Human Ecology During Pleistocene and Later Times in Africa South of the Sahara

by J. Desmond Clark

This is an attempt to bring together the evidence of the cultural remains found in such profusion in the vast region of Africa south of the Sahara and to show what can legitimately be deduced from such evidence about the relationship between man and his environment throughout the various stages of prehistoric time. It is also an attempt to outline what may be inferred concerning the social and economic organisation of succeeding cultural stages.

Africa is important in this respect, because it has provided us with our most valuable knowledge about the living places of the earliest human societies. The extremely significant finds in China (Choukoutien), western Asia (Mount Carmel), and the more southern parts of Europe have included the less perishable material culture in quantity, and their contribution to our knowledge of, for example, food resources, use of fire, and the nature of the stone and bone equipment, is, of course, immense. But, as most of these finds come from cave sites, it is rarely possible to determine individual floors within the compacted occupation material in the deposits, therefore, as yet, they have not provided much evidence of floor patterns. Also, in higher latitudes subjected during the Pleistocene to glacial and peri-glacial climatic conditions, occupation sites in the open seem rarely to have survived except in loess regions; and tools from river gravels can never yield more than a small proportion of the clues necessary to interpret something of the way of life of their makers. In Africa we have been more fortunate, in that not a few of our discoveries have been undisturbed living sites in the open.

Certain data are essential to any study of the life of early man, if the results are to have lasting value.

Firstly, it is necessary for the chronological framework, from which a cultural succession is built up, to be established on a firm foundation and correlated on a continent-wide basis. The relative chronology for Africa, based on successive geological deposits, on faunas and cultures set in a presumed framework of fluctuating climates, still lacks the completeness obtained for other continents, and as yet absolute dating by Carbon-14 or the potassium–argon method is very much in embryo even for the later stages. Generally, however, while doubt exists as to the validity of some of the climatic interpretation, the broad chronology based on a succession of lithological units, fauna and culture need not be disputed, though a very great deal of detail still needs filling in.1

Secondly, it is necessary for sufficient classificatory work—taxonomic, if you like—to have been done to enable the various industries and technical processes to be pigeonholed correctly, in accordance with the es-

1 H. B. S. Cooke (1958) and Flint (1959a, b) have recently cast doubt on the climatic interpretations of the East African stratigraphical succession and have shown that the previously accepted framework of four "pluvials" separated by three "interpluvials" or "non-pluvials," while it may be the right one, is, on the available geological evidence, not yet proven to the satisfaction of geologists. The climatic interpretation of the geological evidence for the last pluvial and subsequent wetter periods is acceptable, but since it cannot be ruled out that tectonics, as well as climate, could have been responsible for the appearance and disappearance of the earlier Pleistocene lakes, the sediments represented by the rock units contained in their basins could equally well have been the result of earth movement, causing damming, diversion, or reversal of water resources. Since the East African climatic interpretation

J. Desmond Clark is Director of the Rhodes-Livingstone Museum at Livingstone, Northern Rhodesia. Born in 1916, he was educated at Cambridge University (B.A., 1937; Ph.D. 1956). He began his field work in Britain under Sir Mortimer Wheeler and has worked and traveled extensively in Africa since then.

Clark has done field work in Northern Rhodesia and Nyasaland, in the Horn of Africa, and in Angola. He is the author of The Stone Age Cultures of Northern Rhodesia (Cape Town, 1950), The Prehistoric Cultures of the Horn of Africa (Cambridge University Press, 1954), and The Prehistory of Southern Africa (Penguin Books, 1959), as well as of papers in a number of scientific journals.

The present paper, submitted on June 9, 1959, was sent to twelve scholars for CA treatment, of whom the following responded with written comments: Robert J. Brainwood, J. G. D. Clark, H. B. S. Cooke, F. Clark Howell, B. D. Malan, Kenneth P. Oakley, and Roger Summers. Clark has incorporated several of their suggested amendments or improvements in the text, and discussed others in the footnotes. He wishes to express his gratitude to these scholars, and also to Erven DeVore, discussion with whom has helped him to "a clearer perception of the possibilities and limits of group behavior among the earliest hominids."

Vol. 1 - No. 4 - July 1960
sentially African terminology that is now universally adopted. As this must lie behind any study of prehistoric societies, it is not surprising that there is a wealth of material available for Africa (Goodwin 1946; Cole 1954; Clark 1959a).

Thirdly, we need to know the spatial distribution of our cultures and industries and also of certain specialisation of tools. In other words, we need good distribution maps setting forth the regional spread of specialised culture patterns, industrial units, and individual forms. In this we are at present sadly lacking. For the Union of South Africa, where prehistoric research has been carried on since 1858, there are as yet no such maps, with the exception of one for prehistoric art groups. For most parts of East Africa we fare no better; and in others investigations have not even begun. In fact, for not more than half a dozen African territories do adequate distribution maps at present exist. However, the preparation of such maps is already under way for southern Africa and, it is expected, will shortly begin for the entire continent.2 (See J. G. D. Clark [1,2]). Air photography is as yet used little by the archaeologist, mainly because it has a rather limited application in the African bush where vegetation usually obscures topography, though good possibilities exist where there is intensive agricultural activity.

Fourthly, it is essential that the environment and ecological setting of cultures in each case be established as accurately as possible. Without this knowledge, we can hardly begin to interpret the cultural evidence (see J. G. D. Clark [2]). It is necessary to know the nature of faunas, vegetation and climate, of kinds and forms of raw material (both stone and other) available to man, and so on. Here, to a very great degree, the archaeologist must rely on workers in other disciplines —geologist, palaeontologist, ecologist, palaeobotanist, soil chemist, and geographer, to mention but a few. It is now fully apparent that unless there is team work with other disciplines we cannot hope to extract more than a fraction of the evidence that in many instances our sites could yield. For example, only within the last five years have the possibilities of palaeobotany been appreciated with regard to tropical regions, but now palynology has made a great beginning in Africa and is going to be of the greatest importance to the archaeologist (Bakker 1958). Again, techniques for the study of fossil soils, such as those evolved by Brain (1958) in South Africa and Bond (1957a, b) in Rhodesia, are invaluable for indicating degree of climatic change, and they need a far wider application. Only teamwork of this kind will produce the evidence we need so badly, and, as yet, such teamwork is all too often a rarity in Africa, though in Europe and the United States, for example, it has long been a recognised feature of Quaternary research (see J. G. D. Clark [3]). In Africa one man all too often tries to undertake all this work and fails, though this may frequently be occasioned by the inadequate number of workers and the large field that each has to cover.

Fifthly, it is necessary to be selective in the choice and excavation of sites. Only camping and settlement sites will provide evidence of the nature of the home itself, of the settlement pattern, and of the groupings of the people who lived there. Sealed sites in the open yield better evidence of this kind than do cave sites, even though a greater wealth of cultural material may well be found in caves. Excavation technique must be of the best, especially for the earlier sites, since the older such sealed living sites are, the rarer they become. Unfortunately, it must be admitted that in Africa techniques rarely attain the high standard that the work requires, and it is hardly necessary to point out that once a site has been excavated, any evidence that has not been preserved has been destroyed and lost forever.

Recently, excavation techniques usually adopted only for sites of Neolithic and later age have been applied to Palaeolithic sites. These techniques, by which the whole or a good part of the site is uncovered and the spread of the occupation material accurately recorded, have been used to very good effect by Leakey (1952, 1958) at the Earlier Stone Age sites of Olduvai, Olorgesailie, and Kariandusi in East Africa; by F. Clark Howell (Howell, Kleindienst, and Cole 1959) at Isimila in Tanganyika; by Mason (Mason, Dart, and Kitching 1958) at the Middle Stone Age site of Kalkbank in the Transvaal; and by the writer at the Earlier and Middle Stone Age sites at Broken Hill (Clark 1960) and the Kalambo Falls (Clark 1954).

