

## Archeology in the Turkana District, Kenya

Discoveries made in northwestern Kenya demonstrate the importance of the Lake Rudolf basin in the African past.

Lawrence H. Robbins

For many years scientists have noted that northwest Kenya was likely to be a very important area for archeological research. In particular, the Turkana District, which connects East Africa with the Sudan and Ethiopia, has long intrigued scholars (1). Nevertheless, because of the remoteness of the region, very little systematic fieldwork has been done there. Recent investigations, however, are shedding much new light on the area (2). In this article, I review the archeological sequence and present original data bearing on the cultural relations between East Africa and the middle Nile Valley during the Holocene.

### The Turkana Environment

Turkana is sharply demarcated by the Rift Valley escarpment on the west and Lake Rudolf on the east (Fig. 1). Within this natural corridor connecting the Sudan to East Africa is a sun-parched landscape of flat plains broken by low volcanic ranges. The central part of Turkana is a desert, with a sparse cover of vegetation, areas of

shifting sand dunes, and an annual rainfall of less than 6 inches (Fig. 2). In a general way, the remainder of the Turkana District can be described as semidesert. The two major exceptions to this description are the tops of the higher mountain ranges and the main river valleys, where dense fringing vegetation is found.

Judging from the desert conditions and the present scarcity of big game animals, Turkana would appear to have been a marginal subsistence area for Stone Age hunter-gatherers or Iron Age agricultural peoples. However, Turkana has only recently become a desert. Much of the deterioration of the landscape is due to the combination of overgrazing and the strong, daily winds that sweep back the sand from the retreating shoreline of the lake. I have asked many Turkana elders about conditions during their boyhood and during their fathers' times. Without exception, the countryside of southcentral Turkana, now extremely desiccated, was said to have been greener, and big game animals abundant. There was grass where there is none today, and animals such as buffalo, giraffe, zebra, rhinoceros, and elephant were found where they are no longer evident. This picture of re-

cent change in southcentral Turkana is duplicated for parts of northern Turkana in the records of various military and early scientific expeditions (3).

Further in the past, there is a very long record of environmental change in the Pleistocene. Although there are no rivers draining Lake Rudolf today, a Nilotic fauna attests to former connections with the Nile's drainage system. Geological and faunal evidence indicates that the ancient lake extended into the Lotigipi Depression in northern Turkana and was drained by the Sobat River, a tributary of the Nile (4). Ancient beachlines can be found as much as 10 miles to the west of the present lakeshore and over 300 feet above the present water level of the lake. These beaches are often characterized by an abundance of archeological remains.

### Early Man: The Dawn of Tool-Making

In recent years, the Lake Rudolf basin has been yielding spectacular finds about early man. Remains of early hominids have been discovered at Omo in southern Ethiopia, in the East Rudolf area, and in Turkana (5, 6).

With regard to the Turkana finds, Australopithecine remains were found at two sites. The oldest fragment was found at Lothagam (2.55°N, 36.4°E) and is believed to date back about 5.5 million years, or to the Pliocene (7). This is the earliest Australopithecine on record. At Kanapoi, which is about 35 miles from Lothagam, an Australopithecine fragment was discovered by Patterson (6). The age of Kanapoi has recently been re-evaluated, and it is now believed to date back about 4 million years, or to Late Pliocene times.

The absence of stone artifacts in Turkana's very extensive Pliocene beds, which are about 4 to 8 million years old, and the appearance in East Rudolf of well-made stone tools, which are about 2.6 million years old, indicate

The author is assistant professor, department of anthropology and African Studies Center, Michigan State University, East Lansing 48823.

that archeologists are closing in on the dawn of recognizable technology. It appears that formalized stone tool-making was initiated between 3 and 4 million years ago.

In Turkana, pebble tools of the Oldowan type can be found on the surface in many localities, but the age of these tools is open to question. In fact, some of these implements have been found in Late Stone Age, post-Pleistocene contexts in association with pottery (8). It is interesting that these oldest of technological items were among the most successful inventions, for they continued to be manufactured throughout the entire Stone Age.

