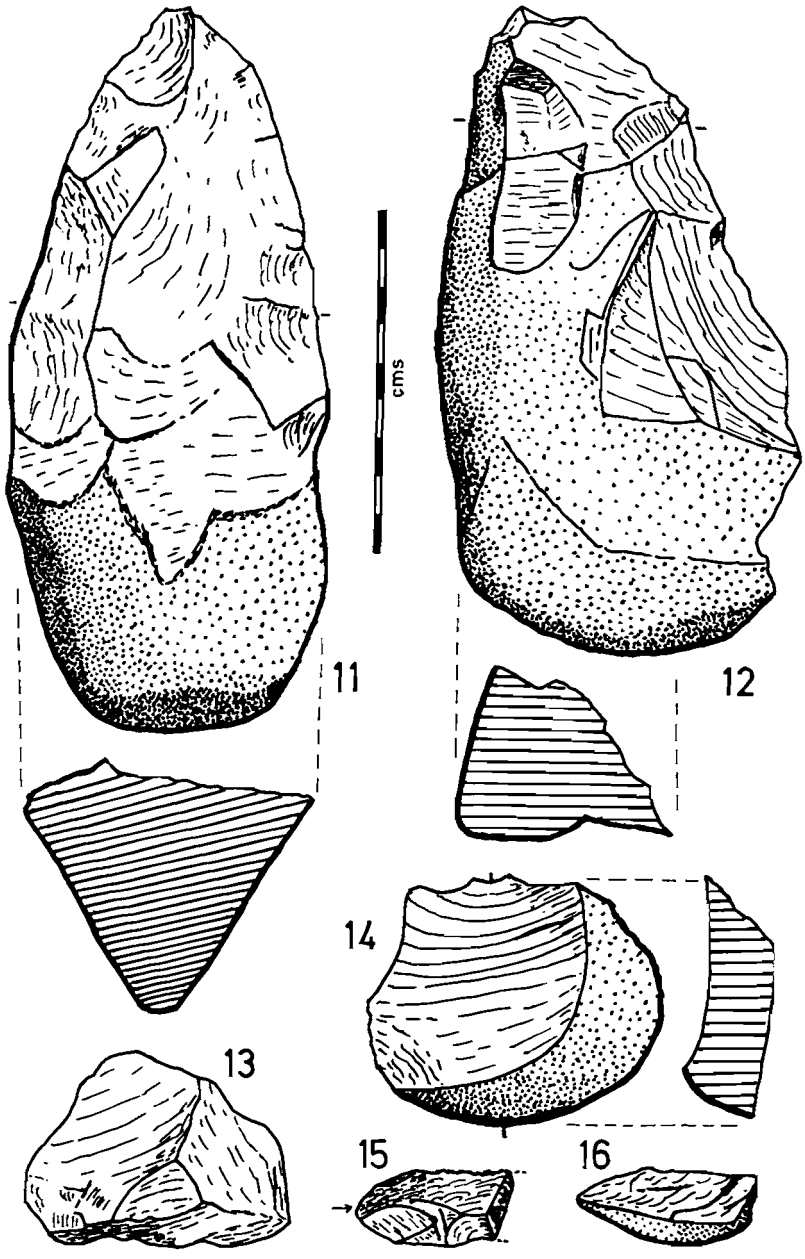
Industry B came from the contact of Members 2 and 3; some pieces are stained red on one face and whitish on the other. Most pieces assigned to it (73/20) were collected in 1973 on or just below the humified surface of Member 2, on or at the sides of the platform projecting southward from the calcified ridge. Some were therefore not exactly stratified; but as at this point there was no indication of Industry A, all may with reasonable certainty be assigned to Industry B.

The following types can be distinguished:

(a) Uniface picks

80/8, medium-sized pick, perhaps unfinished, found 150 m south of the calcified ridge on a mound of red sand just below the contact with the calcarenite of Member 3. Fig. 20, typologically indeterminate; but as there is no trace of red sand it probably had lain at the contact and is assignable to Industry B.

Another piece (Davies, 1976*b*: Fig. 5) made from a large quartzite pebble.



Figs 11–16. 11–12. Uniface pebble-butted picks, thick outlines indicate rolled flake and pebble surfaces. 11. Stratified, 80/7. 12. Unstratified but red-stained on both faces. 13–14. Flakes, unstratified but red-stained on both faces. 13. 80/10. 14. 73/18. 15–16. Flakes, stratified. 15. 80/7. 16. 80/11.