Sixthly, surviving ethnographic evidence must not be overlooked. Selective consideration of ethnographic parallels from studies of existing primitive peoples in similar stages of culture can help considerably to fill out the picture obtained from archaeological material cul-

---

2 It should be borne in mind, however, that until ground survey has been carried out evenly over the whole territory, distribution maps will reflect the contemporary state of prehistoric research in particular regions. In order that this be not forgotten, the extent of research should always be indicated, so that the cultural distribution pattern may be viewed in its right perspective.

808 CURRENT ANTHROPOLOGY
tecture, although an uncritical use of such evidence is to be deplored (see J. G. D. Clark [4]). Bushman and Pygmy groups, pastoral Hottentots or Bantu mixed farmers and agriculturalists, preserve for us today living evidence of what some of our later pre- and protohistoric African cultures were like. Indeed, they are sometimes the living descendants of those cultures. Not nearly enough use has up to now been made of this important ethnographic evidence, nor of that preserved to us in the prehistoric art groups found in certain regions from the Horn to the Cape. Here is a most valuable record of racial characters, weapons and tools, food-collecting and hunting practices, dietary preferences, magico-religious beliefs and customs connected with initiation, death, and so on. This wealth of material has barely begun to receive examination from an ethnological point of view, and more analytical work of the nature of that initiated by C. K. Cooke (1958) is badly needed. A co-operative study of this art by ethnographer and archaeologist would give most valuable results.

Early investigators not infrequently had a less narrow outlook on prehistoric matters than some of their successors. For example, they did not neglect to draw parallels between the remnants of the Bushman peoples and the later prehistoric cultures. Unfortunately, their lack of critical approach and of selectivity rendered much of their work of dubious value and thus caused later investigators to concentrate on the narrower, but then more reliable, fields of typology and stratigraphy. The observation of one, Martin (who rejoiced in the pseudonym of “Barnacle” on account of his interest in stranded looting sites), that grindo-stones associated with many of these Later Stone Age middens were used as “gravy dishes for the epilics among the natives,” leads one to suspect that his knowledge of the life of hunter-gatherers did not go very deep (Martin 1872). The portrait painted by another early writer, of prehistoric man using his “rounded and notched nerve-scraper, preparing the skins of wild animals for his daily habiliments,” at least shows a more practical interest in the ethnographic approach (Barber 1872). And the title of yet another early paper, “Evidence on the Antiquity of Man in East London, Cape Colony, with a Note on the Castor Oil Plant” (McKay 1896), shows that the study of early man was still regarded as closely allied with natural history, unless it be that some more subtle nuance is implied.

In short, in Africa south of the Sahara much spade-work has still to be undertaken, but not a little material is now ready for synthesis.

Before we consider what may be deduced and inferred from this material, the reader is reminded of the fact that it was during times of climatic change and, in particular, of drier or non-pluvial climatic conditions, that the most rapid changes in technology occurred, if we may take the imperishable equipment, which is often all that has been preserved, to be a true reflection of a culture as a whole (Summers [16]).

Five of these dry (non-pluvial) periods have been recognised in widely separated parts of the continent.

Clark: HUMAN ECOLOGY IN PREHISTORIC AFRICA

The first saw the introduction of tool making. The third saw the important technical advance that marks the change from the Earlier to the Middle Stone Age. The fourth coincided with the transitional cultures that heralded the microlithic revolution (Clark 1959c). Finally, the fifth seems to have been responsible in southwest Asia for the fundamental change from food collecting to inceptic food producing. (See Howell [6].)

These drier periods seem to have been times of cultural “speed-up”-times of relatively short duration compared with the intervening wet periods, when new ideas and new forms were able to spread with greater ease throughout the continent and when less favourable living conditions stimulated man’s powers of invention toward improved methods of securing food and more comfortable living quarters (an example, as J. G. D. Clark [8] has pointed out, of Toynbee’s concept of “Challenge and Response” as a main explanation of the historical development of human society).

On the other hand, as soon as technical ability permitted (that is to say, from the end of the Earlier Stone Age onwards), the long periods of wetter climate made for stability, slow development, and isolation of such times. “Pluvial” conditions need not imply that rainfall was much above the present mean for any given region, but it is likely that rainfall was more regular and more evenly distributed, so that important changes in vegetation patterns and in surface-water supplies could have resulted. For example, it is unlikely that, even at the height of a “pluvial,” the climate ever improved beyond the semi-arid in the Horn or in South West Africa (see al Bond 1957).

Howell [8] says he “doubts the validity of ‘cultural speed-ups’...” But, for example, radio-carbon dates and stratigraphical evidence indicate that the drier periods at the beginning and end of the Upper Pleistocene were of shorter duration than the anterior and intervening wetter phases. The pre-Gamblian drier or non-pluvial phase dates at the Kalambo Falls to between 45,000 and 48,000 a.p. (“before present”) (Clark 1959c). Though it might be allowed that these dates most probably do not represent the extreme upper or lower limits, this period would seem to have been of shorter duration than the succeeding Gamblian Pluvial which, on C-14 results from Kalambo, Florisbad, the Cave of Hearths, and northeastern Angola, lasted from approximately 40,000-30,000 B.C. to 12,000 B.C. The post-Gamblian drier periods (as this post-pluvial period seems to have been, notably in Angola [same proviso]), on C-14 evidence from Kalambo Falls and Mufo, Angola, from 12,000 to 9,000 B.C. The cultures of the First Intermediate period—the regional Sangoan and the Fairensian—cover the time of the pre-Gamblian drier phase, while the Second Intermediate Magosian industries are the cultural forms found during the post-Gamblian phase. These cultural stages represent periods of typological and technical change in the stone cultures which, on chronological evidence, can be shown to have been relatively rapid and of short duration by comparison with the slower development of the Chelles-Acheul, on the one hand, and of the Middle Stone Age cultures, on the other.

6 See Malan [11]. The significant point here is that favourable environments, i.e., where precipitation is not deficient, make for stability of culture at primitive subsistence levels, so that there is no economic need for groups to move out of their traditional territory. When, however, this stability is upset by climatic change or some other cause, the balance with the environment is overthrown, with the result that the population has either to adjust its culture to the new conditions or to migrate. It is perfectly possible for individuals and whole tribes to move half the length of the continent in a very short time, as Malan states, but they will do so only if the need to move is sufficiently pronounced. Such necessity is basically economic, especially for the hunting-collecting level of culture.

I would have thought that during wetter periods the contrast between forest and savana was generally less marked, and that temperature change was equally as important a factor as precipitation in influencing vegetation patterns.

Naturally many factors, of which Malan has mentioned some, come into play in building up culture traditions, but I suspect that it was less easy to move about physically when the vegetation
penetrated until recent times. But an amelioration of the tropical environment during times of decreasing rainfall may be expected to have opened corridors and sometimes highways from north to south and from east to west, which seem to have invited, even though they also sometimes sidetracked, movement by groups forced to migrate by the deterioration of their traditional environment. Sometimes biological proof, in the shape of human fossils, confirms this.\(^7\) At other times we have to rely on different evidence, for example the patterns of spread of new items of cultural equipment. Contact between bands naturally encourages the spread of cultural traits, and new inventions or techniques may be surmised to have been speedily transmitted at times of ecological change and population movement. Also, most hunter-gatherers appear to be exogamous, patrilineal, and patrilocal, and there seems generally to present them with few difficulties. Indeed, such ease of adoption has been established for other primates (e.g., baboons). It is small wonder that the idea of tool making, once conceived, should have spread so rapidly among the earliest hominids.

