Recent Archaeological Research in Southeastern Ethiopia. 1974 - 1975

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Annales d'Ethiopie, Année 1978, Volume 11, Numéro 1
p. 19 - 44

RECENT ARCHAEOLOGICAL RESEARCH IN SOUTHEASTERN ETHIOPIA (1974-1975)

SOME PRELIMINARY RESULTS

by

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During the winters of 1974 and 1975, with finance provided by the National Science Foundation and the Swan Fund, a group of archaeologists from Berkeley, geomorphologists from Macquarie University and a rock art specialist from Cambridge University, carried out reconnaissance and some excavation and copying of rock paintings in the southern part of the Afar Rift at c.900m and the northern part of the Southeast Plateau at about 2,500m. Our main objectives were:

1. to locate and sample sealed occupation sites, hopefully with plant remains and fauna, that could be radiometrically dated and tied into the climatic and ecological changes recorded by the geomorphologists.
2. to try to reconstruct the economic base by sampling and catchment analysis at selected sites.
3. to try to assess the extent to which the contrasting eco-systems of Rift and Plateau may have been responsible for observed differences in the cultural assemblages.
4. to try to document the appearance of domestic plants and animals in that part of southeastern Ethiopia and to construct models for prehistoric land and resource use based on the work of the ecological botanist/anthropologist, Claudia Carr from the University of California at Santa Cruz, who in 1975 studied the pastoral and agricultural Itu Galla at the south end of the Afar Rift to provide a basis for such model building.

In 1974 our work was mostly confined to the Rift and in 1975 we extended this work and carried out reconnaissance of the upper part of the Webi Shebeli on the South-East Plateau. In 1975, also, Richard Wilding of the National University in Addis Ababa surveyed mediaeval town sites in eastern Shoa and south and east of Harar and joined us for part of our own survey in Bale.

The main sites are all either adjacent to or within the escarpment country or on the Southeastern Plateau (Fig. 1). As in other parts of the Rift Valley system,

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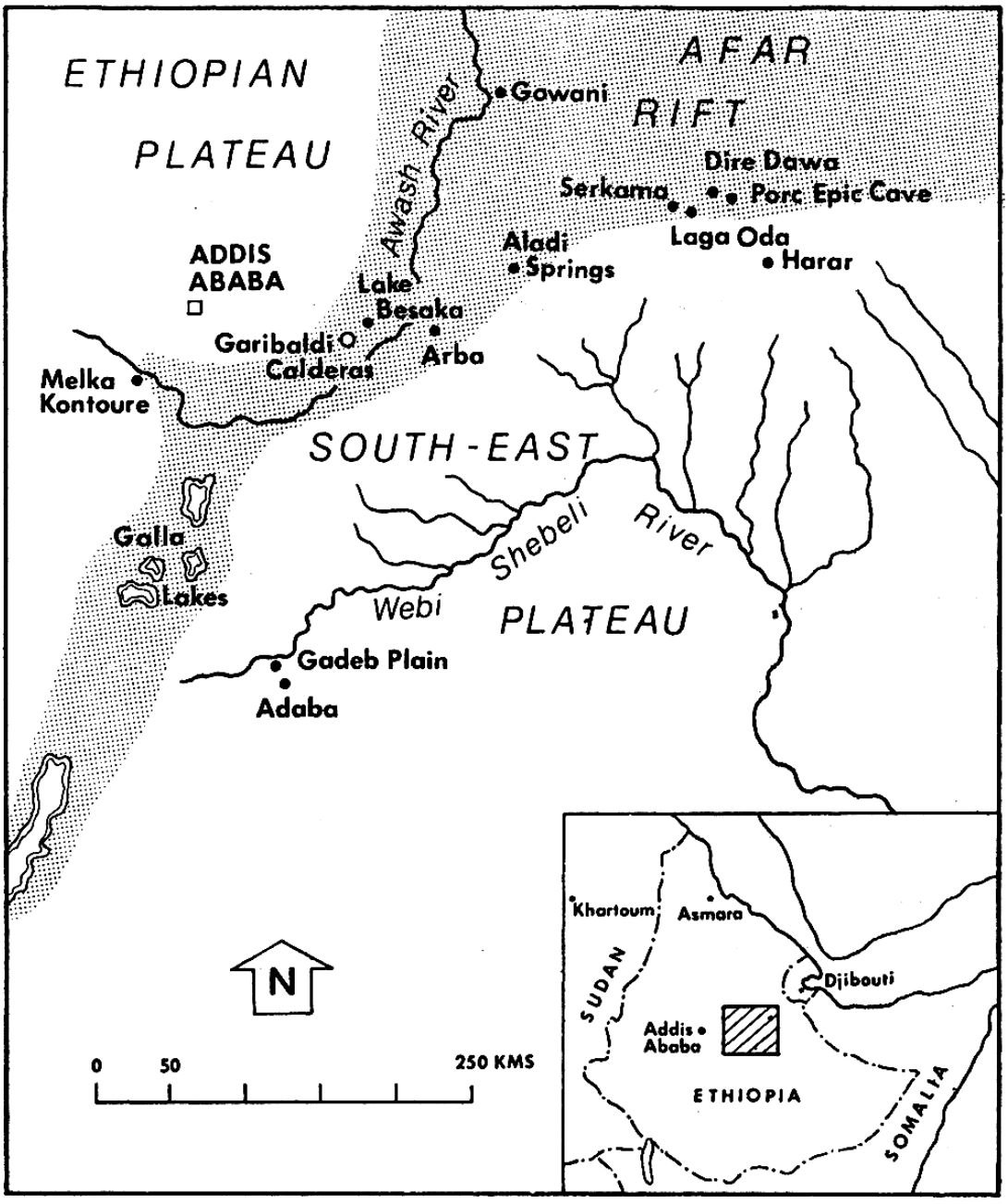

Fig. 1. Map of part of southeast Ethiopia to show sites referred to in the text.

there is much evidence in both cases for Cainozoic volcanic activity and tectonic movement yielding volcanic rocks and sediments with potential for dating. Several of our sites merit much more extensive excavation than we have yet been able to carry out and it must be emphasised that this is a report on reconnaissance and potential: the detailed studies remain to be carried out. The sites discussed here are Gadeb; Arba; Garibaldi; Lake Besaka; Aladi Springs; Porc Epic Cave, Dire Dawa; Serkama and Laga Oda.

The Plio-Pleistocene Sequence in the Upper Webi Shebeli Basin.

The headwater tributaries of the Webi Shebeli drain a series of rugged volcanic mountains which rise to over 3,500 m. The highest of these massifs exceed 4,000 m in elevation, and were glaciated during the Late Pleistocene. The tributaries join the main river, which meanders across the treeless Gadeb Plain at an altitude of about 2,300 m. The outer margins of this plain coincide with the maximum extent of the former Plio-Pleistocene lake which occupied a shallow basin dammed by horizontal lava flows some 20 km downstream of Melka Wacana. Eroded patches of pure diatomites abut against these lavas up to heights of 2,300 m, and pre-date the erosion of the Webi Shebeli gorge which is 500 m deep at this point. Diatomites at somewhat lower elevations near Melka Likimi some 15 km upstream are characterised by diatom species of very archaic appearance and possible pre-Pleistocene age (F. Gasse, pers. comm.). The lake probably remained in existence until about Middle Pleistocene times, after which the original volcanic dam became breached by headward erosion, and fluvial deposition succeeded the previous lacustrine sedimentation in the Gadeb Plain.

Reconnaissance of the wide Gadeb Plain some 20 km north of Dodola and Adaba in Bale, at altitudes of 2,300-2,400m, provided some 15 localities with a long stratigraphic sequence and cultural material interbedded at most of them, and gave evidence for at least two major cycles of sedimentation. To the north is Mt. Kaka (4,193m) a Pleistocene volcano, overlooking the short, high altitude grassland of the plain through which the river meanders in these upper reaches exposing cliff-like sections of the sediments (Plate 1). Montane forest still survives on Mt. Kaka as it does on the Bale Mountains to the south. The general Pleistocene succession we found here remains provisional until further work confirms that of the past season. The two most important of the localities here were Gadeb 2 and Gadeb 8 where excavations were carried out. Artifacts were made almost exclusively from basalt lava or welded tuff.

At *Gadeb* 2 we excavated at three areas where fauna and Developed Oldowan artifacts were eroding from the middle part of the older sedimentary sequence. The main cliff section here is 22m high. Lake deposits (diatomites) in the lower part are overlain by alternating fluvial gravels and sands and diatomaceous clays; the whole is capped and sealed by a massive sandstone. Although not in fully primary context, the artifacts lie in shallow stream channels in the upper part of the section and the distributions show that they can have been moved very little after being discarded. The assemblage from Gadeb 2B falls into Mary Leakey's (1971:1-2) Developed Oldowan B category with choppers (27%), polyhedrons (31%), light duty scrapers (37%) on flakes, fragments and chunks and one core-scraper. There is also a single ficron handaxe worked bifacially by hard hammer, and a proto-biface. All the artifacts are made on cobbles or chunks of basalt or welded tuff. The assemblage from Gadeb 2C (Fig. 2), slightly lower than 2B, includes the same range of artifacts — 26% choppers, 18% polyhedrons, 42% light duty scrapers — but there are more bifaces (7.5%) — 5 handaxes and 4 "other bifaces". These two assemblages are typical of others found *in situ* from other localities in the Plain of Gadeb. Rolled and fresh faunal remains, including a *Metridiochoerus* suid molar, came from another excavation, Gadeb 2D, which also yielded a few fresh flakes. This sedimentary sequence, therefore, would seem to lie more probably with the late Lower to earlier Middle Pleistocene time range (1.5-0.7 m.y. range). The diatomites forming the basal part of the sequence at Gadeb 2 and 8 have not produced