#### Hand Axes—Ancient or Recent?

In the 1930's, scholars were intrigued by the possibilities of relating the ancient beaches of the East African lakes to the European Pleistocene glacial sequence (9). It was reasoned that high water levels of lakes resulted from increased rainfall during Pleistocene pluvial episodes in East Africa. Fuchs, working in Turkana, used archeological evidence as one means for dating the ancient lake beds of Lake Rudolf according to the pluvial sequence (10). Since tools described as Chellean and Acheulian were found on the ancient lake deposits, he reasoned that the beds

dated to pluvial episodes of the Middle Pleistocene. Assumptions of this type, in which geological events are determined on the basis of artifacts, can lead to a confusion of the evidence. Beaches considered to be Pleistocene have recently surprised workers in the field with pottery in situ and Holocene radiocarbon dates.

Whereas many of the artifacts found on the ancient beaches of Lake Rudolf resemble hand axes, they are not, in fact, Pleistocene in origin. Along the old lake beds in central Turkana, it is possible to find bifacially flaked tools, that, at first glance, closely resemble hand axes. However, having collected a full range of these surface artifacts from Holocene lake beds, I find that about 10 percent of them would pass for hand axes, while the remaining 90 percent are clearly different (Fig. 3, Nos. 1, 2). These tools resemble West African Neolithic hoes (11). At this point, I do not claim that the tools are related to the West African finds, nor that they functioned as hoes, but they are most likely post-Pleistocene in origin. Further evidence of the recentness of hand axe-like tools comes from the Omo, where three hand axes were recovered from river sands and gravels coeval to Kibish formation member IVa, which has been radiocarbon dated back about 8900 years (12).

No Acheulian sites have been excavated in Turkana, although sites have been reported for Ngakoriangora Mountain and the adjacent southern Sudan (13). I have found occasional hand axes in central Turkana, but have not yet seen a hand axe in situ there. One possible explanation for the sporadic occurrence of hand axes and the lack of well-defined sites follows: during Middle and probably Upper Pleistocene times, an enlarged Lake Rudolf would have been an attractive place for Stone Age hunter-gatherers. Some of the early beaches surrounding the lake were, in all likelihood, camping, hunting, and watering areas for Acheulian man. However, according to Walsh, some of the earlier beach levels have been eroded by the water level's rising to 220 feet in the Holocene (14). Therefore, the early sites may well have been destroyed by erosion and the tools redeposited. Hence, the hand axes occur as isolated finds on the same surface where the more recent Late Stone Age peoples have also left behind their flaking debris.