**CURRENT ANTHROPOLOGY**

**LOWER PLEISTOCENE AND PRE-CHELLES-ACHEUL INDUSTRIES**

So far we know little about the living places of the earliest tool makers. These date to the end of the Lower Pleistocene. Relevant sites are few, and it is only since 1956, when Brain and Robinson discovered pebble tools in association with Australopithecus and *Paranthropus* at Sterkfontein and Swartkrans, respectively, that it became apparent that the Australopithecines not only used tools but most probably also made them and thus represent the first hominid stage. Confirmation came most dramatically with the Leakeys' discovery, in 1959, of the skull of the *Paranthropus*-like hominid, *Zinjanthropus*, on a living floor 25 feet down in Bed I at Olduvai Gorge. *Zinjanthropus* was associated with pebble tools and flakes and the dismembered remains of small and juvenile mammals, reptiles, etc., which would seem little doubt formed part of the food of this Australopithecine. But the Australopithecine dentition (Robinson 1954; Leakey 1959) shows that vegetable foods also formed a very important part of their diet—probably, to begin with, the primary part. However, with the introduction of tool making and thus the greater proficiency in dealing with meat, they were increasingly able to satisfy better their carnivorous tendencies. The skinning and dismembering of kills required sharp tools, most commonly stones, and where such occur in nature there would have been no problem. However, in areas where the harder rocks were found only as erratics (most commonly as rounded pebbles) in sedimentary deposits, it would have become necessary to make sharp tools.\(^8\) The pebble choppers, small utilised flakes and polyhedral stones (cutting and

\(^7\) I.e., the evidence of skeletal remains of Afro-Mediterranean or "Erythrite" type in southern Africa, from the end of later Pleistocene times.

\(^8\) I.e., on the middle Vaal, and in much of those regions where the soft rocks of the Basement Complex predominate at the surface.
tice among some primitive human societies to-day.10 But for the hunting and killing of even small game it would have been necessary to group together, and in such a necessity can be seen the beginnings and the development of the band. There is evidence to suggest that small game may have been driven into swamps or water, or cornered in caves or on rocky ground and perhaps despatched by clubbing and stoning.11 Leakey's (1958) excavation of the somewhat later BK 2 Site at the unconformable junction of Beds I and II at Olduvai showed that a gully filled with sticky swamp clay had been used by Chellean man, most probably on several occasions, for driving and bogging down game which he then dismembered and ate on the adjacent bank. This driving and "bogging in" of game has been practised in Africa until recent times, and it is probable that some of the Pre-Chelles-Acheul open sites were kill sites of this nature. The fauna associated with the Taung child and with Zinjanthropus—lizards, tortoise, crabs, small baboons, pigs, antelopes, and other juvenile mammals—probably reflects best the Australopithecine standard of hunting efficiency, and, where the remains of large animals form a significant percentage, they were most likely acquired by scavenging (i.e., "Limeworks," Makapan Valley).

The evidence put forward by Dart (1957) in support of his "oestodontokeratic culture" suggests that the Australopithecines made use of any natural tools that were ready to hand and suited to the purpose of the moment. A long bone or half a mandible from their meal debris would have served as an efficient clubbing or ripping tool, while natural stones such as are found in the Sterkfontein deposit could have formed equally effective missiles. The only bone tool showing definite evidence of utilisation is the pointed fragment from Sterkfontein (Robinson 1959).

We have only a half dozen or so sealed sites that may in any way be recognised as living or kill sites of these earliest hominids, though their stone implements are found also in river gravels and marine beaches of this time. At Ain Hanech in Algeria (Arambourg and Balout 1952; Balout 1955) the site was a lakeside one, as was also the Zinjanthropus site at Olduvai (Leakey 1959). Other sites are all in the open by lakes or rivers, with the exception of those in the Transvaal Caves, and Taung on the Kaap Escarpment. It is possible that caves had been used as temporary homes by the Australopithecines, but there is as yet no indication, unless they alone can be held responsible for the quantity of dismembered faunal remains, that their occupation was anything more than very transitory. They could not have been occupation sites in the true sense, for as yet no factory debris has been found with the "pebble tools" at Sterkfontein or Swartkrans, such as are found with all except the most temporary of Stone Age habitation sites. Perhaps, therefore, the association of a comparatively small number of stone implements with a much greater selective accumulation of broken animal bones with the Australopithecines at Sterkfontein and Swartkrans can be accounted for by regarding these caves primarily as watering places. Since water is rarely found on the surface in flat or undulating, dry dolomite country, the pools in the bottoms of the caves would have provided almost the only permanent supplies. At the same time as taking water, these earliest hominids may also have turned the caves to good use as butchery places where they could lie up and attack other animals using the waterholes. The associated fauna could result partly from successful kills eaten on the spot, partly from meat carried into the cave to eat near the water, and partly from non-primate occupation by carnivores.

The stone tools of this time show no significant typological variation from one end of the continent to the other, and at the few sealed living sites they are found distributed as a thin lateral or vertical scatter, lying in small patches and never as a continuous concentration over an extensive area (cf. Ain Hanech [Arambourg and Balout 1952; Balout 1955], Lochard [Bond 1946 and Jones 1946], Harrisdale on the Vaal [Lowe 1958], etc.). This absence of heavy or extensive concentrations of tools on these pre-Chelles-Acheul sites suggests that the Australopithecine bands may not have been very large. Any attempt to assess the size of the bands and group behaviour at this time, however, cannot fail to take careful account of observations of non-human, primate behaviour (Washburn 1957, 1959; Carpenter 1942; Bartholomew and Birdsell 1953; Scott 1958; Gavain 1955; DeVore MS; and many others).

The great apes, being adaptively specialised to a forest environment and vegetable foods, are organised in small family groups, so it is usually supposed, although larger groupings have also been recorded. Gorilla troops observed by Schaller (1959) comprised 8, 15, 5, 18+, and 11 individuals, though at times the first three troops would join together and sometimes nest within a hundred yards of each other. But the earliest hominids were omnivorous, living in open country. Probably, therefore, it will be from studying the behaviour of open-country primates such as the baboon, rather than the forest-dwelling forms, that we may learn most about the possible habits and group organisation of the first bands of tool makers. Thus Oakley [15] stresses "that if the earliest hominids were comparable with baboons, the members who were in group contact at any one time may have fluctuated as widely as between 20 and 200, depending on the scarcity or abundance of food supplies." So far as the composition of the Australopithecine bands is concerned, it will probably never be possible to give any accurate indication, and all that can be said at present is that, on analogy with the gorilla and baboon, there would have been a greater number of adult females than adult males, together with a number of immature individuals of both sexes.

Since all primate groups, or for that matter all vertebrates, keep to a clearly defined range of territory, it is safe to assume that this habit had a major effect upon Australopithecine behaviour. One gorilla troop ob-

---

10 Juveniles are still, or were until recently, sent out in the early morning by the Mashi River tribes (17°09'S, 22°40'E) to locate where vultures were flying, thus pinpointing the place where a carnivore had made a kill. The villagers could then recover the meat. See also sixteenth-seventeenth-century descriptions of strandloping Hottentots at the Cape.

11 The following observations made in Northern Rhodesia may be of interest here. The writer was present when a hare was run down and caught among rocks by two Africans, by no other means than shouting and bare hands. R. R. Inskeep was present when one African caught a bushpig by chasing it over a rocky hillside, cornering it, and killing it with his hands. Also, the throwing of stones when chasing animals has been observed by the writer on a number of occasions.
served by Schaller (1959) rarely moved more than half a mile a day, but the ground-dwelling baboons living in open country range farther but not more than two to three miles from their sleeping places (Haddow 1952; DeVore MS). Primitive hominids practising group hunting may be expected to have needed a wider range of territory, though not as extensive as that of the predatory animals (Murie 1944), or of human hunter-gatherer groups (Clark 1959a). However, as DeVore has pointed out (MS), a primate group living on the ground is much more vulnerable to attack by predators, so that the more restricted the territory, the more intimate would be the knowledge of it and the better the chance of escape. Moreover, to ensure the maintenance of an adequate food and water supply for the group, the territory has to be sufficiently small to be adequately protected from other groups. It may be suggested, therefore, that the Australopithecine bands, which were naturally adapted to drier open country where game was plentiful rather than to closed bush, may have had a range somewhere between the herbivores and carnivores. They probably ranged between several sleeping places, depending upon the number of water holes, but may not have moved much farther than four or five miles from their water supply.