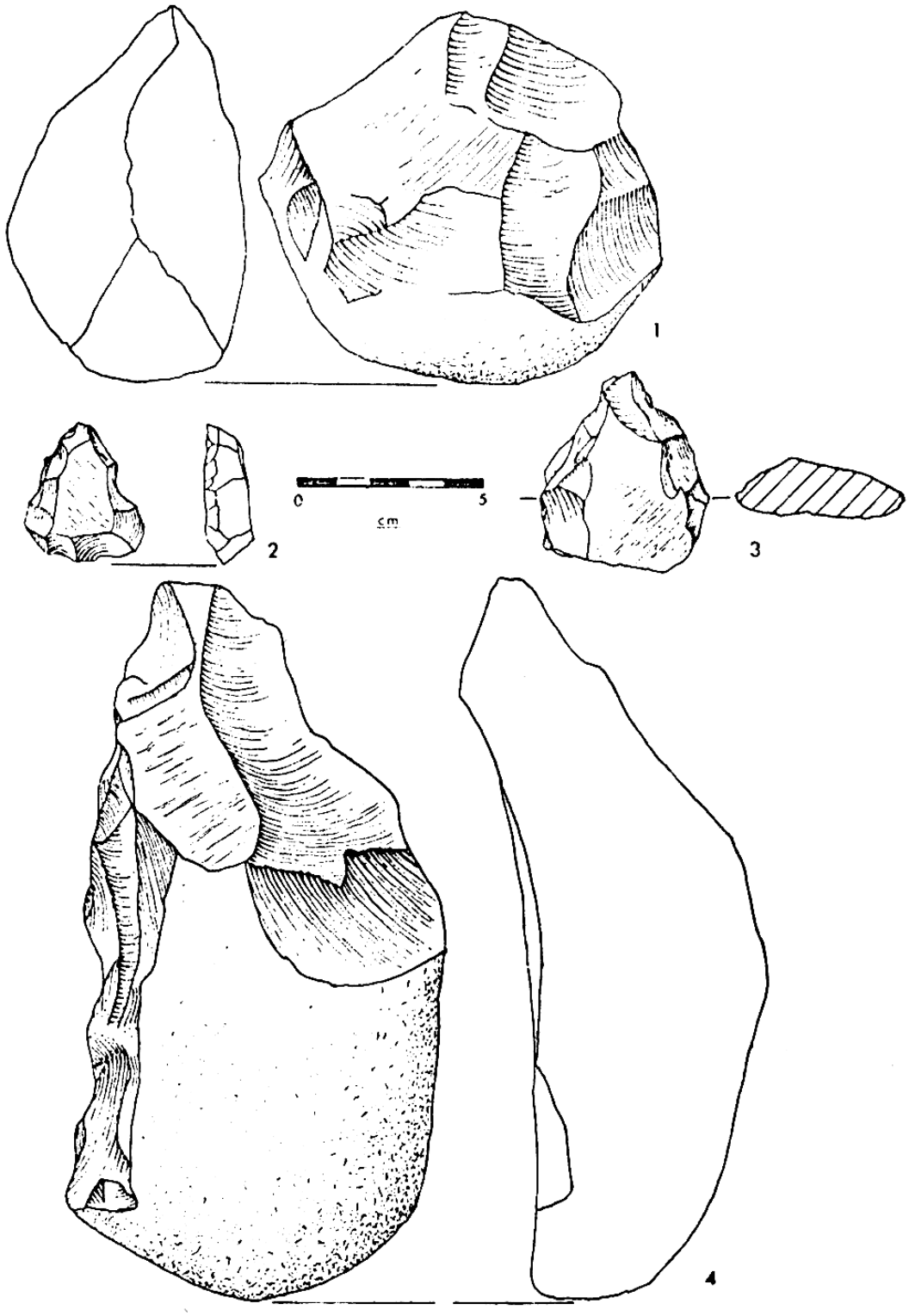

Fig. 2. Bifacial core/chopper, handaxe on a large flake and two Light Duty scrapers of lava from Developed Oldowan assemblage at Gadeb, Locality 2C.

any artifacts but from a sandy channel just above the lower diatomite came two completely fresh Acheulian cleavers and some bone. Also at Melka Likimi (Locality 1) to the east, a fresh polyhedron with a scapula, probably bovid, was recovered from diatomaceous sand just above present water level.

Gadeb 8, close to our camp and about 1km east of Gadeb 2, yielded from two small excavations the most complete assemblages of Acheulian artifacts. The geomorphologists studied the sequence here extensively and at least two main stages of cutting and filling are evident. An earlier series of gravels and sands (in the middle of the section) with Upper Acheulian artifacts, disconformably overlies diatomite and is tentatively placed in the earlier part of the Middle Pleistocene. On the evidence of incorporated "Middle Stone Age" pieces, the later cycle (the upper part of the sequence) belongs in the Later Pleistocene. A small excavation 2m x 4m in the earlier gravels and sands at Gadeb 8A yielded 1852 Acheulian artifacts occurring in a stream channel. Concentrations of this size suggest that the makers may have been camping in the stream bed itself at times of low water. However, a number of the bifaces show a preferred orientation of the long axis and were imbricated, showing the direction of stream flow to have been c.45° - 55° East of North. The Acheulian bifaces, made on flakes from large cobbles, are mostly refined and comparatively thin in relation to length and breadth (Fig. 3). There were 41% handaxes, more

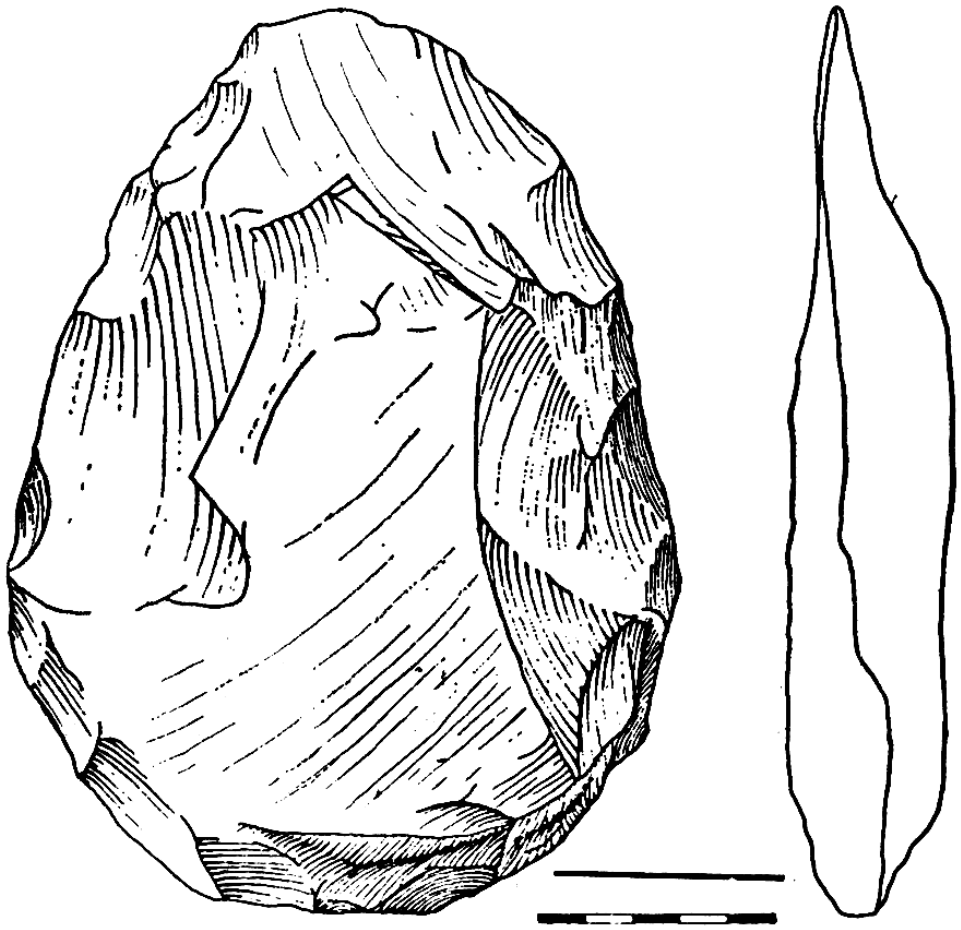

Fig. 3. Ovate Acheulian handaxe made on a thin flake struck from a lava cobble. From Gadeb, Locality 8A.

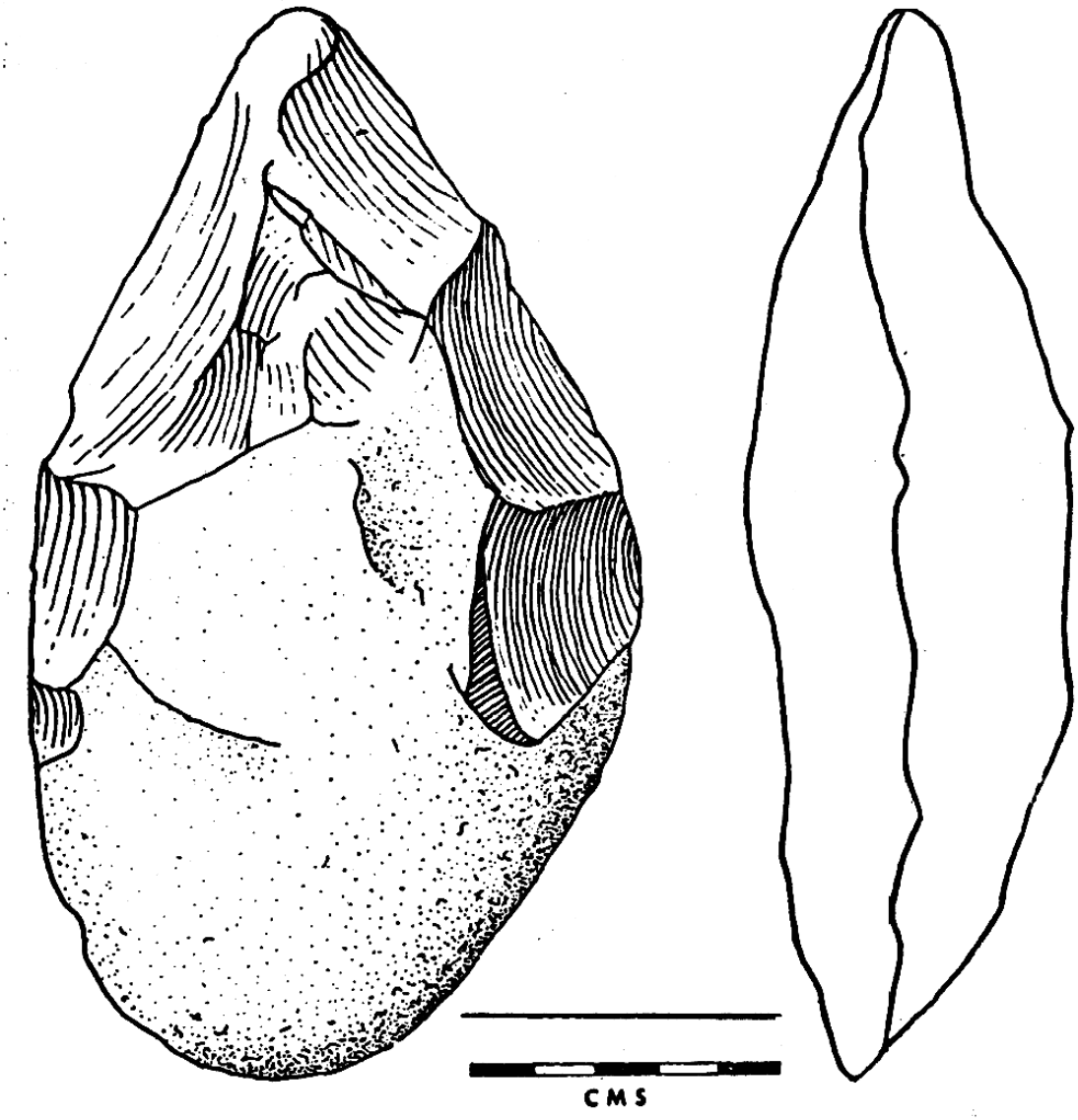

Fig. 4. Ficron-type Acheulian handaxe in lava from Gadeb, Locality 8D.

than 14% cleavers and cleaver flakes with 14 other bifaces and 2 bifacial knives. Closely associated were the usual choppers (20%), polyhedrons (9%), spheroids (4.5%), two steep and 23 (5.7%) light duty scrapers. The cores comprise forms present with the Developed Oldowan with also one large, heavily abraded proto-Levallois specimen while among the flakes are two large, proto-Levallois examples with facetted platforms and 12% of the flakes are blades.