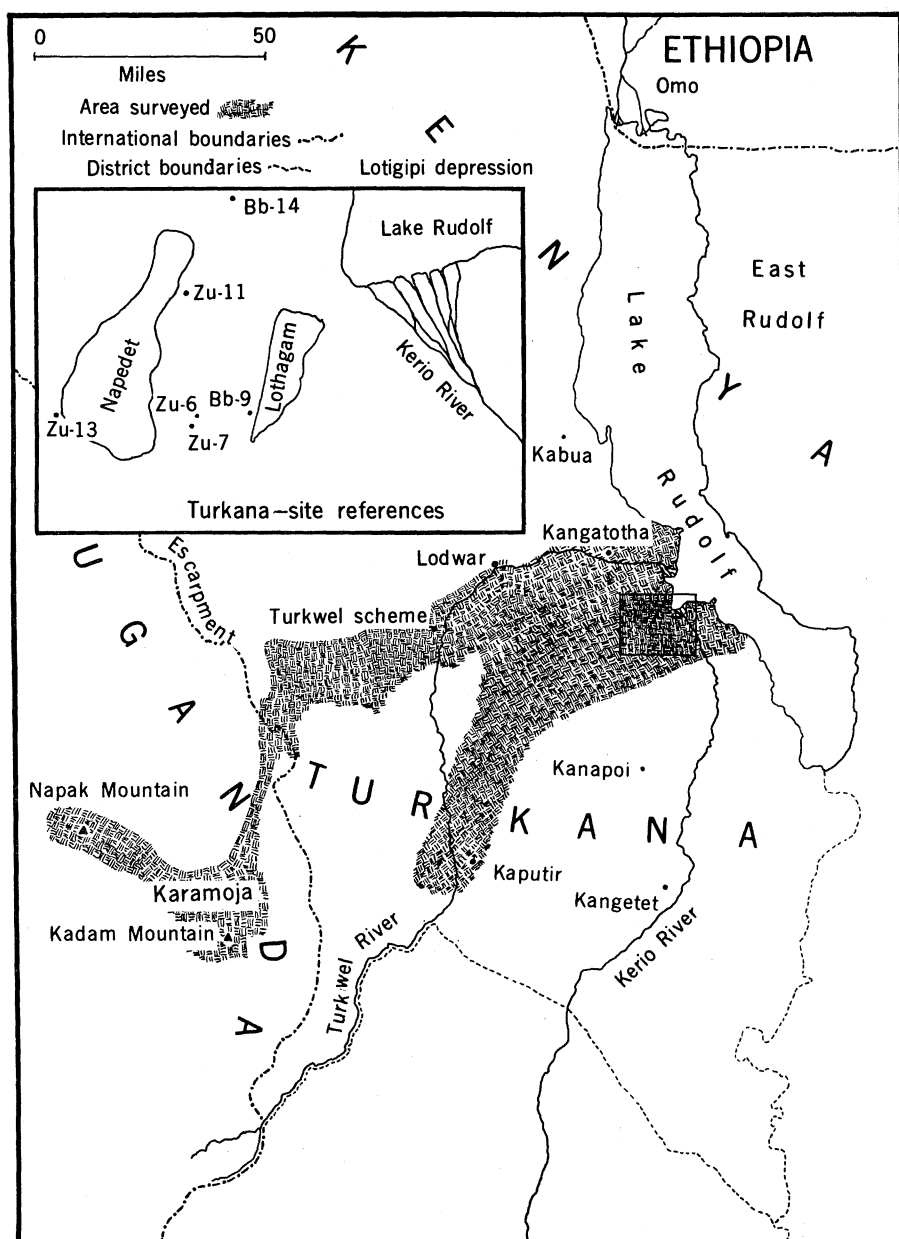


Fig. 1. Map of the area surveyed.

## The Upper Pleistocene

The Acheulian is followed by a period of regional specialization in the prehistoric cultures of sub-Saharan Africa. One of the best known of the new, Upper Pleistocene regional variants is the Sangoan industry, which has been dated back 46,000 to 37,000 years. The Sangoan industry is often considered one of the earliest adaptations to tropical forest conditions in Africa. The characteristic heavy-duty tools are believed to have been used for woodworking, and sites are distributed in the low-lying riverine and lacustrine areas of Central Africa.

In Turkana, the Sangoan industry appears to be represented at a number of localities. Here again, no sites have been fully excavated, and there are no available radiocarbon dates. Whitworth, for example, has reported Sangoan artifacts from near the Kabua water-hole in central Turkana (15). Tools described as crude hand axes were found on the surface of ancient lake sediments. In addition to the artifacts, human skeletal material described as Neanderthaloid was recovered from the site. An Upper Pleistocene age has been suggested for the skeletal material, largely on the basis of faunal remains and the proximity of surface artifacts believed to be Pleistocene in origin (16). However, oral tradition and archeological evidence indicate that most of the animals positively identified at Kabua survived until quite recently in Turkana. In addition, a range of Late Stone Age microliths and Holocene bone harpoon points were found on the surface at Kabua. For the above reasons, the exact age of the Kabua hominid is still unresolved.

We have discovered one possible Sangoan locality at site Zu-13, just west of the Napedet hills (17). The tools, which were recovered from the surface, include core axes, choppers, push planes, and heavy-duty scrapers (Fig. 3, No. 3). All of these finds resemble the heavy-duty tools found on Sangoan sites. An outstanding feature of this site is the approximately 141 stone circles arranged in four arc-shaped complexes. According to Turkana elders, the circles may represent an ancient, pre-Turkana site, an Ethiopian outpost, or a colonial military camp. Excavations have not yet resolved this problem because there is



Fig. 2. View of central Turkana from Lothagam Hill.

little identifiable artifactual debris in the circles.