Comparison of male and female crania from Swartkrans (Broom and Robinson 1952; Robinson 1958) demonstrates that Paranthropus had already undergone selective differentiation which showed that the male must have been the stronger and so the dominant partner. "A basic function of male dominance in a primate social system may well be protection—both from predators and from territorial encroachment by an adjoining group" (DeVore MS). Especially is this true where ground-dwelling primates are concerned, and it would seem probable, therefore, that the adult male Australopithecines were primarily responsible, in addition to their hunting duties, for the defence of the band, for keeping the peace among its members, and for protecting the weaker individuals.

The responsibility of protecting the Australopithecine juveniles is emphasized by Dart’s (1948) and Robinson’s (1956) studies of the deciduous dentition, which shows that the young were dependent upon their parents for nutrition and protection for several years, as are human young.

It may be suggested that, like the gorilla, the Australopithecines may, when threatened by danger, have relied for protection upon making a great deal of noise—upon simulated ferocity and aggressive gestures. Since there is no indication that the Australopithecines knew the use of fire, they must have been especially vulnerable at night, so that, like baboons, they may have used trees or naturally protected rock ledges or fissures as sleeping places (Oakley [15]).

MIDDLE PLEISTOCENE AND THE CHELLES-ACHEUL INDUSTRIES

When we come to the main part of the Earlier Stone Age (the Chelles-Acheul Culture), many more sites are known, especially of Acheulian age. The population

Clark: HUMAN ECOLOGY IN PREHISTORIC AFRICA

must still have been extremely sparse and, from the distribution as known, was confined generally to open-country grassland and park savannah where lakes, broad river valleys, or the seashore made mobility easy and provided an abundance of water and of both animal and vegetable foods.²² Caves do not appear to have been occupied as living quarters in Africa before the end of Acheulian times; at least no evidence exists for earlier occupation of this kind.

These Earlier Stone Age people were unspecialised hunter-gatherers, adjusted more or less to one type of environment that supplied their simple needs. Since there seems to have been little permanent change in type of environment throughout the length of the Middle Pleistocene, it is not surprising that there was only extremely slow development of culture.²³ At that time, man’s exploitation of his environment was still very limited, and he had no sufficiently advanced technical equipment to allow him to occupy less favourable regions such as desert or forest.²⁴ Probably, however, owing to the sparseness of the population, this was not necessary.

The "Australopithecus phase" of hominid evolution gave place during the Middle Pleistocene to a "Pithecanthropus phase" (Le Gros Clark 1958; Washburn 1959, etc.). The human fossil remains found in association with tools of the Chelles-Acheul culture in Africa are regrettably fragmentary or incomplete and appear to conflict, i.e., Pithecanthropus-type jaws with a late Chellian/early Acheulian industry at Ternifine (Arambourg 1955) and sapiens-type calvaria with primitive handaxes at Kanjera (Leakey 1935). This apparent anomaly disappears, however, if it is accepted that the cranial form of the Pithecanthropoid stock in Africa underwent a fairly rapid development towards the early Homo sapiens form, though still preserving the robust facial features of the parent stock (Wells 1957). Whether this be so or not, the increased cranial capacity of man during the "Pithecanthropus phase" (900–1100 cc.) over the Australopithecines (450–550 cc.) (Washburn 1959) must nevertheless represent an improved intellectual capacity brought about, it is to be supposed, as a result.

²²The faunal remains on most of these Earlier Stone Age sites are of primarily parkland, or open-savannah, rather than forest or closed-woodland forms (see Arambourg 1953; Boulou 1953; Leakey 1951, 1958, etc.; H. B. S. Cooke 1949, etc.).

²³The so-called Kasaian/Kanjera "interpluvial" or "non-pluvial" does not appear to have been as arid as has been previously suggested; whatever the degree of climatic change, however, it was nevertheless sufficient to bring about an extinction of certain genera and species in the mammalian fauna, and the change from Chellian to Acheulian culture. (See Leakey 1951, for particulars of significant faunal differences between Be’s I and II [Kasaian] and Beda III and IV [Kanjera at Olduvai].)

²⁴The writer knows of no evidence to show permanent occupation of what is now desert or moist forest country during Earlier Stone Age times, and it may be inferred that the climate pertaining usually to those regions during the Lower and Middle Pleistocene was not sufficiently different from what it is today to make them attractive for human occupation at that level of culture. Though, at periods when the climate permitted, such country might be temporarily occupied, there is nevertheless an almost total absence of cultural remains earlier than late Acheulian times in the Horn and in South West Africa; and, for example, the eastern Katanga was only temporaril occupied by pre-Chelles-Acheul men during the Lower Pleistocene dry period; the next and permanent occupation in the Katanga took place in final Acheulian times. (See Kamo, etc. [Mortelmans 1957a]).
of tool making (see Oakley [14]). It is reasonable to suggest, therefore, that Chelles-Acheul man was generally more effectively organized than were the Austra-
lopliochines.

The living sites of Chelles-Acheul times are invariably found close to water and often adjacent to a good source of raw material for making stone tools. The Chelles-Acheul, in particular the Acheulian camping floors, cover a larger area than those of the pebble-tool makers. The concentration of tools is generally heavier, and the patches or ‘squatting-places’ are larger and may cover as much as 2,500 square feet or more (approximate estimate for Kalambo Falls Acheulian).

Sometimes several of these patches exist at one horizon (i.e., Olorgesailie, Olduvai, Isimila, Kalambo, etc.) and may indicate either that several groups or bands had come together temporarily, or that they represent several seasons’ occupation by the same band. Camping places seem to have had no particular defined limits, and the concentration and scatter-pattern of tools and equipment on them give almost no indication that even the flimsiest of dwelling structures was known. The absence of any appreciable thickness to most of the floors indicates that the sites were only temporary camps in the seasonal movement round the hunting territory. If they had been occupied uninterruptedly for any length of time, some depth of deposit would be bound to have accumulated, in spite of the quicker dispersal of occupation debris that can be expected at open sites where there are no natural confines such as in a cave.

16 Howell [9] has stated he thinks ‘camping places’ do show limits (cf. Isimila, Kariandusi, Olorgesailie, Olduvai Bed II sites), and scatter patterns show much special activity going on. Of course the concentrations of tools and waste on these ‘living floors’ have general limits which presumably show the general extent of the ‘occupation,’ but no consistent pattern has so far emerged to show that these camps or halting places were made on any regular plan. So far as can be deduced from the existing evidence, the scatter of the stone equipment never follows any regular pattern and is dictated solely by the circumstances of the site at the time it was occupied and by the number of individuals in the band.

17 The only evidence known to the writer that man at this time may have used some kind of primitive shelter comes from Olorgesailie and Kalambo Falls. One or two irregular shallow depressions on the edge of the living floors in the Olorgesailie lake deposits in the Magadi section of the Gregory (Kenya) Rift might conceivably have been sleeping places and would come well within the definition of Bushman or Hottentot sleeping ‘form.’ At Kalambo Falls in 1959, on one of the late Acheulian living floors (Floor 5), a rough arc of stones was found which looks as if the stones had been intentionally placed there. Cultural material was found in quantity outside the arc, but very little occurred within it. It might be suggested, therefore, that these stones may have formed the base of a windbreak or screen erected to afford protection at a time when the climate was wetter and colder than it is today (Bakker and Clark 1960). In addition, these excavations yielded, on the same floor, three separate accumulations of matted grass stems, fibrous roots and twigs, all carbonised presumably due to fire. These final shallow depressions, three to four feet in ground diameter, call to mind the grass-lined bedding places made by Bushmen and other hunting-collecting peoples.