This Upper Acheulian assemblage exhibits some interesting local variability and differs from that we recovered from the Gadeb 8D excavation further west adjacent to the cliff section exposing the older sedimentary sequence. The site at Gadeb 8D is a stream bank situation and the artifacts show no preferred orientation and they are usually only slightly abraded. A total of 488 artifacts was recovered here: handaxes are mostly lanceolate while those from Gadeb 8A are generally

ovate forms; cleavers are rare. Typologically, the whole assemblage approximates more closely to a Lower than it does to an Upper Acheulian, though other explanations for the differences are possible (Fig. 4). The stratigraphic sequence here differs from that at Gadeb 8A and other sections to the east and further work is needed to determine the precise stratigraphic position of 8D which is obscured by slope wash. At present it seems more probable that it belongs with the earlier rather than the later Middle Pleistocene sediments.

The fauna from these Acheulian localities, provisionally identified by Denis Geraads of the National University, Addis Ababa, includes bovids, suids, and a preponderance of hippo. These still remain to be studied as do also the pollens and diatoms though an earlier sample pollen spectrum studied by Dr. Raymonde Bonnefille of C.N.R.S., Paris, shows that there was a higher proportion of montane forest — c.50% — here than at the Acheulian site at Melka Kontoure at c.2000m on the western side of the Rift on the Ethiopian Plateau (Bonnefille et al. 1970). Clearly, the headwaters of the Webi Shebeli can be expected to produce important palaeoanthropological and palaeoecological data relating to late Lower and Middle Pleistocene behaviour patterns and, in particular, on hominid adaptations to living in the ecotone with the high altitude forest.

An Upper Acheulian Assemblage from Arba, southern Afar Rift.

An Acheulian assemblage somewhat similar to that from Gadeb 8A was found at Arba, 30km east of Awash Station in the Afar Rift close to the foot of the escarpment in an extensive erosion area exposing a graben filled with diatomites.

The graben is bounded to the west by an upper and a lower fault-scarp developed in welded tuffs of probable late Tertiary age. The eastern fault-scarp is obscured by bouldery colluvium. Along the western edge of the basin clayey lake-marginal facies, possibly of the lake which occupied the fault-trough during the Pliocene, abut against the lower fault-scarp but show no sign of tectonic displacement. From the base upwards were exposed several metres of brown clay overlain by a grey clay with occasional diatomite clasts. An interval of erosion followed the deposition of the grey clay, and was succeeded in turn by the deposition of an admixture of diatomite clasts and occasional basalt fragments in a matrix of clay, brown at the base, and olive-grey in the upper half. A gravelly brown clay overlies the sequence, which may be interpreted as indicating two phases of lake transgression, each succeeded by a regression and an interval of subaerial erosion.

The diatomites in the axis of the trough may predate the littoral clays. They are at least 20 m thick, contain frequent 3-5 cm thick beds of fine grey volcanic ash, and are invariably tilted about 10°W, suggesting post-lacustrine relative subsidence along the western margin of the graben. Juch and Schonfeld (1971) have suggested that the Arba diatomites, believed to be Lower Pliocene in age on the basis of the contained faunal remains, may have been deposited in a single lake at least 70 km and perhaps 120 km long, which occupied some 1500-2700 km between Afdem and Awash Station in early Pliocene times. Pending detailed microscopic analyses of the diatom assemblages in this region, and absolute dating of the associated volcanic rocks, these conclusions should be regarded as highly tentative and as yet unproven.

During the long interval of erosion which followed the final desiccation of the Arba lake(s), widespread fluviatile gravels containing rolled Acheulian implements were laid down unconformably on the eroded surface of the diatomites and were

covered in turn by dark clays of probable Late Pleistocene to Recent age which are now being eroded. The Arba graben thus contains evidence of a Pliocene lake, a ? Middle Pleistocene phase of fluvial erosion and gravel deposition, and a late Pleistocene/Holocene interval of clay deposition under conditions more humid than at present.

It seems unlikely that primary context Acheulian assemblages will be found although some of the bifaces and flake artifacts made in basalt and welded tuff were in fresh condition. No excavation was carried out and the collection made here was selective. The chief characteristic is the well developed, proto-Levallois method used, with both raw materials, for the production of large flakes (Fig. 5 no. 1). The cores at Arba are radially prepared, usually large and both struck and unstruck; there are numerous flakes which have sometimes plunged removing part of the ventral face of the core. Flakes have been made into parti-bifacial, sometimes fully bifacial handaxes; there are also examples classified as unifacial handaxes (total 26%). The cleavers (Fig. 5 no.2) and cleaver flakes (total 46%) are made on broad, subrectangular, proto-Levallois flakes; there are also handaxes on cores or cobbles. Small, typical Levallois cores also occur and the smaller flake and blade element showing utilisation and minimal retouch is not insignificant and is most probably under-represented in our sample.

As yet detailed comparisons of these Acheulian assemblages and those from Melka Kontoure (Chavaillon, N. 1972: Chavaillon, J. 1972) are not possible but indications are that there is probably no close similarity between them. Again, the significant blade component (14% of modified/utilised pieces and 7% of the unmodified waste flakes), made mostly on selected welded tuff, and the well-developed proto-Levallois method, show that this assemblage is comparable to that from Kapthurin in the Lake Baringo basin of northern Kenya with which was associated a hominid mandible said to be of *Homo erectus* and dated to 0.6 - 0.22 m.y. ago (Leakey, M. et al 1969). In its proto-Levallois and blade elements this Arba assemblage also compares with the assemblages from the Older Tug Gravels from

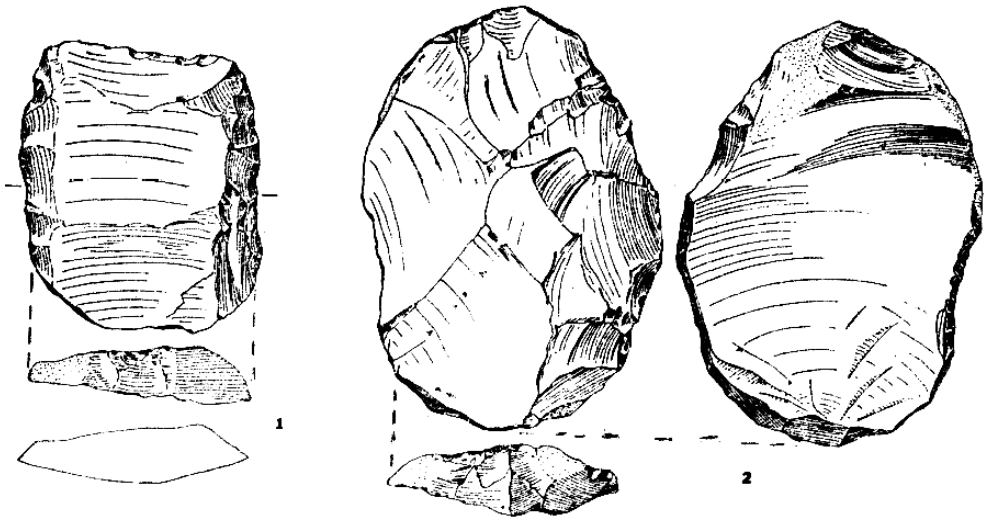

Fig. 5. No. 1. Cleaver in lava made from a proto-Levallois flake; Arba.
No. 2. Large, radially prepared lava flake struck from a proto-Levallois core; Arba.

Hargeisa in northern Somalia (Clark 1954: 160-8) and implies that both these elements may be found to form significant components of late Acheulian industries in eastern Africa.

Later Pleistocene Sites and the Middle Stone Age.

The Middle Stone Age is known from three main localities in our area, all in the Rift.

Garibaldi Caldera Complex.

Garibaldi Caldera Complex some 30 kms west of Lake Besaka consists of 8 successively-formed calderas of Quaternary age belonging to the Aden Series Volcanics in the centre of the main Ethiopian Rift (Cole, 1969). The artifact-bearing clays containing the Middle and Later Stone Age assemblages crop out in two gullied localities within the fifth such caldera, the rim of which is well-defined to the east, highly degraded to the west and south, and replaced by the outer wall of the youngest caldera (8) to the north-east (Plate 2). The gullying was initiated by the late Holocene fissures which traverse the basal green ignimbrites that line the floor of caldera 5. A reworked silty ash and several metres of shower-bedded pumice gravels capped by 5 cm of grey volcanic ash and by 20 cm of indurated pumice sand overlie the ignimbrite and underlie the clays.

The clays consist of three dark cracking clays, provisionally termed the Lower, Middle and Upper Vertisols, separated by two brown loams (The Lower and Upper Loams), overlying 1.3 m of brown clay, the lower 0.7 m of which seem devoid of artifacts. The total thickness of clays and loams in the gullied area nearest to the road is about 12 m. The sequence thins out towards the SW, away from the caldera margin, and was probably laid down under marshy conditions at the distal end of a low-angle alluvial fan under wetter than present conditions. The Upper Vertisol was deposited after 14,700±200 B.P., and was probably synchronous with the end-Pleistocene/early Holocene wet phase evidenced at Aladi Springs and at Lake Besaka, and with the rise in Lake Shala in the Main Rift south of Addis Ababa at or after 14,400 B.P. (Grove et al., 1975).

Extensive outcrops of good quality obsidian occur on the northern rim of the caldera about 135 m from the centre of three erosion areas and were used by the Middle and Later Stone Age groups. The ignimbrite is covered by a pumice gravel overlain, in turn, by a series of horizontally bedded loams and vertisols in which the artifact concentrations are stratified. The assemblages in the lower two thirds of the sequence, all from primary context Middle Stone Age flaking floors, are characterised by a high percentage of Levallois flakes and blades made in obsidian and pitchstone. Levallois flake-, blade, point-cores, disc-and some single-platform cores are present together with the primary flakes struck off in preparing the cores and also the flakes and blades which were the desired product (Fig. 6). Tools are mostly unifacial and parti-bifacial points, often broken in the manufacture, but there are also side scrapers, denticulates and burins (Fig. 7 nos.1-6). A particularly interesting technique of core rejuvenation results in blade-like redirecting flakes which at first appearance resemble backing (Fig. 7 nos. 7-9). It is not unreasonable to suggest that some such forms may lie behind the blade industry tradition that makes its first appearance in already developed form at the base of the Upper Vertisol, from where ostrich eggshell has been dated to 14,760±200 years B.P.