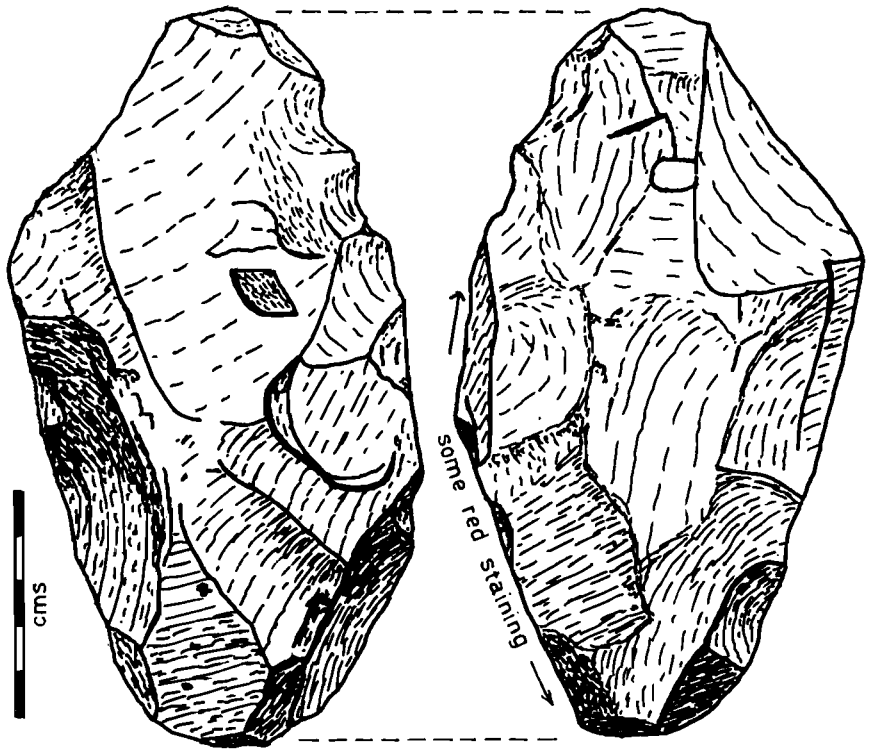


Fig. 17. Pick made on a large quartzite pebble; Industry B, from contact of Members 2 and 3; 73/20.

(b) Large biface picks (Figs 17–19)

Nearly all were made from large quartzite pebbles and most retain much of the pebble-surface on the butt: Fig. 17, used on the point, without pebble-surface remaining; reflaked at the butt on an abraded surface; Fig. 18, unworn; Fig. 19, much worn on both edges but not at the point; Davies, 1976*b*: Fig. 4, made on a slab of quartzite.

Several picks of this type were collected during mining and have now disappeared.

(c) Flat hand-axes of shale or fine sandstone

Two were collected and assigned to Industry B because of red staining on only one face. One lacks the piriform outline of the hand-axes of Industry A.