No evidence of any long continued occupation of an Earlier Stone Age site in Africa is known to the writer before the end of Acheulian times. Some sites were consistently revisited throughout and here several living floors may be found separated by thin layers of sterile deposit. However, the absence of any thickness of accumulation of occupation debris on these living floors themselves suggests very temporary seasonal occupation only—probably for no longer than was necessary for man’s continued hunting to scavenge away the game. Malan [19] has suggested that it is unprofitable to consider a considerable depth of occupation deposit could develop on an open site unless it is confined by topographical circumstances. While admitting that some outward dispersal of occupation material may have occurred, he states that there has been continuous un-
rupted occupation over a sufficient length of time, a vertical ac-
cumulation of debris (waste materials) does result (shell mounds.

Some of these sites can have been no more than stopping places for consuming a single large food animal (Leakey 1951). Others, however, provide signs of deliberate and more prolonged occupation and are believed to represent butchery sites where a number of animals, on more than one occasion, were killed, cut up, and eaten, or where a seasonal crop of vegetable foods determined a stay of several days. The driving of game into water or swamps was practised, and there is some slight evidence to suggest that man may have carried some of the meat away with him to other camps.

18 See Leakey’s description (1958) of the early Chelian butchery site (BR 2) at the junction of Beds I and II at the Olduvai Gorge; Power’s (1946) Acheulian site at Pniel on the Vaal River; Cornelis (Oakley 1954) with a Fauresmith industry, in the northern Orange Free State; Hopefield, again with a Fauresmith, in the western Cape (where concentrations of broken bones of several different mammals may owe their accumulation to man) (Binger 1957), and Summers [17], for evidence, with the Acheulian again, from Southern Rhodesia; also, the possible driving of game through selected defiles and gaps in mountain ranges orilly ridges as during final Acheulian and Fauresmith times at Wonderboompoort near Pretoria (Mason 1957). The discovery, in one of the lower horizons at Isimila, of a hippo carcass associated with a few
Although no regular pattern to the camping places can be seen at this time, the distribution of stone equipment and waste on some of these sites clearly indicates that different activities were being carried on in different parts of the camp. Most of the evidence on this is not yet published (Ismilha, Hangklip, Olorgesailie, Kariandusi, etc.), but it can be clearly demonstrated from our own work at Kalambo Falls. In some places on the Acheulian floors at this site, only the coarse factory debris is found, together with unfinished tools or roughouts. In this instance the factory debris lay close to the source of quartzite boulders, and it could be seen how the boulders had been smashed up with considerable force by using others of similar size and weight. Large and small primary flakes lie about in profusion, and it is possible to fit not a few of these together again. It has been suggested that, at Hangklip, fire may have been used to split large sandstone and quartzite boulders, but the heat spalls on this site could be simply the result of ancient or modern bush fires. In other places at Kalambo were found concentrations (sometimes as many as twenty-five tools to a five-foot square) of handaxes and cleavers which had clearly been carried to the spot and used there. Here the waste is confined to typical “handaxe trimming flakes,” which occur in some quantity and which could be flakes knocked off either during use or by intentional resharpening. The latter explanation is preferred, but the detailed study of the material has not yet been completed. In other places, again, isolated implements, or one or more handaxes or cleavers together, with several feet separating them from the next group, suggests that they may have been the tools of single individuals. Handaxes and cleavers have also been found standing on edge in the sand of the camp floor, which suggests that they may have been placed like that when the individual had finished using them (at Ismilha—personal communication from M. R. Kleindienst—and Kalambo Falls, 1959 season). In other places, notably on the bank and down the side of a stream channel at Kalambo, were a large number of flake tools. These again suggest that some specialist activity may have taken place there. For possible explanations of the Middle Pleistocene flake industries see Posnansky (1959a) and Clark (1960).

The only formal tools of this time were the handaxe and cleaver, but numerous unspecialised flake tools were also used, as well as pounding and chopping equipment.

The preponderance of large beasts at many of the sites, and the nature of their remains, indicate that the equipment was fully adequate for the dismembering of even the largest animals and made it possible for every part that was in any way edible to be consumed. Good circumstantial evidence can be adduced to suggest that one of the main uses for the handaxes and cleavers, that occur in such profusion on the sites of this time, was as meat mattocks and flensers for dealing with thick-skinned, larger game.

There is every reason to believe that the stone equipment of Earlier Stone Age man was highly expendable and that, provided the raw material was available (as it usually was), tools were made for a particular occasion only and were subsequently discarded when the band moved on. The nature of his subsistence required that man be fully mobile, and it is unreasonable to suppose that large quantities of stone tools were carried about when man’s technical ability enabled him easily to manufacture new tools. But if these and many of the smaller flake tools were domestic equipment, is it possible to determine what weapons these people possessed?

sites has convinced the writer that the same intentional design of flakes does not lie behind the flake tools and other stone equipment of Middle Pleistocene man. It is true that it is perfectly possible to sub-divide flake tools, or choppers, for example, into many different forms—single and double side-scrappers, hollow scrapers, etc.—but a close examination of the wearing edges indicates that the final shape of the tool can have been of little or no importance. It is not possible to show, for example, from the assemblages I have examined, that there was any selection of forms of primary flake for the manufacture of special categories of flake tool. Any convenient flake or core seems to have been used. Edges show some secondary trimming and a lot of trimming resulting from utilisation, and it would seem to have been of no special importance whether one or both edges were used, or whether, in the latter case, the edges sometimes converged to a point, or not. The amount of “secondary working” seems to have depended on how much work had to be done with the tool, or what it was used for, and whether the shape of the primary flake prevented more than one edge from being used. The same applies to choppers, chopping tools, and other core tools. Polyhedral stones would seem to have acquired their shape in the earlier stages as a result of utilisation (as hammer stones, anvils, nut and bone crackers, etc.), rather than by deliberate intention. No consistent design is apparent. But by the very end of Acheulian times these stones were being made into well-shaped spheres, and, it can be argued, had by then been adapted to some secondary use; they had thus become formal tools in the sense that handaxes and cleavers are described here.

Fauna lists from Ternifine (with a late Chellian/early Acheulian industry) include (Arambourg 1955, 1957): Elephas atlanticus, Rhinoceros simus, Camelus Thomasi, Hippopotamus, Giraffa, large and small antelopes and gazelles, Machairodus, giant pig (Hyaenotherium). From the BR 2 (Chellian I) site at Olduvai (Leakey 1956) came: Rhinoceros sp., Serengetitherium sp., giant pigs, Palaeoloxodon antiquus, Archidiskodon sp., Pliohippus antiquus, Bularchus arko, Hippopotamus gorgori, Giraffa camelopardalis, Statherium oldowayensis, Equus oldowayensis, etc. At Elandsfontein (Hopwood) the larger animals included (Singer 1957): Palaeoloxodon antiquus, White and Black Rhinoceros, Equus helmei (cf. E. camelopardalis), giant pigs, Hippopotamus, Statherium oldowayensis, Homo erectus, and tools. The culture associated with the Elandsfontein fauna is believed to be a regional Fauresmith.

On living sites that have not been disturbed and where tools are fresh, it is apparent that the edges of handaxes and cleavers are always sharp, though blunting may result from the bending of some parts during manufacture or re-trimming. This implies that these tools must have been used on “soft” rather than “hard” substances, as, if employed for chopping wood, for example, they would show signs of blunting the edges, which they do not. Some form of large cutting tools would be essential to dismember most large animals, as is apparent when one observes present-day Africans cutting up an elephant or hippo: mallets, axes, and knives are all employed. As has been demon-
From contemporary sites in Europe we know that Middle Pleistocene man had wooden spears, and there is a suggestion from one of the African sites that they may have possessed the throwing stick or club. When one adds to these the use of natural and artificially shaped stones as hand missiles, it is likely that the somewhat meagre inventory is virtually complete. Indeed, the Australian aborigine possesses little more than this even today. The emphasis in securing the meat supply must have been on mobility and co-operative hunting.