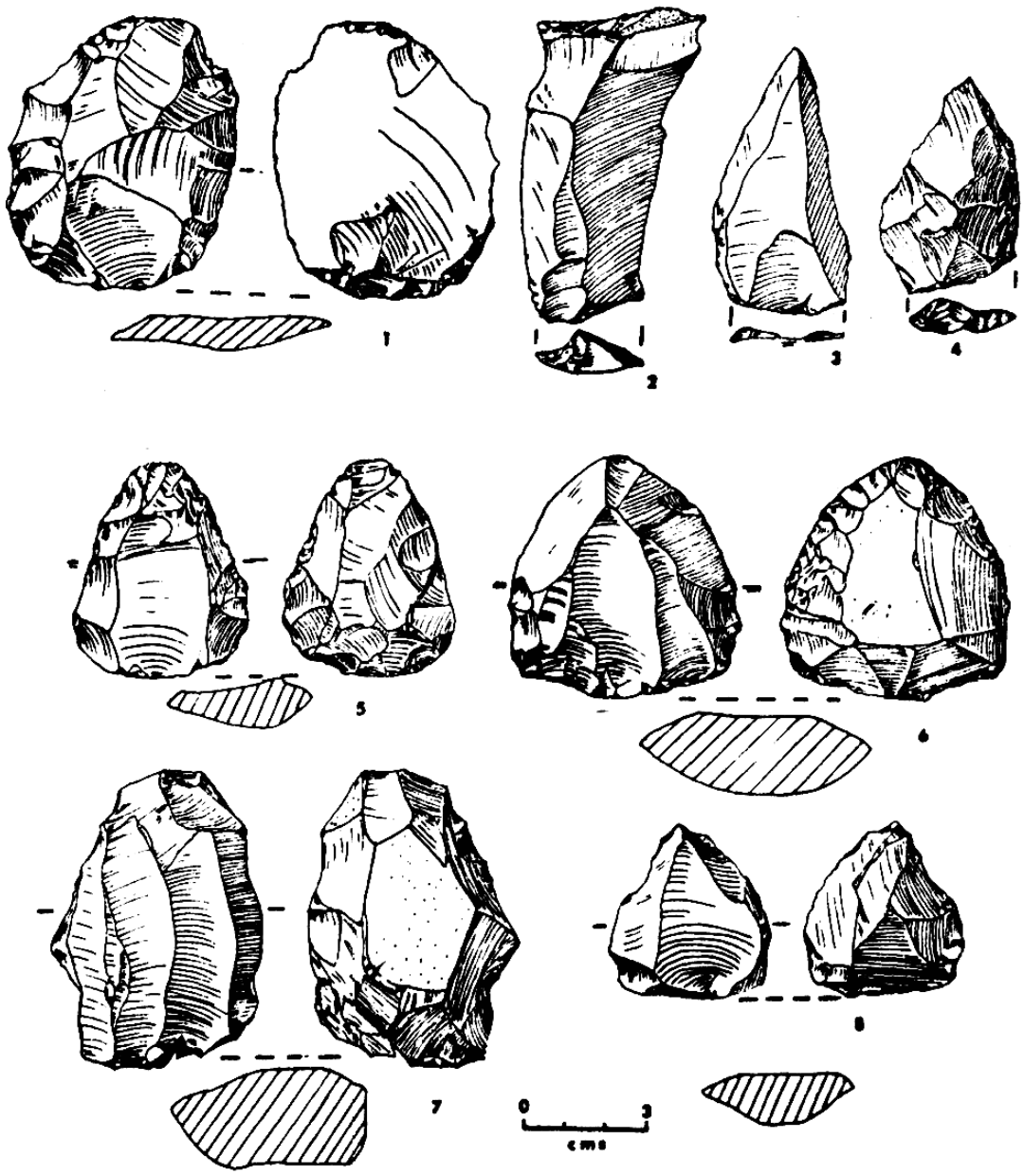

Fig. 6. Cores, unmodified flakes and a blade from Middle Stone Age workshop floors in the Lower Loam, Garibaldi Caldera complex.

Nos. 1 and 4. Flakes (no. 1 with marginal utilisation) from radially prepared Levallois cores.

No. 2. Levallois blade.
No. 3. Levallois point.
No. 5. Radially prepared, sub-triangular Levallois core (struck).
No. 6. Levallois point core.
No. 7. Levallois blade core.
No. 8. Nubian core (Levallois).

All obsidian.

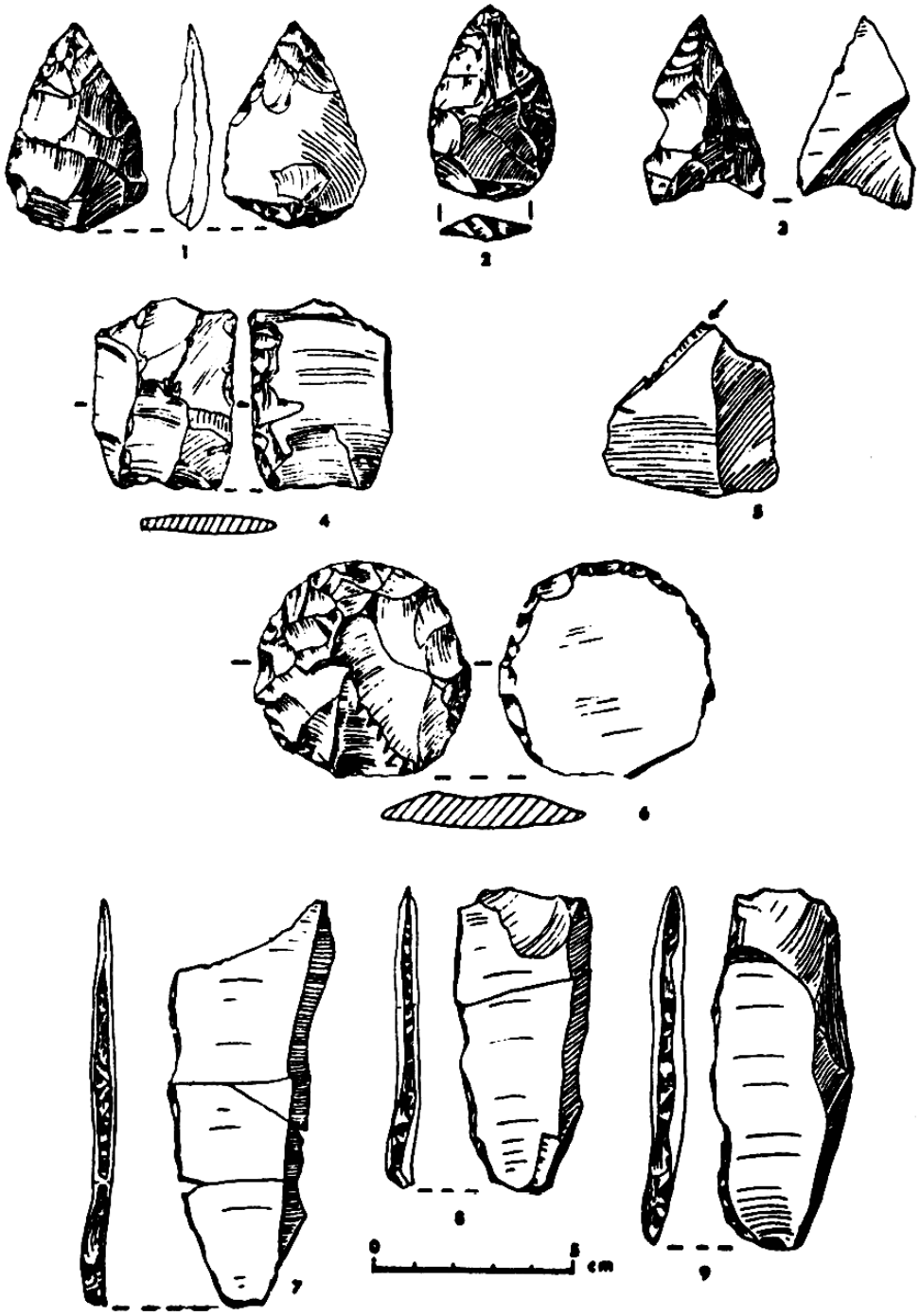

Fig. 7. Shaped tools and trimming flakes from Middle Stone Age flaking floors in the Lower Loam, Garibaldi Caldera complex.

Nos. 1-3. Proto-bifaced and unifaced points; No. 3 broken.
No. 4. Inverse scraper.
No. 5. Single blow burin.
No. 6. Flat, radially flaked discoid core or disc.
Nos. 7-9. Blades simulating backed knives struck from Levallois blade cores in process of rejuvenating.

Obsidian and pitchstone.

Blade industry artifacts were not found in dense concentrations but were scattered throughout the lower part of the Upper Vertisol and comprised backed blades and microlithic forms together with end-scrapers and burins similar to those of the Kenya Capsian. In 1975 we recovered a sample of an assemblage showing technical characteristics relating it both with the Middle and Later Stone Age traditions and, similarly, occupying an intermediate stratigraphic position.

Porc Epic Cave, Dire Dawa.

Porc Epic cave is a phreatic bedding-plane cave developed in the upper part of the Jurassic Antalo Limestone 2 km south of Dire Dawa. Uplift of the limestone which crops out along the southern scarp of the Afar Rift led to valley incision and to a fall in the phreatic surface. Subsequent slight widening of the valley opened up the cave, which now lies over 140 m above the sandy floor of the seasonal oued draining the uplands south of Dire Dawa. It is approached by a very steep climb and has a commanding view over the surrounding country. On the south wall are some poorly preserved schematic and naturalistic paintings but the north wall is partly obscured by a thick curtain of dripstone resting on and sealing a breccia containing fauna and numerous Middle Stone Age artifacts.

The cave-fill consists of over 2 m of dark calcareous clay which accumulated before and after the deposition of 50 cm of angular limestone rubble and a 50 cm thick wedge of well-sorted quartz sand brought in by a small stream flowing into the cave from above. The sand passes upwards into a transitional horizon of clay, sand and calcareous cave breccia, capped by up to 1.5 m of indurated coarsely-laminated calcareous cave breccia, locally concealed beneath a massive curtain of dripstone. Erosion of the breccia by streams flowing through the cave was succeeded by the accumulation of a younger cave-fill of organic-stained sands which overlie the breccia or abut against the eroded ledges that indicate its former extent. Both stream erosion and carbonate precipitation presuppose moister conditions than those characteristic of this now dry cave.

A trench was dug in 1974 from the south to the north wallls, providing a cross-section of the stratigraphy (Fig. 8). The section exposed dripstone overlying the breccia with the Middle Stone Age industry. This gives place to waterlaid sands and the whole sequence rests on a friable dark clay over bedrock. It helps to show that what the previous excavators (Breuil et al. 1951) had thought was a mixture of Middle and Later Stone Age artifacts from the deposits in the front part of the cave had, in fact, occurred subsequent to the sealing of the breccia by the dripstone and was most likely due to the action of small streams (similar to the older evidence to be seen in our section) eroding the breccia, carrying away the fines and letting down the heavier material, including the artifacts, which later became incorporated in the unconsolidated ashy sand with the debris of the Later Stone Age occupation capping the sequence towards the rear of the cave.