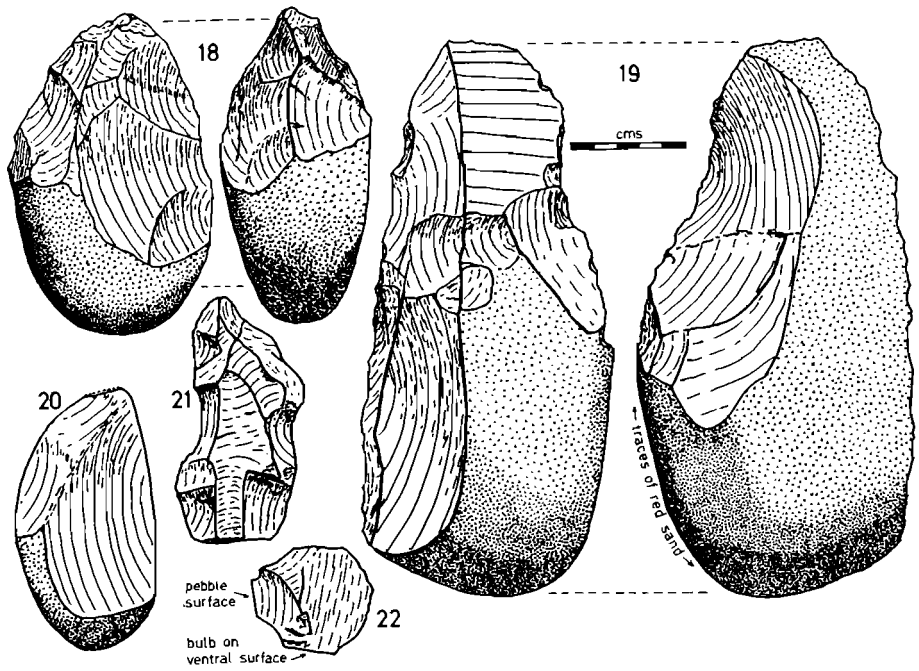
(d) Flakes

Fig. 21, a fair-sized irregular flake with traces of bulb on the ventral surface, red on one face and grey on the other; Fig. 22, small flake with traces of pebble-surface, 1,4 cm thick; probably slightly red-stained on one face and grey on the other.

Several other small flakes not illustrated.

(e) ?Hollow scraper Not illustrated.

Industry B should be assigned to the Tugela Industry (formerly Natal Sangoan). This occurs abundantly along the Natal coast, on the lower courses of some rivers, and in Zululand, Swaziland and the Transvaal west of the Lebombo range, but very rarely on the coastal plain east of the mountains. Davies has detailed the tool-kit elsewhere (1976*b*: 898–904). Sites with abundant typical pieces occur not on but 1–2 m below the surface of the red dune-sands where they have not suffered erosion, whereas on the red sands there are collections



Figs 18–22. Industry B. 18. Biface pick from interface of Members 2 and 3. 19. Biface pick, maximum thickness 8 cms; 73/20, unstratified but red-stained and probably from interface of Members 2 and 3. 20. Uniface pick, 80/8, stratified. 21–22. Flakes.

corresponding to Industry C. It is inferred that the red sand beneath the Tugela horizon corresponds to Member 2 at Umgababa, and that between the two industries to the lower part of Member 4. The only site known for the complete sequence is Burman's Bush in Durban (29°49′30″S 31°00′20″E), which is now much overgrown and built over and was probably never well exposed. No artefacts have been reported. The stratification is approximately:

About + 45– + 102 m, grey bedded calcarenite, very hard near surface. On and just above this surface many terrestrial molluscs and Pliopleistocene foraminifera probably blown inland.
Below a surface between + 36 and + 45 m, red sand.

It should be noted that the tool-kit of Industry A at Umgababa is more like that normally assigned to the Tugela Industry than from other Late Acheulian sites in Natal. In particular, the fairly abundant picks are usually rare in Late Acheulian assemblages, while true hand-axes seldom occur with the Tugela Industry. This may be partly due to the rarity of Late Acheulian sites in Natal; for whatever reason, the Late Acheulian is mostly restricted to the interior, and where in Natal it is fairly abundant, for instance in Pietermaritzburg or near Dundee, the pieces lie on rock mixed with picks. It seems that massive erosion caused the slumping of all older sediments, and the existing sequences began to accumulate after the Tugela Industry. Thus Industry A at Umgababa looks transitional, and may be later than other stratified Late Acheulian assemblages from marine and fluviatile terrace-gravels.

A major typological difficulty is due to Beaumont's failure to publish the sequence from Border Cave. This sequence fairly certainly extended behind the Last Interglacial, though Butzer's suggestion (1978) that the Middle Stone Age started about 200 000 B.P. is no more than a guess. We do not know if Beaumont found at Border Cave either miniature hand-axes, which occur in the East Cape about the time of the Last Interglacial, or heavy picks of the Tugela Industry; nor at what level such artefacts may have appeared. I have tried to discuss in another paper, contributed to the Festschrift Smolla and due to appear in 1984, the transition from the Acheulian to the Middle Stone Age.

Industry C, 73/21

This industry occurred only within the Upper Red Sand (Member 3), in a horizon of black nodules 1,5 m above the base of this member and probably 3–4 m below its surface (see Fig. 1). Some of the 19 pieces in the Natal Museum were collected *in situ*, others round the base of the knoll.

In the collection are two pebble-choppers (Fig. 23a & b). The first is poorly flaked from a well-rounded pebble and heavily stained on one face. The second is made from a pebble of fine, fairly soft sandstone and is deeply red-stained. Neither is comparable with the choppers of Industries A and B.