Fish was sometimes collected and eaten, for fish-remains (Barbus and Protopterus) have been reported from a Late Acheulian living floor (Nyabusoro: M/N horizon) in the Kagera Valley in Uganda (Posnansky 1959b). Also, the irregular line of stones partially excavated on one of the temporary land surfaces round the one time Lake Oloresai in the Magadi section of the Kenya Rift is reminiscent of the small fish weirs and dams commonly built in tropical Africa round the margins of lakes and rivers where fish can be trapped as the water recedes at the end of the rainy season.

It is reasonable to suppose that there were no members of the band who were not engaged in collecting food, and, especially for hunting, there must have been some means of controlling behaviour and ensuring co-operation among the individual members. Even at this early stage co-operative effort would have been essential, and from this Sommerfelt assumes that some sort of language is as old as man himself, and developed with the tool (see J. G. D. Clark [5] and Sommerfelt 1954). Such basic language would not have been speech, as we know it, and must have been very limited in its field of reference and probably confined to various inarticulate cries, signals, and gestures, though less limited and more fluid than that of other higher mammals.

Wild vegetables must have been also an important source of food, but to obtain these, little equipment would be necessary other than a digging stick and a sharp stone, and such sticks have been found at one African site (Kalambo Falls). The fruits and shoots best found in the fringing forests along the water courses can be collected with little more than a chopper to aid in tree

stratified more than once, a handaxe or a cleaver would have formed a serviceable tool for skinning and dismembering a kill and for cutting up or scraping the meat off bones.

...
climbing and a natural container to hold or store the food. Honey may have provided the necessary sugar, and deficiencies in mineral salts could be supplied by some lake or river silts.28 Thus we may presume a reasonably balanced diet for these people.

As to the size of bands during the Earlier Stone Age, there is little that can at present be said with certainty. A study of the number and variety of implements in relation to the number of food animals on the camping sites might be expected to give an approximate estimate. There is, however, no evidence of even semi-permanent occupation of a camp site during the whole of this period, and the composition of bands can, therefore, never have been very large. Before the spread of firemaking it is likely that man continued to rely for defence on numbers and group action, as do baboon troops, so that with his improved efficiency in tool making and foraging it may be supposed that Chelles-Acheul man was grouped into larger units than were the Australopithecines. The groups would still have been small enough to preserve the degree of mobility necessary, though it may be surmised that at favourable seasons, or for specific purposes, larger units would have come together (see Howell [9]29).

The discovery of how to make and use fire apparently did not reach Africa until the end of the Earlier Stone Age, no doubt on account of the prevailing climate which was warmer than in Europe or North East Asia (Oakley 1955) where the first evidence for man's use of fire goes back to the Mindel Glaciation (Choukoutien). The social and economic advantages attendant upon this revolutionary discovery must, therefore, be considered to have been largely unexploited in Africa during the 400,000 years or so of the Earlier Stone Age.

The earliest evidence of fire in Africa is found at the very end of this period. At approximately the same time, evidence for the occupation of cave sites begins,24 and regions that are now moist rain-forest and desert country began also to be occupied on a more permanent basis. The ability to specialise by adaptation now enabled man to establish himself in most areas, and there is a considerably more continent-wide distribution of sites. Both these circumstances—the occupation of caves, providing shelter and protection and a semi-permanent home, and the population of hitherto less attractive environments—were, it may be suggested, indirectly due to the use of fire.

The working of wood (Clark 1955, 1959a) must have been greatly facilitated by the use of fire, and easy woodworking, in turn, provided new methods of hunting. The telling of trees can now have presented no great difficulty,20 and the use of various kinds of traps in more thickly wooded country may have given rise to more individual forms of food collecting. Thus members of a group were able to live in close contact, and groups could develop independently. The greatly increased number of sites known from the times of the First Intermediate and Middle Stone Age cultures may be taken to indicate also an increase in overall population. The greater need for, and, it may be suggested, the more jealously guarded rights over, permanent water resources may have led to interband warfare.26

UPPER PLEISTOCENE:
MIDDLE STONE AGE INDUSTRIES

If the desiccation27 which brought the Earlier Stone Age cultures to an end saw the beginnings of regional specialisation in technical equipment, and so, we may infer, in society and culture, the Middle Stone Age, extending in time throughout much of the last or Gamblian Pluvial,28 saw specialisation carried further and the establishment of a number of regional29 cultural...

---

28 There is reason to believe that some of the lumps of peaty clays with burnt vegetable matter that have been found on Late Acheulian camping floors at the Kalambos Falls may be pieces of lake muds purposely collected for eating. Geophagy as practised in Africa today is normally related to mineral-salt or vitamin deficiency.

29 Open sites with evidence of fire are a late Acheulian floor in the Kagera valley (Nyabuso), where Posnansky reports burnt bone; and the Kalambos Falls, where charcoals, ash, and charred logs are preserved with the late Acheulian. Cave sites yielding similar evidence are the Cave of Hearths in the northern Transvaal and the Mountagi Cave in the western Cape.

30 Deciduous trees are regularly felled by lighting a fire at the base. African bee cultivators, when clearing new bush for planting, fell large trees by lighting a fire at the base of the trunk.
variants (Malan 1949; Clark 1959a). These demonstrate the extent to which their makers were able to exploit local ecological resources, in that we find some variants adapted to moist rain-forest, others to sahanna, others to grassland, and so on. For example, in the Lupembian and later Sangoan variants there was a great emphasis on woodworking tools and equipment, suited to close bush in the thicker vegetation areas, and, perhaps, one may suggest for such cultures a heavy dependence on vegetable foods. In this connection should be noted the grinding and pounding stones found in Middle Stone Age cultures in the savannah regions, and there may also have been easier to obtain if the state of the teeth of Broken Hill man is anything to go on. In other cultures hunting would seem to have assumed the greater significance, and the pressure-flaked points of the Pietersburg and Stillbay peoples, for example, show the importance of throwing spears and knives in the equipment of a band of hunters.

Now, for the first time, we have slight but definite evidence of the differing nature of wet- and dry-season camps. The wet-season camps of hunter-collectors may be expected to be some distance from permanent water and the stone culture to reflect only transitory occupation by a band or small group of hunters without the full range of tools found at the more permanent occupation sites. (For Bushman wet-season camps, see Schapera 1930.) Alternating residence in semi-permanent camps, protected by fires, must have resulted in more specialised food collecting, according to season, and perhaps also in a more exact division of labour between the sexes. Certainly a greater specialisation in activities seems to have accompanied the increased use of conditions did not bring about the total extinction of genera and species of one pattern and its supersession by another, but were manifested rather in advances, or wider dispersal, of some forms and retreats, or contractions, of others. For example, the pollen spectra from Florisbad, Kalambo Falls, Muto, and other sites in southern Africa (Bakker 1957; Bakker and Clark 1960) and from the Sahara (Bakker 1958) indicate that, since the beginning of the Upper Pleistocene, changes in precipitation and temperature have been sufficient to turn sour velds into sweet-grass velds, saline freshwater conditions in small lakes and pans, and to bring the montane cold-loving flora as much as 1,000 to 1,500 feet below its normal level. It was not sufficient to, however, to cover the whole of the State with sahanna, nor the Tanganyika Plateau with closed forest, and, while the cold-loving vegetation was able to spread over the higher parts of the central plateau, this repopulation can not have been more than of a corridor or gallery nature. Goodwin (1955) was one of the first to show that the modifications in the climate of Africa during the Pleistocene were not of the severity archaeologists have been used to suppose. Thus, generally speaking, archaeologists should think in terms of shifting belts of vegetation, of changes in accordance with a regular pattern where, if the precipitation is increased, desert is replaced by sclerophytic steppes, steppe by park and woodland savannah, savannah in various kinds of forest; or if the rainfall becomes less, a reversal of this pattern can be expected. Given, therefore, the existing vegetation pattern, and some knowledge of the magnitude of changes in precipitation and temperature from paleontological evidence, it should be possible to reach an approximate idea of the pattern for the various regions at the peak of a wet, and lower level of a dry, period during later Pleistocene times, and to confirm this by further palaeo-botanical investigations. Some general outlines have been made already to reconstruct vegetation patterns in certain regions during non-pluvial and last pluvial times (Butter 1958; H. Wild, in Clark 1957; Clark 1959a, and more palaeo-geographical work of this kind is urgently required.