The importance of this site lies in the nature of the Middle Stone Age assemblage. The characteristic tools (Fig. 9) are a variety of retouched points — unifacial, bifacial and parti-bifacial — a range of scraper forms, usually not so well made as the points; some burins, chiefly technical examples, and a small percentage of naturally backed blades. It would appear that the blade and flake forms used for the points and the utilised/modified flakes and blades were specially selected since the mode of their length/breadth ratios differs significantly from that of the unmodified waste. The

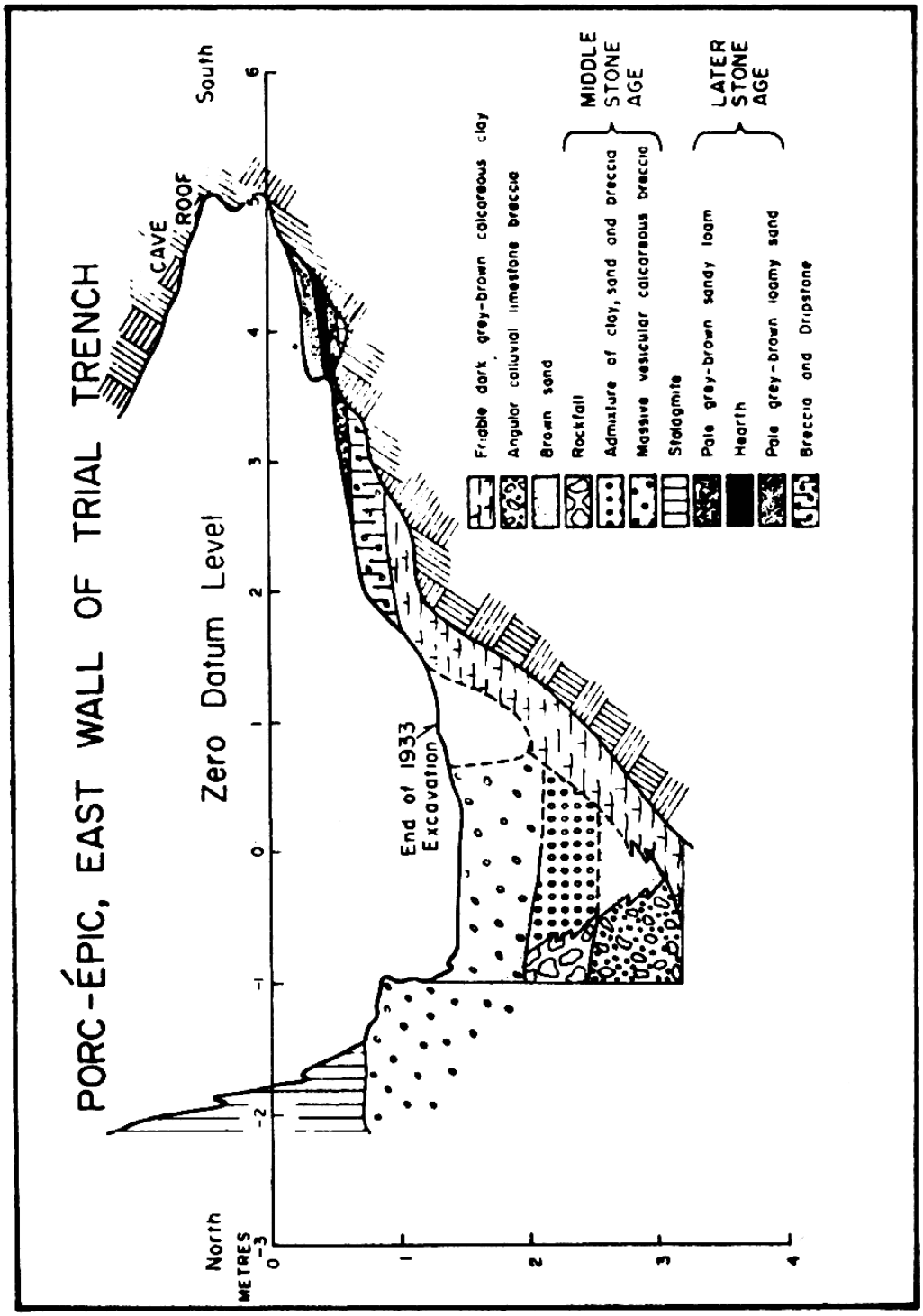

Fig. 8. North/South section across the deposits in Porc Epic Cave, Dire Dawa; Trial Excavation, 1974.

greatest number of cores are Levallois with a few disc cores; flakes, many of them Levallois, are about four times as numerous as blades which, nevertheless, form a significant element, many of them being utilised. Two possible hearths were en-

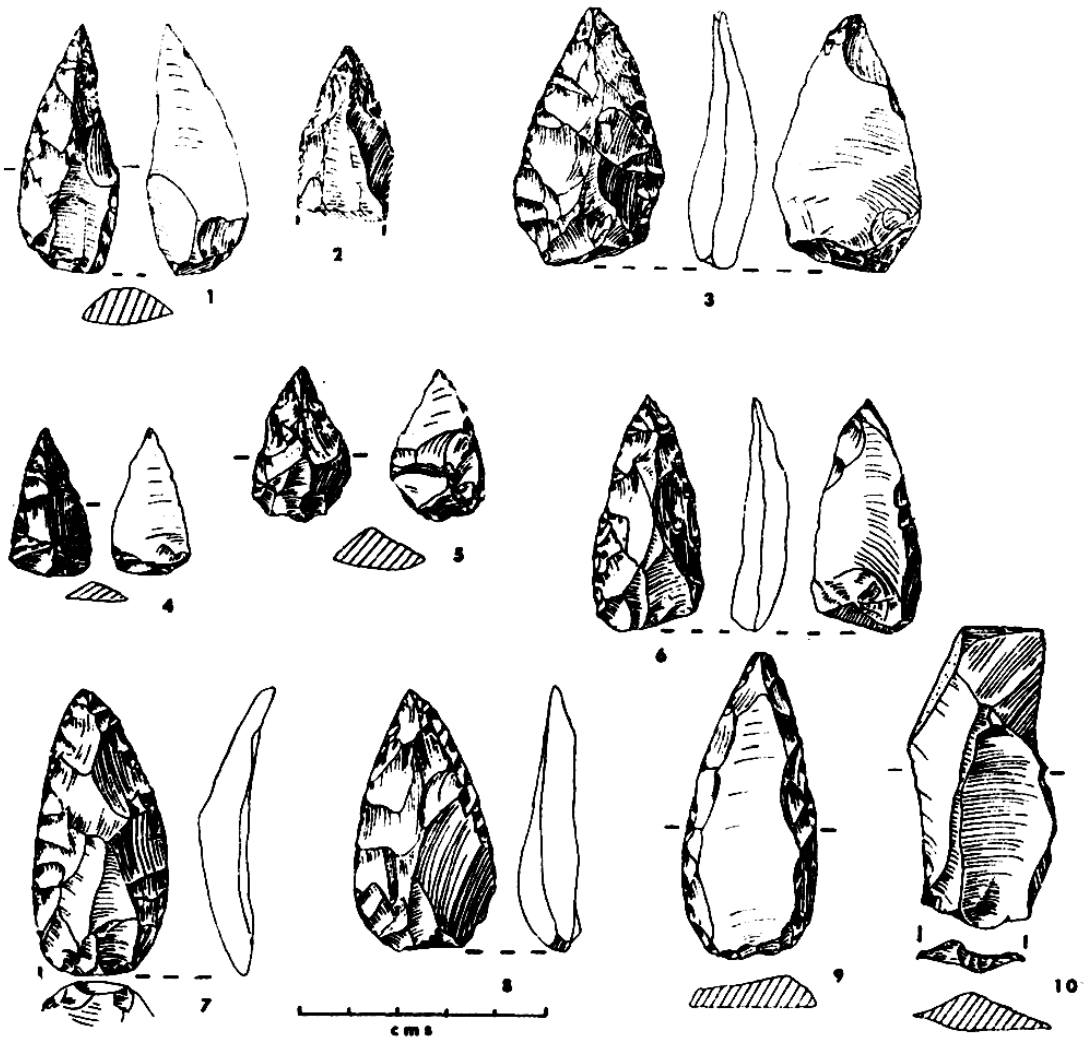

Fig. 9. Unifacial and parti-bifacial points and naturally backed and utilised knife (No. 10) from Porc Epic Cave, Dire Dawa, 1974 Excavation.

Nos. 1,2,9 fine-grained basalt or indurated shale; 6-8, 10 chert; 3-5 obsidian.

Nos. 4 at 70; 5 at 75; 3 at 100; i,2 at 106-116; 6-9 at 116-126; 10 at 152cm below datum.

countered and there are a number of fire craked pieces; also one pestle/rubbing stone and several pieces of rubbed haematite.

The broken up nature of the bone, which is not abundant, suggests that generally only the meat was brought back to the cave — perhaps because of the steep climb! — and that the animals, mostly bovids, were butchered where they were killed. Our preliminary findings, therefore, suggest that this was a hunting camp — *vide* the high proportion of points and knives — occupied at one (or two) different times in the year when the game was migrating between the escarpment and the plain, in much the same way as the present day pastoral populations move between the hills and the plain today.

We confidently expect to obtain dates and it is possible that the Porc Epic Middle Stone Age may be as old as 50,000 years. We also hope that excavations being conducted by Mr. Kenneth Williamson in 1975 will yield further human remains associated with this industry in view of the mandible fragment ascribed by Vallois to a Neanderthaloid physical type. (Vallois 1951).

Aladi Springs.

At Aladi Springs, some 120 kms west of Dire Dawa near the base of the escarpment of the South-East Plateau, there is evidence of two wet and three relatively dry phases during the late Quaternary. The second wet phase saw the formation of a mound spring capped by tufa containing shells dated at 11,070±160 B.P., and was contemporary with a Late Stone Age microblade industry in obsidian and chert (Fig. 10 nos. 1-13). The first wet phase is of probable Late Pleistocene age, and was characterised by widespread deposition of a calcareous green clay loam, possibly under lacustrine conditions. Middle Stone Age implements occur mainly in the upper 10-20 cm of this 1.5 m thick deposit. Separating the tufa and the green loam there is a brown gritty clay which was probably formed during the terminal arid phase of 17,000—12,000/14,000 B.P. A dark grey-brown clay devoid of stone tools and at least 1.7 m thick lies beneath the green clay loam.

The as yet undated assemblage of later Middle Stone Age affinities contained in a calcareous green clay loam combines Levallois and disc-core technology for making small points and scrapers with a micro-blade element (Fig. 10 nos. 14-33). This may, however, have been a special purpose site as, together with the conventional tool forms, there occurred with both assemblages a number of heavy duty scrapers with an archaic appearance and, had these not been found *in situ*, they might have been considered as representing an older industrial stage (Fig. 11).

Lake Besaka, Metahara.

Most of the 1974 season was devoted to survey and excavation in the middle section of the Awash valley and round the west side of the small, now saline, Lake Besaka near the western edge of the study area. The lake is dominated by Fantale volcano, the probable source of the obsidian from which the artifacts were made, and lies in a tectonic basin bounded by generations of fault scarps of which the oldest are degraded and of late Pleistocene and the youngest of end-Pleistocene and middle to late Recent age.

Geological study west of Lake Besaka revealed two major lake transgressions, the younger of which ended shortly after 11,000 B.P. The extent of the late Pleistocene early Holocene lake is not known with certainty, but it may have attained a height of at least 18 m and somewhat less than 23 m relative to the January 1974 lake-level. Lake Besaka is rising rapidly at present as a result of overspill from the Awash fed irrigated cotton project at Abadir. The rise in level between January 1974 and January 1975 was 0.5 m, and continued during 1975, leading to flooding of the main road from Addis Ababa. At the same time the level of terminal Lake Abhe is falling, and this man-induced trend seems likely to continue unless efforts are made to return excess irrigation water to the Awash River.