All the other pieces are fairly small and uniface flakes of quartzite, sandstone and indurated shale. Some are red-stained, others are unstained but have probably been exposed for some years. One flake was struck from a faceted core (Davies 1976*b*: Fig. 10). There is one uniface miniature hand-axe (*ibid.*: Fig. 9). Three seem to be side-scrapers (Fig. 23c, e & f). The other pieces show no clear signs of use (Fig. 23d; Davies 1976*b*: Figs 6–8).

Industry C seems to be Middle Stone Age, roughly comparable with the Pietersburg Industry of the Transvaal. The stages of its development have not been worked out in Natal. It occurs widely in northern Natal on stone-lines within mobile sediments (cf. the Masotcheni Formation, S.A.C.S. 1980: 625). Industry C is also to be correlated with the material on the surface of the red coastal dunes of Natal, from above the Tugela Industry horizon.

Industry E, 80/14

This was found *in situ* at the western foot of the calcified ridge, on a fragmentary black floor at the base of a valley which seems to have been incised into the dune probably in the Holocene and refilled by slumping. The slumped material was re-excavated during mining. Along with the artefacts were a few pieces of calcarenite which must have slipped from Member 3 into the depression during mining, and a very few laterite nodules perhaps from Member 4. A few artefacts are much sand-blasted and may be from Industry C slumped. A few sherds and beads may have been dropped by local Zulus since mining stopped; there is a house and garden close by.

The most numerous pieces are stone chips, largely of lydianite. Only those with signs of working were collected and no excavation was attempted. It appeared, however, that all the material formed a thin layer on the black floor, but part of the site may be buried under recent drift-sand.