The Lupemban industries, derived from the Sangoan, existed in Central Africa during Late Pleistocene times (from approximately 36,000 to 14,000 years ago) and are also described as adaptations to the tropical forest. Typical artifacts are lance points, which are possibly derived from the earlier Sangoan core axes. Some writers have attributed bifacial points found on the surface in Turkana to the Lupemban (15). However, I have found isolated points resembling both Lupemban and Stillbay artifacts in central Turkana on the surface of lake beds that are clearly Holocene. The example shown in Fig. 3 (No. 4) was recovered from the surface of lake sediments dated to about 8230 years ago (18). Another point was recovered from the surface of sands overlying shell beds dated to approximately 6010 years ago (19). While it is possible that these points are Late Pleistocene artifacts that were subsequently reused, it is best not to attribute broad, regional cultural affinities to a little-known area on the basis of the typology of a few stone points (20).

As for other Upper Pleistocene industries, I have located a site (Zu-7) eroding from a blowout east of Napedet. Much to my regret, there is no way to date site Zu-7 in absolute years because of the absence of material that can be dated by the radiocarbon method. However, the site is about 2 meters lower in elevation than nearby Holocene lake sediments dated to approximately

7960 years ago (21). This suggests that the material could be Late Pleistocene. In addition, the artifacts were generally more heavily weathered and larger than comparable samples collected from the Holocene sediments. At Zu-7, a 1-meter square was completely excavated, in quadrants, from the surface to a depth of 15 centimeters, where the material was solidly embedded. Approximately 900 lava artifacts were recovered, about 10 percent of which were formally shaped tools. The implements were characterized by heavy-duty scrapers (25 percent) and choppers (25 percent) (Fig. 3, Nos. 5-7). Blades and microliths were absent at this site, whereas they were present with varying frequency on many of the surrounding, later sites. In terms of the stone technology represented, the assemblage provides a perfect ancestral candidate for many of the Holocene industries in the same area. Holocene industries are often characterized by choppers and scrapers, but also include several important new items: blades, microliths, pottery, and, in some cases, bone points.

## The Early Holocene

The Early Holocene includes much of the Late Stone Age (Fig. 4). While each geographical area deserves its own special terminology, a shift toward more intensive exploitation of local food resources is evident in many areas of the prehistoric world after the close of the Pleistocene. For example, one

finds specialized fishing peoples utilizing the lakes and rivers more fully than ever before, while other groups are specialized as intensive gatherers of particular kinds of seeds, nuts, wild grasses, and so on. Archeologically, this period of increased local specialization is often marked by the proliferation of microliths, which reflect the use of composite tools, as well as grinding stones and pottery.

In Turkana, Late Stone Age industries are very well represented and exceedingly diverse in character. Those who study African prehistory have traditionally defined these complexes on the basis of similarities and differences in the stone tools found at various sites. Characteristic tool types define a complex as Wilton, Capsian, and so on. Unfortunately, these entities are sometimes treated as distinct cultures, as if different ethnic groups were involved. While "Wilton equals prehistoric Bushman" might be a good equation for some areas, it could be misleading for others, particularly where

the human skeletal morphology is not Boskopoid (22). It would be easy to distinguish, on the basis of tool typology, four or five Late Stone Age industries for central Turkana alone. Some sites have a great many microlithic tools, while others have large blades and few microliths. Still others have more flake tools and choppers. Preliminary observations suggest that much of this variation in lithic assemblages is a result of the fact that the tools were functionally specific for certain tasks and activities, as well as dependent on the kinds of raw materials available.

I believe that the pottery, rather than the lithics, will be the more sensitive indicator of chronological, spatial, and, possibly, real ethnic relations. The pottery associated with Late Stone Age industries in Turkana is richly varied in terms of design style and general level of sophistication. Although much of the material comes from surface surveys and has not yet been fully studied, the following information on

the early ceramics is important (23).