Correlation of the sedimentary sequence beneath the fault-scarp with that above it, where the main archaeological sites are situated, is still problematic, but

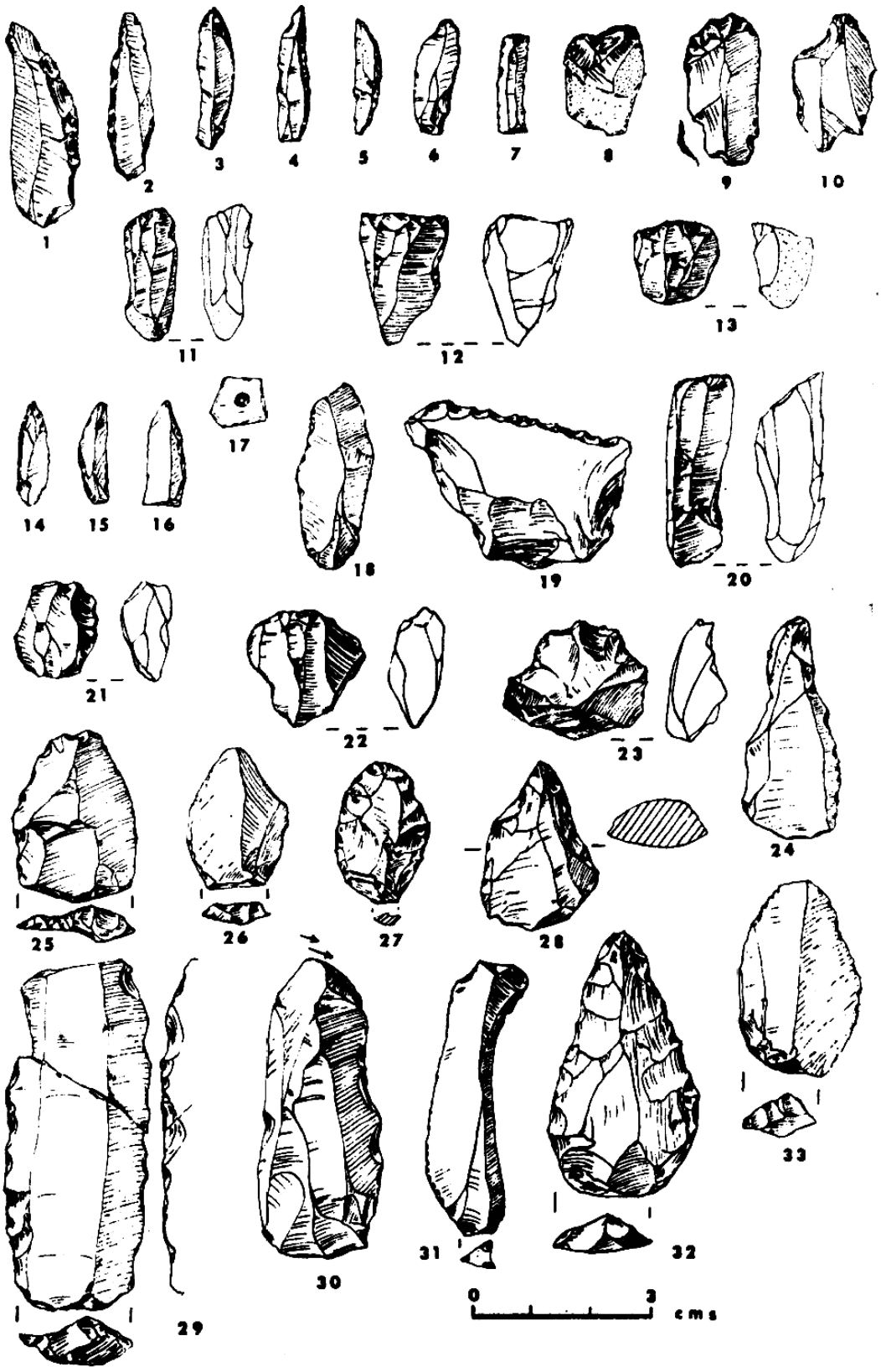
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Figure 10

will be resolved when specific horizons on either side of the fault have been dated. Terminal Pleistocene diatomites reach to the foot of the fault-scarp at a height of 10 m, but were nowhere seen above that height.

Below the fault-scarp the paleosol which marks the close of the Late Pleistocene transgression (c. 30,000 to 20,000 B.P.) (see Gasse, 1975) contains a sparse scatter of fresh Late Stone Age debitage which *may* correspond to the "Phase A" blade-tool tradition in the buried soil above the fault-scarp. A second and younger buried paleosol — a dark organic clay — is widespread along the foot of the scarp but nowhere present above it. Overlying shell-bearing diatomites dated at 11,430±380 B.P. and 11,200±160 B.P., it also contains fresh Late Stone Age artifacts.

Above the fault-scarp is a brown loamy paleosol which directly overlies the vesicular basalt bedrock and underlies a green pumiceous gravelly sand containing fish-bones but no artifacts. These lacustrine sands closely resemble the green pumiceous sands that invariably overlie coarse pumice gravels and underlie the terminal Pleistocene diatomite below the fault-scarp. The former mark the start of the transgression, and the latter the peak of the transgression. Since no well-defined very early Holocene strandline has yet been observed at the foot of the scarp, it is quite likely that the green sands above the fault-scarp are the shallow-water equivalent of the deeper-water terminal Pleistocene green sands and diatomites at the foot of the scarp.

Two deep archaeological soundings made in 1975 in a narrow fissure adjacent to the main fault-scarp, at a height intermediate between the sections studied above and below the scarp, were especially informative. At a depth of 3.25 m to 3.60 m there was a dark grey-brown loamy paleosol which we tentatively equate with the "Phase A" basal paleosol above the scarp and with the Late Pleistocene (? post-Pleistocene) buried soil below the scarp. Above a thin band of basalt stones just above the paleosol there was roughly 1.5 m of green pumiceous sand similar in pH,

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Fig.10. Nos. 1-13 Artifacts of the Ethiopian Late Stone Age Blade Tradition from the shelly tufa and brown gritty clay, Aladi Springs.

No. 1. Backed blade.
Nos. 2-6. Backed bladelets.
No. 7. Utilised bladelet.
Nos. 8-9. End scrapers.
No. 10. Drill/borer.
Nos. 11-13. Single platform blade cores.
Nos. 1,9,12 chert; 6 agate; remainder obsidian.

Nos. 14-33 Artifacts of an (?) evolved phase of the Ethiopian Middle Stone Age from the calcareous olive green clay loam, Aladi Springs.

Nos. 14-16. Backed bladelets.
No. 17. Pierced ostrich eggshell.
No. 18. Blade with *ouchtata* retouch.
No. 19. Denticulate transverse scraper.
Nos. 20, 22. Single platform blade cores.
No. 21. Opposed platform core.
No. 23. Radially prepared (?) disc core.
Nos. 24-26, 33. Utilised, sub-triangular flakes.
Nos. 27, 32. Points.
No. 28. Convergent scraper.
Nos. 29-31. Utilised and marginally retouched blades.
Nos. 19,23,27,30,31,33 chert; 29 ignimbrite; remainder obsidian.

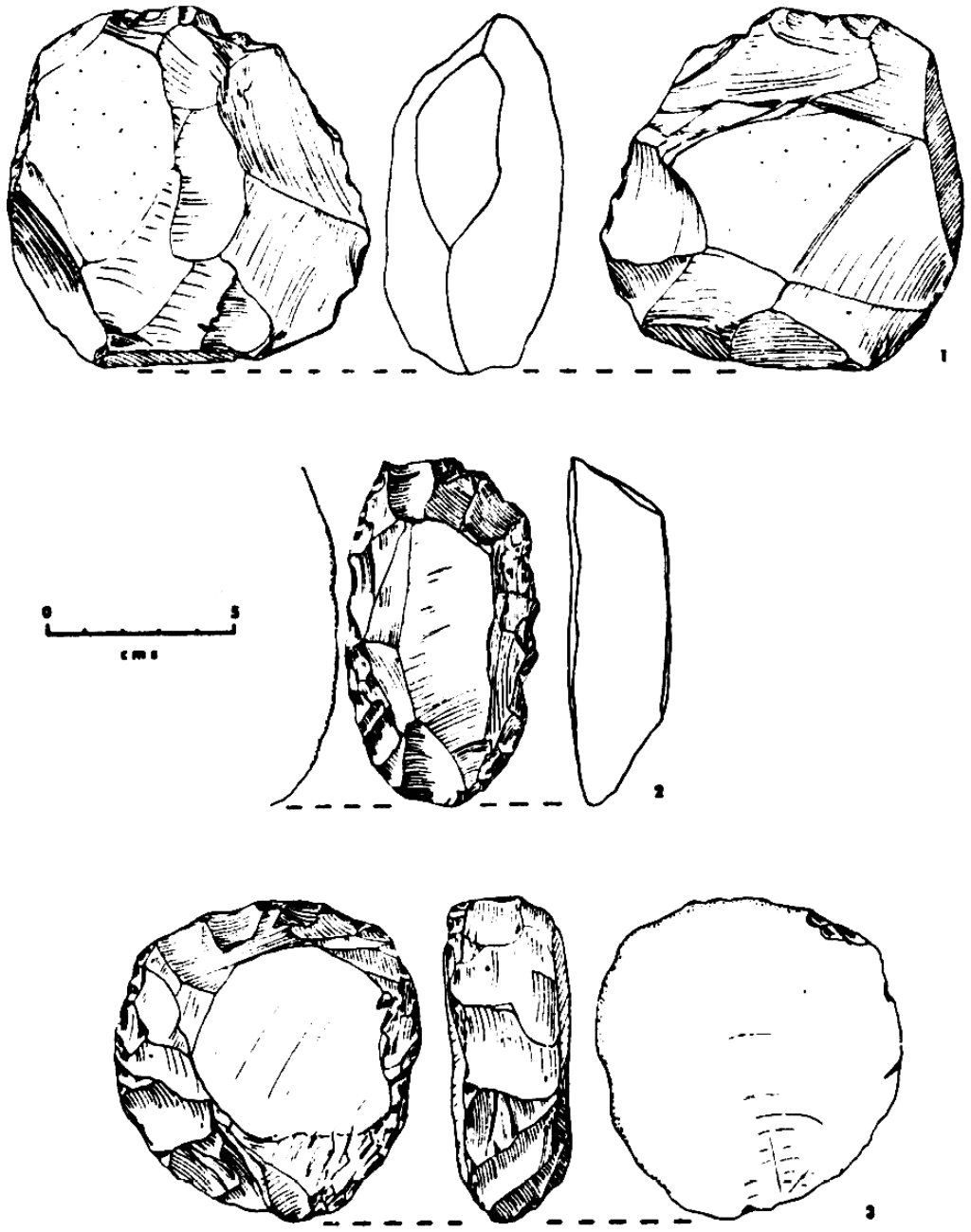

Fig.11. Heavy Duty Tools associated with the Ethiopian Late Stone Age and (?) evolved Middle Stone Age occurrences; from surface erosion, Aladi Springs.