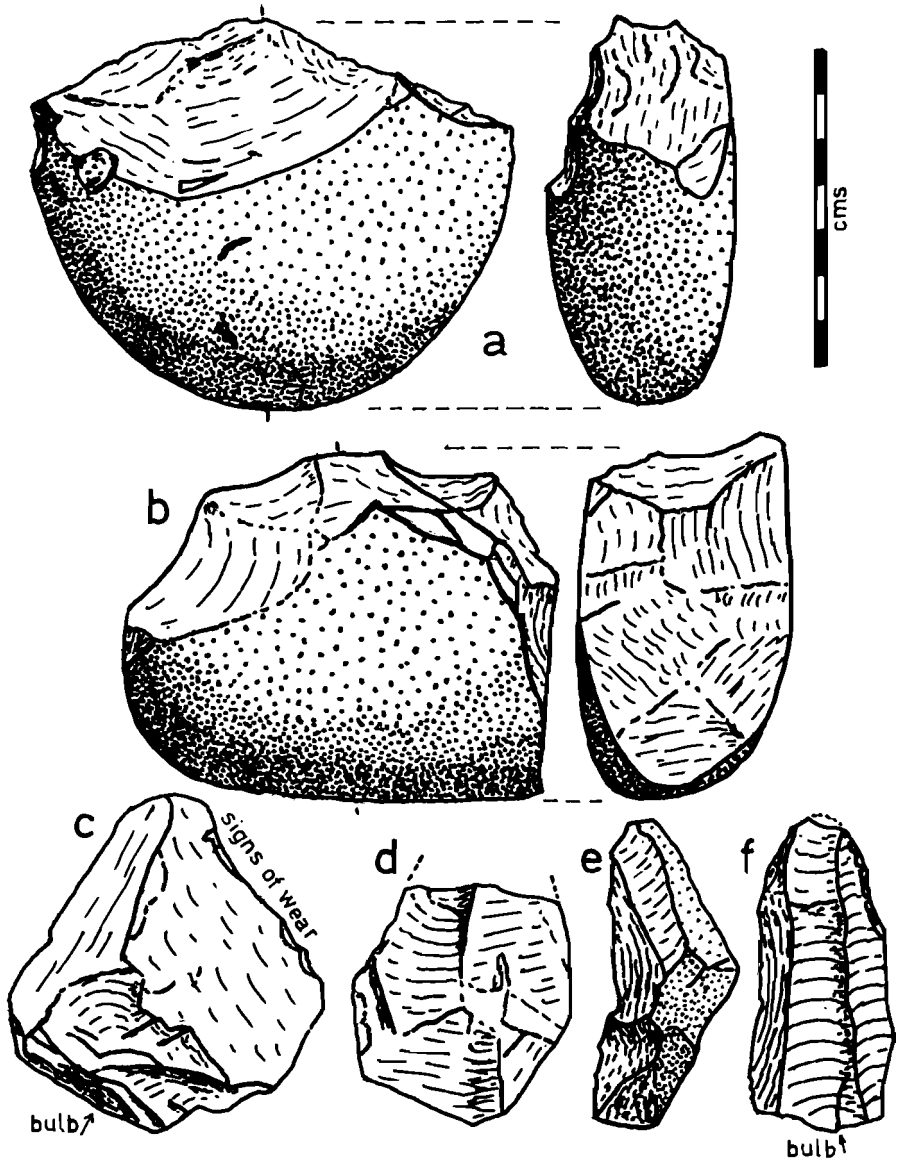


Fig. 23. a–f. Industry C stratified, from a surface within the Upper Red Sand. a–b. Pebble-Choppers. c–f. Uniface pieces with faceted or reduced butts.

The flaked pieces are of quartz, quartzite, lydianite, granite and perhaps silcrete. Many have been made from rolled pebbles, perhaps fluviatile. In addition, there was one weathered piece of hard concreted red sand, hardly an artefact of the mining and perhaps a manuport belonging to the site. It has been difficult to make a representative selection for illustration or to classify satisfactorily the material in the Natal Museum, especially as some pieces could be classified in different ways.

The following is an inventory of the Museum collection (see Fig. 24):

(a) Flakes from pebbles, reflaked at the bulbar end to form a rough tang, but without clear signs of use: 3, 1 ill.
(b) Flakes from pebbles reflaked at both ends, perhaps used as shell-detachers: 1 ill.
(c) Discoid cores on fairly thin flakes: 5, 2 ill.
(d) Probably side-scrapers, with signs of wear on one blade lateral to the bulb: 5, 2 ill.
(e) Scrapers with crude notches perhaps formed by wear: 8, 3 ill.
(f) Perhaps side-scrapers with slight tang: 2 ill.
(g) Microlithic tanged points: 5, 4 ill.
(h) Crude microlithic points, some probably broken: 11, 4 ill.
(i) Very rough tanged pieces: 2 ill.
(j) Blades, one edge blunt, the other slightly worn: 11, 3 ill.
(k) Two-edged microlithic blades: 6, 3 ill.
(l) Lunates ?: 2 ill.
(m) Flakes and chips without sign of wear: 62.
(n) Pebble used for pounding: 1.

Industry E seems to be Late Stone Age, perhaps in the Wilton tradition. There may have been several facies of the Wilton, differing in chronology and location; but they have not been worked out in Natal. A number of Wilton sites has been located on the Natal coast.

Industry D (80/13) and Unstratified (73/18)

A few pieces were found at the south end of the depression about 200 m south-south-west of the calcified ridge. Although they were at first sorted as a separate industry, it has been shown above that the material is probably a dump of mixed origin made during mining. Eight pieces were collected, four are red-stained on one face. They are not like Industry C. If the collection is a unity, it probably came from a single site, now destroyed, on the surface of Member 4. The pieces illustrated in Fig. 25 are:

(a) shell-detacher from a marine-rolled pebble of black shale, without signs of red staining, worn mostly at the top end; a type common on Coastal Smithfield sites.
(b) Flaked atypical piece made from a block of fine sandstone.
(c) Flake from a quartzite pebble, possibly red-stained on ventral surface.
(d) Shale flake from a nodule, probably used.