I have discovered pottery that is surprisingly old for East Africa. At site Zu-4, near Lothagam, I have excavated stamped pottery from a shell bed dated back about 8420 years (24). This early date is supported by evidence from site Zu-6, where stamped and single wavy line sherds have been excavated from Holocene lake beds dated back approximately 7960 years (21). In addition to the above, I have excavated over 800 undecorated sherds from Lothagam. Some of these sherds have been found in lake deposits dated back about 7500 years, although the main complex is later (25). The dates cited relate very well to the Omo Valley sequence established by Butzer *et al.* (26). The Omo data suggest that the general time span for the pottery corresponds to the maximum stage and subsequent regression of Holocene Lake Rudolf from Kibish formation member IVa.

My evidence proves beyond any doubt that pottery was being used in sub-Saharan Africa before the arrival of food production techniques. The data indicate that at least three different styles of pottery were present at an early food-collecting horizon in southcentral Turkana. As far as I know, neither of the two decorated styles has a counterpart elsewhere in East Africa. However, some of this pottery is similar to material from the Nile Valley settlement of Early Khartoum in the Sudan (27). The ceramic resemblances are strongly reinforced by stylistic similarities in the barbed bone points found in both areas. For example, the unique point in Fig. 5 (lower right) has the same cross-hatching that some Khartoum points have.

Archeologists have long recognized that the Khartoum adaptation, which was based upon the intensive exploitation of riverine and lakeside resources, extended far into the moister Holocene environments of the Sahara (28). My data confirm the fact that the Late Stone Age peoples of Lake Rudolf shared in that adaptive pattern. The great density of sites, along with the early ceramic diversity and the radiocarbon dates, suggests that the Lake Rudolf basin was an early center for this cultural adaptation.

The general way of life associated with the early Holocene cultural pattern in Turkana centered on intensive fishing. People exploited the rich re-