No. 1. Bifacial chopper; basalt.

No. 2. Steep scraper (double side and end), rhyolite. Note on the ventral face, the rubbing facet due to use.

No. 3. Steep circular scraper, basalt. Note on the ventral face, the rubbing facet due to use.

colour and grain-size to the green sands above and below the scarp. The green sand merged into a white, possibly diatomaceous fine sand, which was covered in turn by a very dark clayey sandy paleosol, probably equivalent to the dark organic clay

below the scarp, and, more problematically, to the brown clayey sandy soil overlying the green sands and containing the „Phase B" blade-tool tradition above the scarp. Above this brown soil were two further weakly-developed soils separated by a pale grey powdery ash, somewhat comparable to the sediments containing the "Phase C" artifacts, pottery and charcoal, dated at 3,400±280 B.P. at a height of 14.7 m about 1 km further north. Beneath the sediments described above, from a depth of 3.5 m to at least 4.4 m, there was a dark olive-brown fine sand which marks the Late Pleistocene transgression that terminated in the „Phase A" paleosol.

To sum up, the stratigraphic sequence below the main fault-scarp shows evidence of two lake transgressions, each followed by soil formation during the regression. The oldest, or Late Pleistocene paleosol, probably formed after 20,000 B.P., and may be contemporaneous with the "Phase A" blade-tool tradition. The second paleosol developed towards 11,000 B.P, may equate with the "Phase B" tradition. A third paleosol dated at 3,400 B.P. may be the same as that containing the "Phase C" or Neolithic tradition and probably indicates the end of the middle Holocene transgression evident in the Afar lake basins, but probably now concealed beneath the rising waters of Lake Besaka.

At the top of the scarp bounding the lake on the west side, two occupation sites were partially excavated in 1974 and 1975 and provided evidence of two stratified occupation levels with assemblages in the blade tool tradition. The first of them — Phase A (Fig. 12 nos. 17-32) — occurs in the paleosol overlying lava bedrock and comprises macro- and micro-blades, retouched into backed blade forms, end-scrapers and burins. The cores are single- and double-ended prismatic and 'sinew-frayer' forms. As yet, this occurrence is undated but fossil bone (of which a high proportion appears to be burnt) found in 1975 may provide a date. This Phase A assemblage can be equated best on purely archaeological grounds with the artifacts from the second paleosol in the geological pits which would give it a probable age of some 11,000 years, though as stated above on geological grounds it might be older.

The upper or Phase B assemblage (Fig. 12 nos. 1-16) overlies the intervening 70 cms or so of sterile green pumiceous gravel with fishbone and occurs in a deflated midden occupation some 50 cm — 60 cm thick at the top of the section. It contains large quantities of blade tools in association with fragmentary faunal remains, including fish, and buried but incomplete human skeletal remains. The obsidian industry shows comparisons with the Kenya Capsian from Gambles Cave and other sites in the East African Rift, comprising both large and microlithic backed blades, end-scrapers on blades, dihedral burins, burins on truncations and some awls (Leakey 1931). Also associated are upper and lower grindstone fragments and probably a small number of potsherds.

The most interesting feature of the sites are the burials. These are associated with intentionally but irregularly piled stones but the bodies do not appear to have been buried under a cairn since they usually lie outside the stone piles. They are also incomplete; for example, while the upper half may be present there is no trace of the remainder of the skeleton (Plate 3). In all, the incomplete remains of 5 bodies were found in this stone pile. There was no sign that they had been disturbed by scavenging animals nor were there any cut marks suggesting deliberate dismembering. A proportion of the bones are burned, however, and we would appear to have evidence of some rather unusual burial custom that might perhaps be clarified by reference to the later classical texts. Two of the crania which are well fossilised

and reasonably complete have been reconstructed and come from long-headed, long-faced individuals but, while one is robust and rugged, the other is much less so and they may represent sexual differences. The bodies were buried into the midden with no grave goods directly associated. However, lying immediately to the east of the stone pile was a group of interesting objects — two bone tubes that were probably containers; a flat, elipsoid stone of fine sedimentary rock, not local, that might have been a pendant; one large and some 30 to 40 small gasteropod shells, all of which had been pierced for suspension. In another place a group of

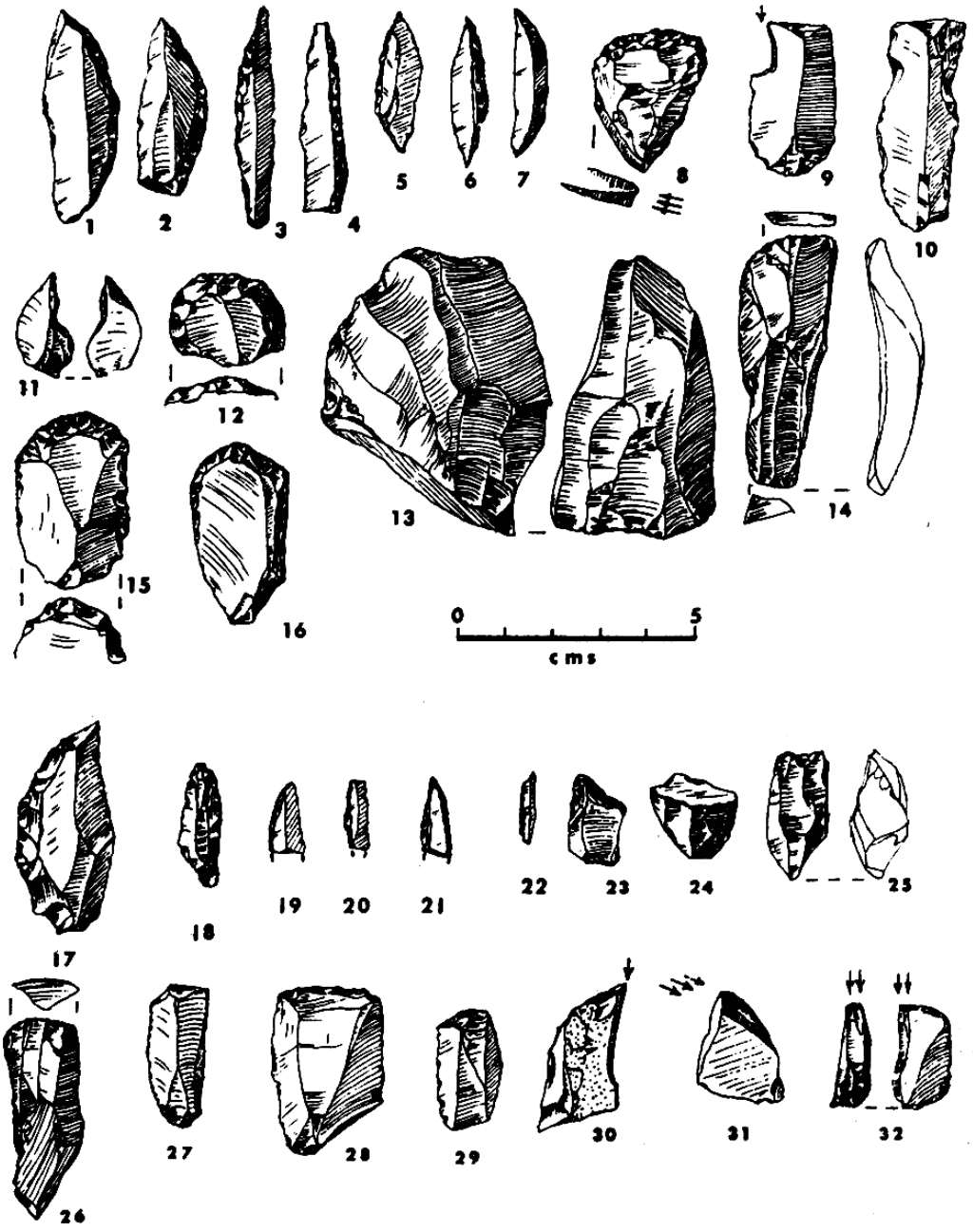

Figure 12

rather large disc beads of ostrich eggshell may have been sewn onto a leather band and further ostrich eggshell and the small gasteropod shells occur in isolated contexts in different parts of the midden. It is especially interesting that the mollusc shells are marine and not freshwater and are identified as *Oliva* cf. *bulbosa* and *Engina mendicaria*, both of which forms are widespread throughout the Red Sea, the Persian Gulf and the East African coast of which the nearest part to our site is Djibouti some 500 km to the east. Unfortunately we have not yet succeeded in obtaining a date for this Phase B assemblage but it is anticipated that it could be as much as 7000 years old, or older if the geological correlation suggested above is confirmed.

Eroding from the younger sediments some 5 m lower was a still later Phase — C — characterised by a high percentage of end- and short convex scrapers and pottery and it is suggested that this superficial stage may be related to the introduction of domestic stock (tentatively identified by P. L. Carter are possible cattle teeth) and the use of scrapers for skin dressing as the Gurage tanners still do today (Gallagher 1974). The same sediments, though at a different place, produced a small stone bowl of vesicular lava, possibly suggesting a relationship with the Neolithic Stone Bowl industries of East Africa which may thus perhaps be the outcome of southward migration of pastoral peoples out of the drier northern parts of the Rift due to the continued lake regression and desiccation in the 1st and 2nd millennia B.C. Charcoal associated with a broken undercorated pointed-based pot produced a date of 3,400±280 B.P. for this Phase C.

In 1975 another blade industry site was found in the small graben about 1.5 km south of those just described and situated between the fault scarp and the hinged and downfaulted rocks of its outer or eastern edge. Two exploratory pits 4.4 m deep which yielded the stratigraphic sequence described above, contained artifacts throughout and the three Phases are stratified here. In the lowest levels were found larger and yet older blades reminiscent both of the Elmenteitan industry of the

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Fig.12. Nos. 1-16. Artifacts of Phase B of the Ethiopian Blade Tradition from excavations in 1974 at Locality T.T.1, Lake Besaka. All obsidian.

Nos. 1-7. Backed blades and bladelets, lunates.
No. 8. Combined end scraper and dihedral burin.
No. 9. Burin on a break.
No. 10. Utilised blade.
No. 11. Micro-burin.
No. 12. Short convex scraper with inverse retouch at the butt.
No. 13. Core with two opposed platforms in different planes.
No. 14. Opposed platform "sinew frayer" core.
Nos. 15,16. End scrapers, No.15 with butt retouch.

Nos. 17-32. Artifacts from Phase A of the Ethiopian Blade Tradition from excavations in 1974 at Locality T.T.2., Lake Besaka. All obsidian.

No. 17. Backed blade.
Nos. 18-20, 22. Backed bladelets.
No. 21. Double backed bladelet.
No. 23. Drill/borer.
Nos. 24,25. Single platform micro-blade cores.
No. 26. Single platform "sinew frayer" core.
No. 27. Bladelet with *ouchtata* retouch.
Nos. 28, 29. End scrapers.
No. 30. Burin on a break.
No. 31. Burin *busqué*.
No. 32. Burin on truncation.

Kenya Rift and of the blades with the "transitional" Middle Stone Age/Later Stone Age assemblage at Garibaldi. It is not unlikely that these could be as much as 20,000 years old.