Clark: HUMAN ECOLOGY IN PREHISTORIC AFRICA

made of materials other than wood and stone. Perhaps the percentage differences in tool form within a single site, and the variation in the percentages over groups of sites, may serve to distinguish equipment used primarily by men and that used primarily by women.

From his increased tool-making ability, it can be assumed that Middle Stone Age man's intellect had developed considerably beyond that of his predecessors, and the fossil record shows that, by the later half of this period, Homo sapiens had replaced the palaeoanthropic stock. There is indirect evidence that the social structure was more complex than in Earlier Stone Age times and that man was able to communicate ideas to his fellows in a way that is possible only by the aid of true speech. The development of specialised tools, the invention and spread of hafting, the use of pigment presupposing art, burial of the dead, and the closely similar pattern of industries, within circumscribed ecological regions, favour cohesion of groups that could have been supported only by a common tongue for each.

It might not be over-stretching the evidence, therefore, to suggest that loose tribal groupings were already present in Middle Stone Age times and that, with improved technical ability permitting greater exploitation of the resources of the environment, there was an overall increase in the size of the hunting bands. Presumably the same factors governing the relationship between rainfall intensity, natural resources, tribal area, and population density that are applicable to modern primitive groups apply also to prehistoric cultures (Birdsell 1953, 1957). But as yet we have only the most imperfect knowledge of the ecological background of these cultures in Africa, so that any attempt at estimating population density or the sizes of bands can be only guesswork.

23 As we have seen, bone as a raw material for tools was used from the time of the earliest tool makers, but it is not until later Pleistocene times that we find bone specially worked to intentional shapes. Some of the earliest evidence from southern Africa comes from the Broken Hill cave, where gouges, spatulate- and pointed-ended tools in bone occur, in addition to various utilised fragments (Clark et al. 1950). The utilised flake of hippo ivory, which bears a well-marked bulb of percussion, from the Chellean II living site (SHR II) at Olduvai Gorge (Leakey 1958), although it is made of ivory, cannot be classified as an intentionally shaped ivory tool in the sense employed here, since its maker has employed stone technique suggesting only fortuitous use of ivory as its raw material.

24 The reduction of the bulb and striking platform that can be seen on flakes and flake-blades in significant percentage on sites of the middle and later stages of the Middle Stone Age can probably be interpreted as aids to facilitate hafting. A Carbon-14 date of between 27,000 and 29,000 years B.P. for a Rhodesian Lepani industry at the Kalambo Falls, where such reduction of butts can be clearly seen, suggests that the introduction of hafting may have first spread generally within the sub-continent at some time shortly after 30,000 years B.P.

25 Pigment with rubbed facets has been discovered in association with a few earlier Middle Stone Age industries, e.g., Bambata, Twin Rivers, and Broken Hill, and with a number of later Middle Stone Age industries. As Howell points out, two pieces of red ochre were found on the Chellean living floor (BK2) at the base of Bed II at Olduvai (Leakey 1958). These pieces bear no signs of use by man, though Leakey suggests that they were intentionally brought to the site. They may have reached their position through the same agency that distributed the large numbers of natural pebbles and lumps of rock over the floor—through a natural, or possibly human, cause.
POST-PLEISTOCENE AND LATER STONE AGE INDUSTRIES

Somewhat more evidence is available for Later Stone Age time, however. These people were still in a hunter-gatherer stage of culture, but geared, one may suggest, more closely to that preserved in existing Bushman social structure. In some instances the recognition of wet-and dry-season camps, besides affording indication of specialised activity, has produced some idea of the size of the smallest groupings. Small dry-season camping places of the Wilton peoples in the Zambezi Valley are characterized by not more than two or three windbreaks along the river which show that, in this region of open forest on Kalahari sand, bands seem to have split up when the dry season was well advanced and converged in small groups on the banks of permanent water just as the Bushmen still do today (Bond and Clark 1954). In other areas, however, it seems that the dry-season concentration by the side of permanent water was an occasion for people to come together in larger groups. This latter form of grouping may possibly be connected with some specialised activity such as fishing (a supposition based on the high incidence of a particular tool form), and may be expected to have occurred at the end of the rains when the water in the rivers was just beginning to recede.35

Again, the specialised Ishango culture, with its range of bone harpoon types, found in the terrace silts and gravels of a former higher level of Lake Edward, could represent the fishing equipment of people who lived seasonally on off-shore papyrus swam islands, as is done by some Nilotic and Negroid groups today (De Heinzelin 1957).36 There is also evidence that specially favourable ecological conditions may have permitted more or less all-year-round occupation of an area by some groups. The strandloping peoples living along the South African south and east coasts are a probable instance.37 They lived permanently upon sea foods, though they still retained their mobility to some degree. The groups that specialised in hunting the eland in the eastern Free State and Natal are another instance of more specialised food collecting.

Estimates of band size are sometimes permissible from the evidence of foundations of windbreaks (Clark 1959a: 218–19), and approximate estimates of territorial limits, based on the distance of culturally related sites from the nearest permanent water, indicate that hunting territory in the drier parts of the continent was more extensive than that of bands that occupied ecologically more favourable regions (Goodwin 1936). Some indication of the spatial range of a group is given

---

35 E.g., certain sites on the upper Zambezi near Livingstonia, and on the middle Zambezi at the Kariba Lake area. These water-side sites show a high percentage of crescent adze-blades which suggest some specialised activity possibly connected with fishing—perhaps the manufacture of basket traps, fish spears, or arrow shafts from *Phragmites* reeds.

36 De Heinzelin, on extrapolated radio-carbon dating, places the Ishango culture between 6,500 and 6,000 B.C. Carbon dates for the Wilton and Nachikuun cultures in Rhodesia show that the Later Stone Age there ranged between 4,500 B.C. and 240 B.C., though of course these dates must not be considered as representing the maximum lower and upper limits.

37 A specialised variant of Smithfield A at the Matjes River Cave has been dated by C-14 to between 9,200–8,500 B.C. approximately.

---

38 For the later re-distribution of Kalahari-type sands in Angola, the Congo, and Rhodesia, see Leakey (1949), Jammart (1953), Mortelmans (1957), Clark (1956).
grave stones from the south coast caves, but, in the main, for the Later Stone Age peoples it is the rock art upon which we draw. From this art we can reconstruct a picture of rain- and hunting-magic and of ceremonies associated with burial, initiation, and perhaps marriage. Even the day-to-day lives of these people is well represented in this art. Further, the rock art provides a wealth of social evidence, the extent and nature of clothing, of weapons, of domestic equipment, the various techniques of hunting, fishing, and food collecting, raw materials, records of events such as dances, fights, cattle raids, and so on, and helps to fill out the information yielded by excavation. From it we see that in South Africa generally there existed, until comparatively late times, Stone Age hunter-gathering groups living side by side with more advanced peoples whose propinquity had modified their traditional cultural patterns to varying degrees.

Neolithic mixed farmers in the highlands of East Africa and Abyssinia, who built some permanent settlements but still no doubt also moved to a certain degree with the seasons, seem to have been the lineal descendants of the Mesolithic hunter-gatherers there. There is also evidence that they may have been in contact with outsiders, however, on the one hand with the Nile Valley, and on the other with the sea coast. Influence from these groups or from the Horn penetrating to South West Africa probably caused some of the western Cape peoples to adopt a nomadic, pastoral life.

Generally speaking, it is not until the southward movement of the Later Iron Age peoples and the northward movement of Europeans from the Cape exerting pressure on the hunter-gathering groups and bringing about large-scale population movement in search of fresh land or new wealth, that there is evidence for anything other than amicable relationships between gatherers and producers and a slow cultural integration. Signs of this latter can be seen in the various cultural borrowings between groups and in the modification of the use of certain forms of tool. Hunter-gatherers, no doubt impressed by the greater material possessions of the settled communities, seem particularly ready to borrow from their wealthier neighbours, and African prehistory has a number of good instances of this. This process can also be well seen in Africa today, and it is interesting to note that borrowed forms are not always made to serve the purpose for which they were originally intended.