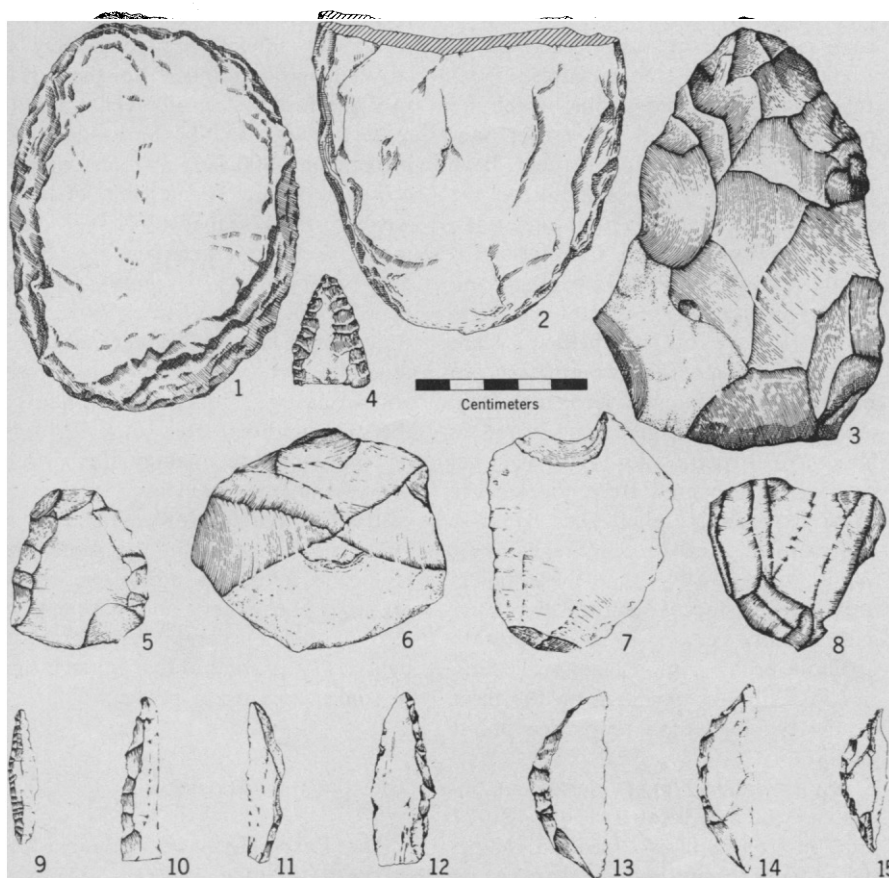


Fig. 3. Stone artifacts: (1, 2) bifacial tools or probable Holocene origin, Zu-12, Zu-6; (3) core ax, Zu-13; (4) bifacial point, Bb-9; (5) prepared core, Zu-7, northwest quadrant, 2 to 10 centimeters deep; (6) chopper, Zu-7, northwest quadrant, 2 to 10 centimeters deep; (7) notched flake, Zu-7, northwest quadrant; (8) blade core, Zu-12; (9) blade backed from two directions, Zu-11; (10, 11) backed blades, Zu-11; (12) backed blade, Zu-12; (13-15) large crescents, Zu-12. All artifacts are lava except (4), which is chert. Proveniences are surface, unless stated otherwise.

sources of an enlarged and fresher lake. In the Lothagam area, this lake was fresh enough to support at least eight different kinds of mollusks, whereas only one form is found in the modern lake (29). The people speared or harpooned large Nile perch in the shallows with their ingeniously fashioned bone and ivory points. They also caught several kinds of catfish, including *Clarias*, *Synodontis*, and *Bagras*. The more than 300 bone and ivory artifacts that were discovered attest to the importance of fishing equipment in the technology. At Lothagam, these points were associated with a fauna that was almost entirely fish (30). In addition to the fish, the marshy lake edge offered soft-shelled turtle, crocodile, cane rat, and hippopotamus. The diet was supplemented by the meat of animals such as wart hog, zebra, buffalo, reedbuck, dik-dik, topi, hartebeest, and giraffe (31).

The people of this period buried their dead in a flexed position on sand spits close to the water's edge, a custom similar to that of the Elmolo tribe in East Rudolf. I have not found any elaborate grave goods in the excavations, although there are occasional sherds and chipped stone artifacts. Perhaps this implies a relatively egalitarian social structure. One individual appears to have met a violent death—a small, sharp, stone flake was found embedded between his ribs.

The available information suggests that this way of life spanned much of the early Holocene. Bone harpoon points have been recovered from Kibish IVa sediments dated back about 9100 years, and I have excavated from site Zu-10 wavy line pottery dated back approximately 6200 years (26, 32). Just how long this cultural pattern continued after the latter date has not yet been determined. The Turkana oral tradition indicates that a distinct fishing people occupied the lakeshore near Lothagam sometime before 1800. Perhaps these were the ancestors of the Elmolo, a modern lakeside fishing tribe first observed on the eastern shore in 1888 (33). Before this time, the Elmolo, who fish with iron harpoons, were widely distributed along the east shore of Lake Rudolf, and it is reasonable to believe that they inhabited the western shore before the expansion of the modern pastoral peoples and the introduction of firearms.

### The Emergence of Food Production

The stages of high water levels of Lake Rudolf in the Holocene may, in part, correlate with a moist episode that is reflected in radiocarbon-dated pollen profiles as far apart as Sacred Lake on Mount Kenya and various

localities in the Sahara (34). Between 5000 and 6000 years ago, portions of the Sahara were favorable enough to support groups of people who kept domestic stock. It is believed that desiccation of the Sahara encouraged the spread of pastoralism and, presumably, food cultivation into new