It is not going to be easy in southeast Ethiopia to document the domestication of the Ethiopian food plants as the necessary evidence is hardly likely to have survived among the pastoral nomads in the Rift and on the plateau, since, if they used grass thatch and cowdung plaster on beehive-shaped dwellings, as is traditional today, this would leave little or no trace in the archaeological record. However, we hope to be able to obtain dating for the paintings of cattle and fat-tailed sheep in the caves and rockshelters in the Harar Province where, in 1974, some 14 painted caves and rockshelters were photographed and traced completely or in part by Patricia Vinnicombe Carter and Patrick L. Carter; and in 1975 we made a complete record of the paintings in the Laga Oda limestone rockshelter in the escarpment 25 km southwest of Dire Dawa and 10 kms north of Kulubi. All these paintings fall into three or more main stylistic groupings — an early series with carefully executed small paintings of cattle, sheep and humans (Fig. 13); followed by a style, as in the upper shelter at Laga Oda, in which the animals are drawn much larger and often not so carefully; and a late style in which schematic designs increase significantly and, besides cattle, camels are represented. The udders of the cows are often carefully depicted denoting the importance of the milking trait. At Laga Oda we were lucky enough to find a rich Later Stone Age occupation using chert and a very little obsidian, with pottery in the upper levels only and fauna throughout most of the 1.4 m depth of occupation material in the excavation so that we expect to be able to bracket the time during which the shelter was occupied. A check will be possible on the time during which the paintings were being done, from the associated fauna, and we believe that a high proportion of the bone waste comes from domestic stock — cattle and sheep.

Fig.13. Part of the central frieze of paintings in black at Serkama Cave, near Ourso, showing cows, fat-tailed sheep with lambs and stylised "capital-H" humans. Belonging to the Early Series paintings of Harar Province.
(Traced by Patricia Vinnicombe Carter, 1974).

Summarising, therefore, these two seasons have provided evidence of a long and reasonably complete cultural succession in southeastern Ethiopia. The Developed Oldowan and Acheulian assemblages on the Arussi-Bale Plateau must be among the highest altitude sites known from the late Lower to Middle Pleistocene time range in Africa and it should be possible to demonstrate from them the extent to

which the activities and artifacts of hominid groups using high altitude forest and the grassland of the lake shore and the river flood plain may have been specially adapted. Pollens, diatoms and faunal assemblages should permit reconstruction of the palaeoclimate and ecology and the limits within which they fluctuated while we hope to be able to obtain K/Ar dates from some of the ash, pumice and ignimbrite samples we collected. It is not unreasonable to expect hominid remains also.

In the Middle Stone Age time range we have the possibility of assessing the extent of local variation between three widely separated localities as well as with Professor Fred Wendorf's sequence in the Lake Zwai basin (Wendorf and Schild 1974). It would seem now, in view of the 'blade-i-ness' of the Middle Stone Age tradition, that the origins of the Ethiopian Later Stone Age blade industry complex probably lie *within* Ethiopia itself; its antiquity finds confirmation from the deep sequence at Lake Besaka and we expect to be able to document its origins and development in some detail.

Indirect evidence suggests that agricultural and pastoral people were in Ethiopia by the end of the 2nd millennium B.C. and we hope to be able to show when significant economic changes to domestication made their appearance. Although several previous excavations have been carried out in painted rock-shelters, up to now there have been no radiocarbon dates associated with them. Charcoal from the 1975 excavation at Laga Oda has provided six dates ranging from 15,000 to 500 years B.P., clearly showing that the microlithic blade industry was long lived and had its beginnings in the late Pleistocene. Remains of domestic *Bos* occur in the upper occupation levels and its earliest appearance at Laga Oda coincides with a radiocarbon date of 1500 B.C. It may, therefore, be inferred that pastoral peoples were present in eastern Ethiopia by the middle of the second millennium B.C. and that domestic stock made its first appearance there some 4000 years ago, a time to which the oldest painting styles may also belong.

This part of Ethiopia is now proven potentially rich in the kind of data needed to provide the palaeoecological and cultural evidence we are seeking. Work over the next few years should help substantially to understand better the palaeogeographic distribution and features of sites in the Rift and high altitude zones and, when different kinds of sealed occupation floors are excavated more completely, will give the much needed information on spatial relationships of features and artifacts, so leading to identification of different kinds of activity areas and thence to a comparison of patterns of behaviour in the two zones. We may also expect to begin to learn something of the extent of Ethiopia's influence on the populations and economies of adjacent parts of the continent in prehistoric times.

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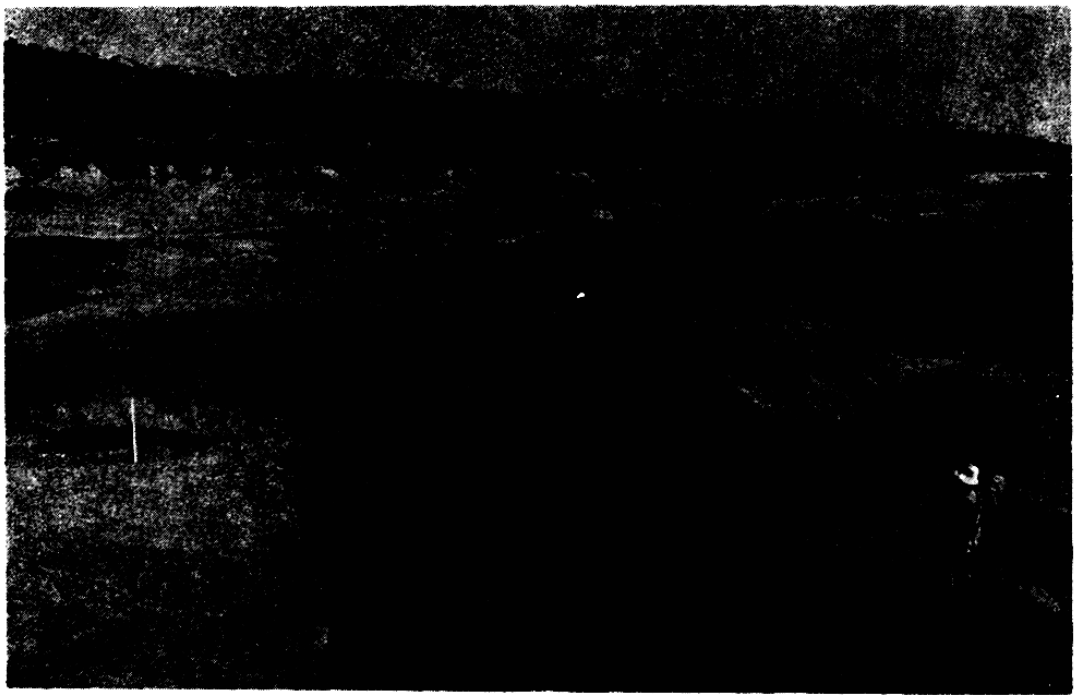
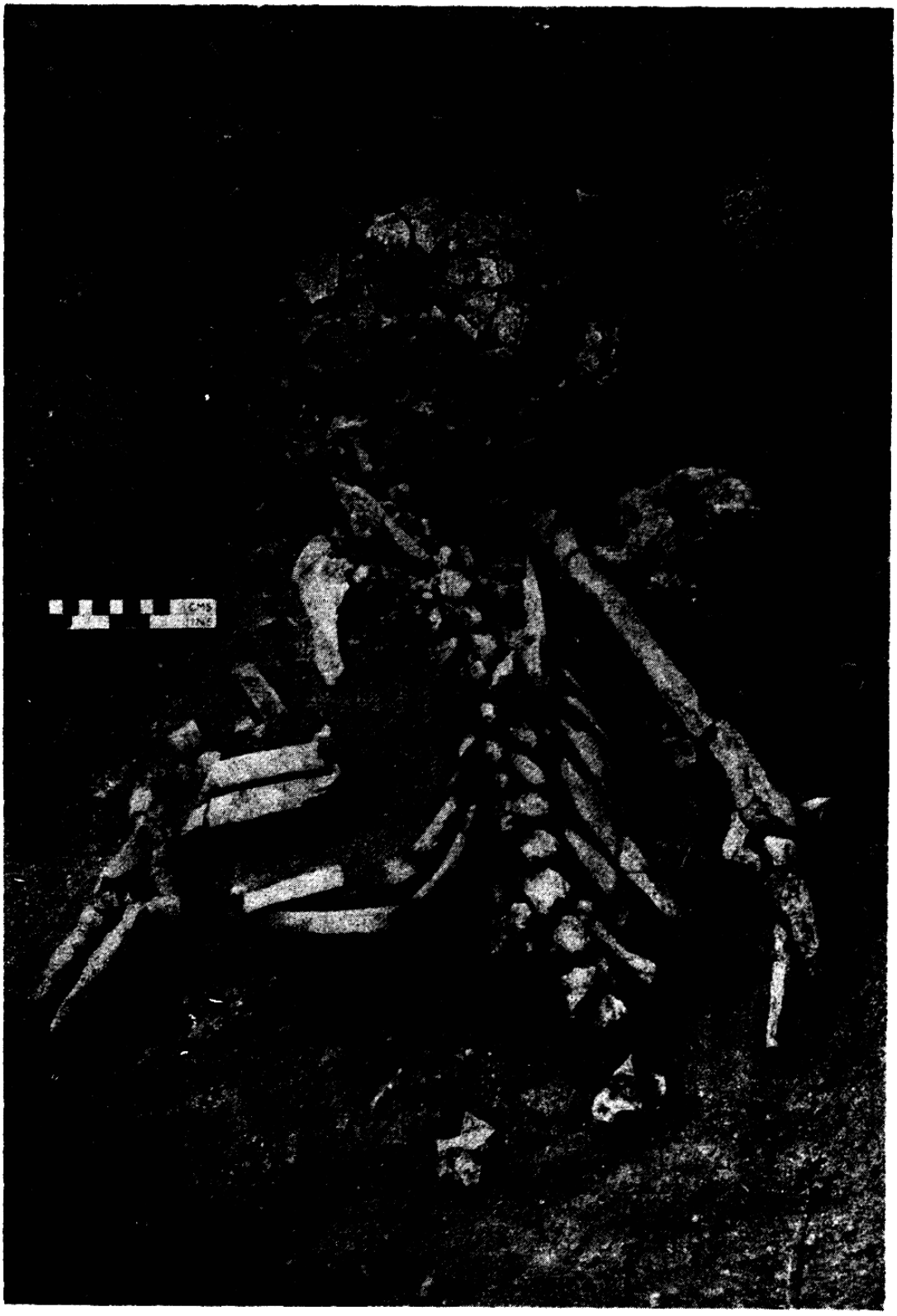
1. General view of the exposures at Gadeb 2, looking northeast. The excavated Developed Oldowan sites are situated approximately one third of the way below the top.



2. General view looking north across eroded Area A at Garibaldi Caldera. In the middle distance are excavated Middle Stone Age workshop areas below the Middle Vertisol. The obsidian outcrops are on the rim of the crater in the background.

PLANCHE VIII



3. Locality T.T.2, Lake Besaka — partial skeleton found in association with stone piles, together with an industry of Kenya Capsian affinities.