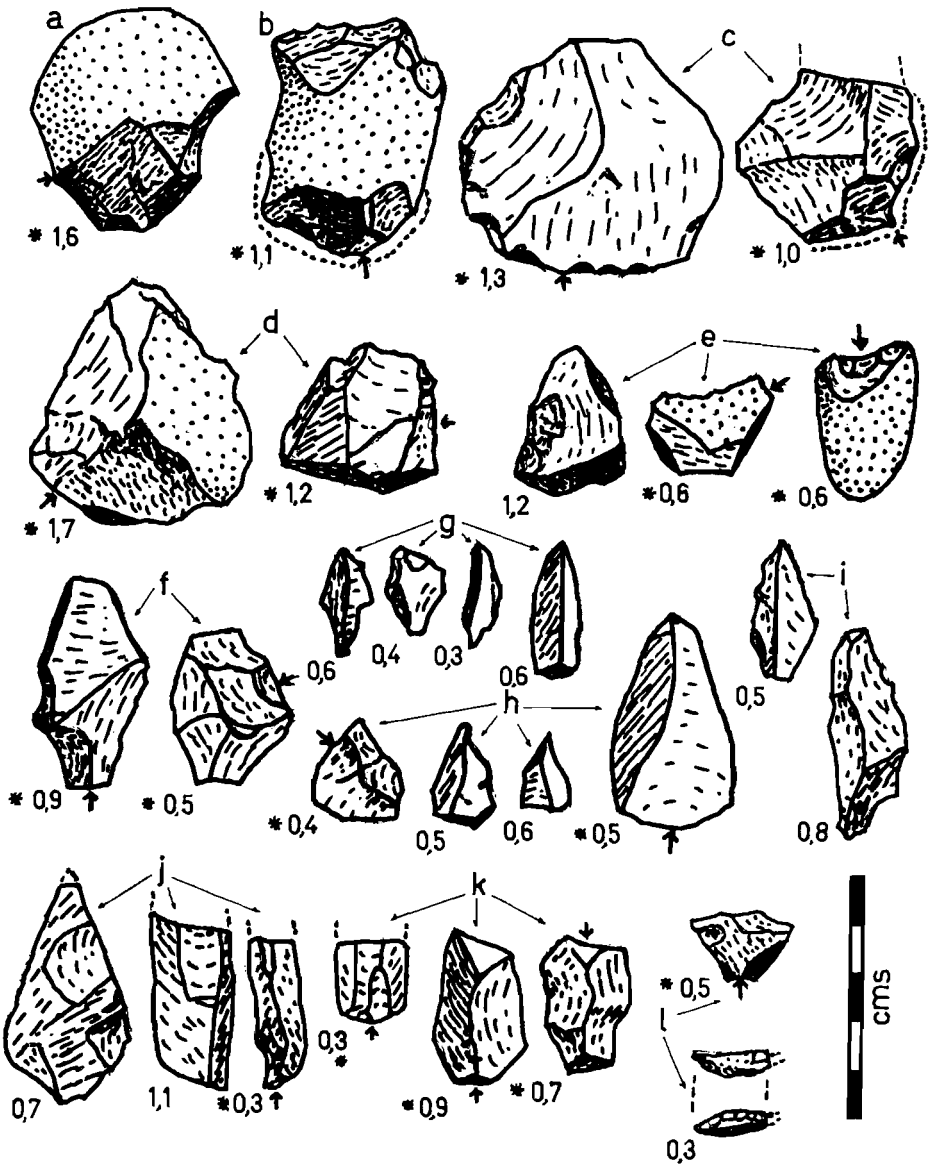


Fig. 24. a–l. Industry E. Mostly Uniface Microliths (as described and defined in text) from site in depression west of Hill. The number under each piece refers to its maximum thickness in centimetres. Dotted lines around parts of b and one piece of c indicate ventral flaking in these areas. Arrows indicate the bulb on ventral surface. An asterisk next to a piece indicates that the ventral face is a flake surface.

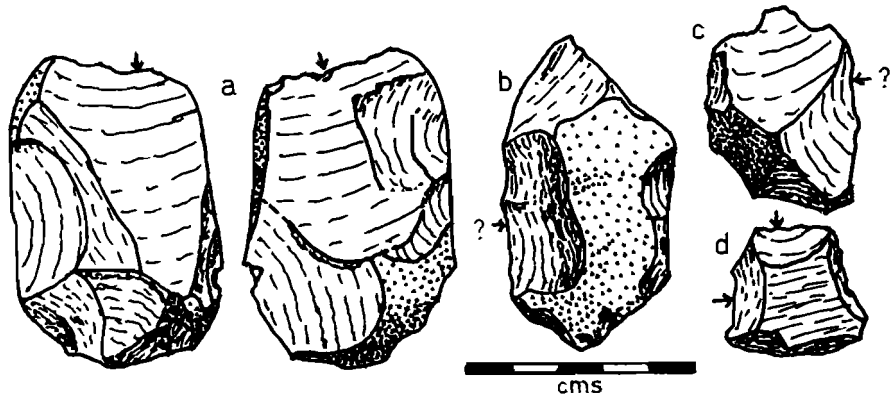


Fig. 25. a–d. Industry D (80/13), unstratified. Perhaps dumped by miners from the surface of the Upper Red Sand. Arrows refer to signs of wear (not certain on pieces b and c).