Up to the end of the Middle Pleistocene, Africa's contribution to the development of human society seems to have been as great and probably greater than that of any other continent. But, from the Later Pleistocene times onwards, possibly because it lacked the environmental stimuli present in more northerly latitudes, human culture south of the Sahara seems to have received more than it gave. This situation seems to have become more pronounced in later times, so that by the time the earlier food-producing cultures appear there, the imitative rather than the inventive trend of indigenous culture is clearly evident.

It must be apparent from this brief sketch that we are still a long way from being able to reconstruct even the latest cultural levels with anything like completeness. We know not a little about the manner of manufacture and use of tools and other equipment—how, for example, microliths and thumbnail scrapers were hafted and used—but we need to go further and endeavour to interpret these in terms of the social and economic life of their makers. We have some facts established and can reasonably infer others, but if the society and economies of African prehistoric cultures are ever to be interpreted properly, we need the help of natural scientists and anthropologists to provide the ecological settings, since such is fundamental to a more complete understanding of any culture, and we need many more efficient excavations to expose and accurately record the settlement patterns—more facts and more teamwork.

---

**Comments**

*By J. G. D. Clark*

[1] Spatial distribution: This is an excellent statement, but I suggest that the danger of publishing distribution maps prematurely, i.e., before field survey has been carried out evenly over the territory, ought to be emphasised; otherwise there is a danger of conclusions being drawn from distribution patterns which reflect no more than the contemporary state of prehistoric research.

[2] The paragraph on environment and ecological setting might be combined with the one on chronological framework, since the main basis for a chronology of the Pleistocene rests on a study of changes in the environmental and ecological setting.

[3] The point made about the necessity for teamwork is well taken. It might be mentioned that this has long been a recognised concept of Quaternary Research.

[4] Ethnographic evidence: The danger inherent in an uncritical use of such evidence should be stressed. "Existing primitive peoples" are not in a strictly historical sense primitive, or at least cannot be accepted as such unequivocally; they are, after all, living on the same plane of time as ourselves, have had an equally long history, and during the last few centuries in particular must, or at least might, have been subjected to influences emanating from cultures at many different levels. Moreover, there are usually several alternative ways of meeting the same problem, and it does not follow that the same choices were made by the prehistoric people and modern "primitives" chosen for comparison.

[5] Language: Surely language in the elementary sense in which it is defined here is common to other animals and even insects, and is it not the case that co-operation between individual members is highly developed in many animal and insect communities?

*By F. Clark Howell*

[6] Considerable evidence is still necessary to establish the actual existence of these "dry periods" in certain ecologically unstable areas of eastern-central Africa. I indeed doubt that several are clearly and unequivocally recognizable in that part of the continent on present geological evidence; not that such did not occur, but proving them is another matter! Surely it is still
ecological changes of the order postulated in Africa had any marked effect on human capacity to travel, or that the absence of the wheel and pack animals is relevant. Greater cultural movement and expansion may indeed have taken place during drier periods, but Clark seems to be clutching at straws to explain the phenomenon. Is it not possible that during wetter periods the contrast between forest and savannah environments was greater and so acted as a more effective barrier to cultural expansion and interchange? Perhaps the phenomenon depends on factors such as incompatibility of culture, lack of cultural adaptability, conservatism of tradition, or absence of pressure of population, rather than a hypothetical restriction on the physical movement of people during a wet period.

Clark takes the lack of thickness of Earlier Stone Age deposits on open sites as evidence that such sites were merely temporary camps occupied for relatively short periods. Here again the conclusion is probable enough, but the argument open to question is it difficult to see how, even during a prolonged occupation, any considerable depth of occupational deposit could develop on an open site unless the deposit was confined by some exceptional topographical circumstance such as a hollow in the ground. In other words, prolonged occupation of an Earlier Stone Age open site would lead to outward dispersion of debris [waste materials] rather than a vertical accumulation or thickness of deposit. Only when the particular way of life demands the disposal of a considerable volume of waste, such as ash or shells, in the form of heaps or middens, can thick deposits be expected to develop on open and unconfined surfaces.

By K. P. OAKLEY

[13] After reading the paper I found myself attempting to assess very roughly the social structure of the early human groups in Africa at each of the main levels of culture. The result was as follows:

Earliest Hominids (Australopithecines): In size of groups and social structure they were perhaps comparable initially with baboons. Like baboons they were adapted to life in relatively dry open country. It has for long been inferred that their adaptation depended on developing carnivorous habits, maintained through becoming bipedal and thus having hands free for use of tools and weapons to supplement bodily equipment. We had known from field evidence such as that collected by Captn H. B. Potter (quoted in Science News [Penguin] 21 [1951]:77-78) that baboons are occasionally carnivorous and have been observed engaging in "apparently organized hunts." It therefore seemed logical to propose that the hominids in becoming adapted to the same environment developed such habits to the full. However, it was not until this year that Raymond Dart's belief that the Australopithecines were hunters and at least tool-users was fully confirmed. From the food-debris at the living site of "Zinjanthropus" discovered by Mrs. L. S. B. Leakey, July, 1959, in Bed I at Olduvai, there is no longer any question that at any rate the more advanced Australopithecines were carnivorous, that they hunted small mammals and the young of medium-sized mammals, and that they were tool-makers.

From the point of view of the beginnings of culture it may be important to remember that if the earliest hominids were comparable with baboons, the numbers who were in group contact at any one time may have fluctuated as widely as between 20 and 200, depending on the scarcity or abundance of food supplies.

[14] Middle and Upper Pleistocene men: The increasing number of cultural elements in common with primitive hunting and food-gathering peoples of the present time suggests that the social structure of the Earlier and Middle Stone Age peoples of Africa may have approached that of men as we know them today. It is interesting that Clark sees in the archaeological record evidence of articulate speech, and is led to infer that within circumscribed areas the Middle Stone Ages peoples had a common language.
Caves with unguarded entrances are particularly dangerous as night shelters for hominoids: for the simple reason that apes and men betray their presence by snoring.

By R. F. H. Summers

[16] A priori the change takes place fastest during the drying phase, but this is also the period during which river deposits are laid down and so is the period about which we know most typologically. There is a possibility that too much weight might be given if one argues from observations only. I think that it ought to be stated that this is an a priori argument.

Geographically, cultural and industrial changes tend to take place quicker in drier, less favoured, marginal areas (compare Transvaal and Orange Free State with Southern Cape).

[17] The same phenomenon in a late Acheulian context has been noticed by a field worker (J. Masfield) on the Southern Rhodesia watershed near Lochard where sheet erosion has stripped a large area. Handaxes and "bolas" stones are concentrated in areas which Masfield considers to have been swampy. No bones remain, as the acid soil does not permit of their survival. (Unpublished information.)

References Cited


---. 1956a. The prehistory of southern Africa. Nora: Bookman's Harmsworth. (General introduction to the climatic and cultural succession and the effect of environmental changes on the early stages of human culture.)


COLE, S. 1954. The prehistory of East Africa. (Penguin Books.) Harmondsworth. (References concerning East Africa, the Horn and Sudan.)

COXE, C. R. 1958. A comparison between the weapons in rock art in Southern Rhodesia and weapons known to have been used by Bushmen and later people. Occasional Papers of the National Museum of Southern Rhodesia 3, No. 22A:120-40.


—-- 1951. Olduvaig gorge. London: Cambridge University Press. (Description of the Acheulian Stage 10 site at HK, Bed IV, with diamermeres remains of a hippo—P. 140-45.)


NILKON, E. 1940. Ancient changes of climate in British East Africa and Abyssinia. Meddelanden från Stockholms Högskolas Geologiska Institut No. 50.