Many pieces were collected from the floor of all parts of the workings. Their provenance is unknown and they may have been moved around by bulldozers, They include hand-axes, picks, choppers, cores and flakes. They probably are derived from all the industries represented, but are of no archaeological value.

SUGGESTED CHRONOLOGY AND CONCLUSIONS

It is assumed in this discussion that—

1. The older coastal dunes of Natal were constructed near the contemporary coast; so apart from a little reworking by wind, none of the existing onshore dunes were formed during glacio-eustatic low sea-levels. Dunes formed at such times are now submerged reefs.

2. All the dunes at one time contained much calcareous shell, both marine fragments and terrestrial molluscs. A low content of shell is unlikely in Natal during any Pleistocene interglacial.

3. At some stage all existing onshore dunes were decalcified, leaving only red quartzitic sand, which would have slumped and now be without structure. Submerged dunes would not be decalcified.

4. Decalcification probably took place during the Eem I interglacial (Deep-sea Stage 5e)[3], which world-wide was warmer and probably wetter than any other stage in the Pleistocene (Shackleton & Opdyke 1976). Its date is fixed by U/Th analyses from many parts of the Tropics as about 125 000 B.P. (Davies 1980). At that time general ocean-level rose + 7–+9 m, so the lower part of the Bluff Ridge at Durban remained calcified.

5. Calcarenite beds in fossil dunes (eg. Umgababa, Burman's Bush, Durban Bluff and the outer cordon in Zululand) were laid down later than the general decalcification. Some of these have subsequently undergone decalcification locally, either in the later interstadials of Eem (Stages 5a and 5c) or in the Holocene (King & Maud 1964: 21–2).

[3] The sequence is classified according to deep-ocean stages, without attempting correlation with the glacial sequence of the Northern Hemisphere.

In the south-east Cape a Middle Stone Age Industry was well established before the peak of Stage 5e (Davies 1980: 162; Davies 1984). More speculative evidence from north Natal (Butzer *et al.* 1978) and not entirely reliable K/Ar dates from Ethiopia (Wendorf *et al.* 1975) suggest that it was established very soon after 200 000 B.P. i.e. around Stage 7. In Natal I regard the Tugela Industry as a very early phase of the Middle Stone Age; it was preceded by a Late Acheulian Industry. Consequently, Member 2 at Umgababa was decalcified in Stage 5e and the dune was constructed earlier. The industry not far below its surface seems transitional, so may belong to Stage 6. Such a transitional industry has not previously been noticed. In Central Africa there is often a sharp hiatus between the Acheulian and the Sangoan (Davies 1976*b*: 896–7). The surface of Umgababa Member 2 is very level, so after decalcification it was probably planed by wind in Stage 5d, a colder period in which south-easterlies may have been frequent. On this planed surface Industry B was deposited, terrestrial molluscs and mammals lived and bushes grew.

On this land-surface Member 3 was constructed as dune-sand, and later calcified. As the dune is likely to have been built during a high but regressing ocean, it probably formed not later than Stage 5a; calcification took place before Stage 4, which was very cold and dry.

It is unlikely that Member 4 was composed of shell-bearing sands, which during the long period of fluctuating climate of Stages 4–1 should have been converted to calcarenite. It could perhaps have been constructed during the very cold Stage 2, when few molluscs may have been able to survive on the Natal coast; but Industry C would hardly suit so late a date when the Late Stone Age was well established in parts of South Africa. So the sand is more likely to have been transported by wind from a blow-out somewhere in Member 2; strong winds would be able to move grains of heavy minerals.

Subsequently, perhaps in the Early Holocene, the valley west of the calcified ridge was incised and the people of Industry E settled in it; this industry need be no more than a few thousand years old. Subsequently the valley was refilled by illuviation.

The following sequence is suggested speculatively:

Planation Member 2	Stage 5d (stadial)
Industry B	Stage 5c (interstadial)
Member 3	Stage 5b (stadial)
Calcification of Member 3	Stage 5a (interstadial)
Member 4 base	Stage 4 (glacial)
Industry C	Stage 3 (interstadial).

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