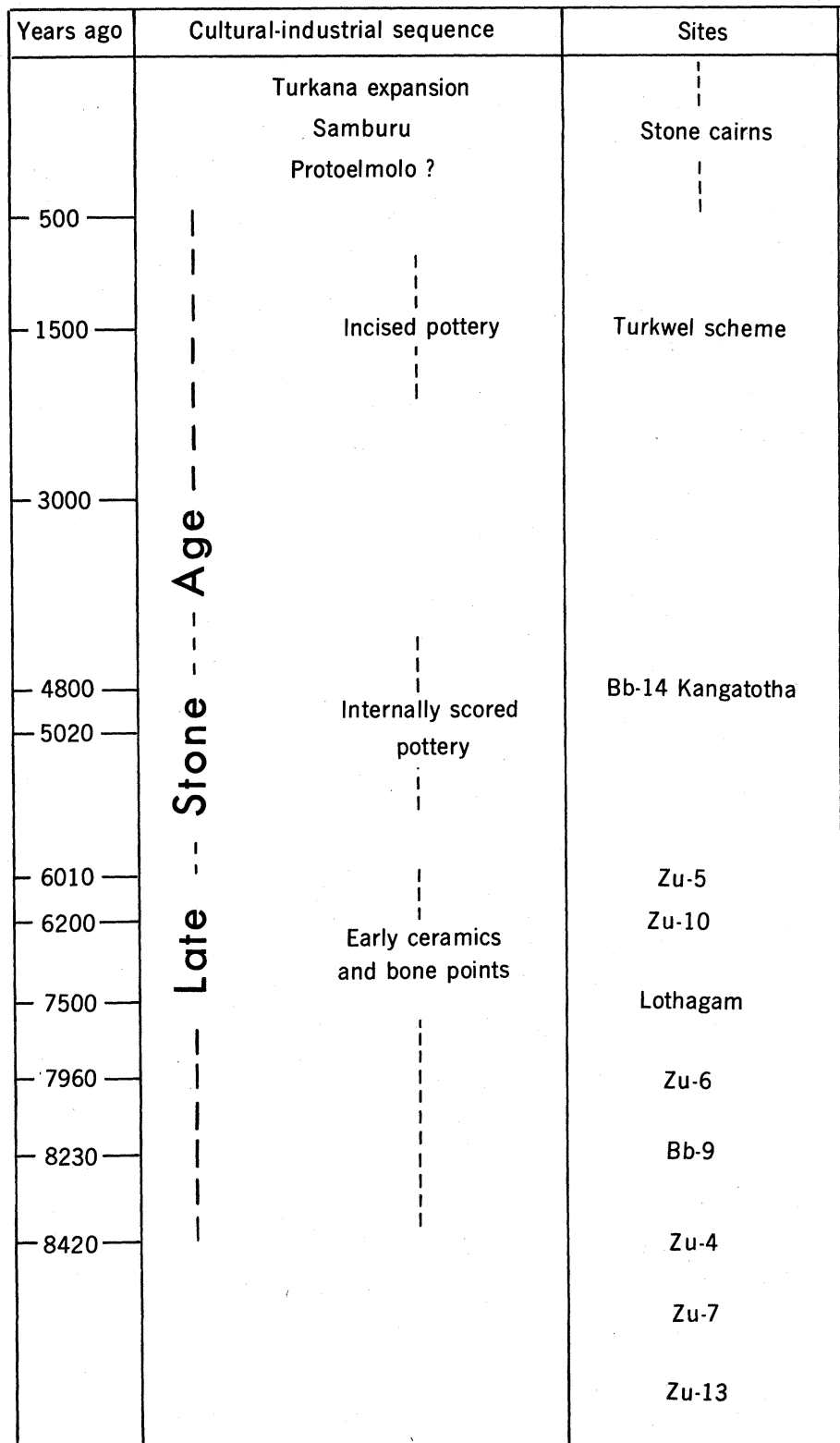


Fig. 4. Suggested chronology for southcentral Turkana.



areas. It was probably about this time that the idea of food production began to filter down from the north. Precisely when and where food production entered East Africa remains to be established (35).

Thus far, no sites with bones of domestic animals or with direct evidence of cultivation have been reported for Turkana.

Pottery characterized by internal scoring and basketwork-like impressions on the exterior is widely distributed between the lower Turkwel

and Kerio river valleys (Fig. 6, No. 3). Elsewhere in Kenya this material, which has been termed Gumban A, was linked with the stone bowl culture and was presumed to indicate the beginning of food production in East Africa. However, Cohen has shown that, in the reported sites, there are no dates available for the Gumban A, nor are there any actual associations with stone bowls (35, 36). At Kangatotha, on the lower Turkwel, I have found Gumban A pottery on the surface of lake sediments dated

back 4800 years (37). I have also found this pottery, as well as sherds of other kinds of pottery, on the surface of site Bb-14, which is located south of Kangatotha, overlooking the Lorengalup River. Here the setting strongly suggests that the sherds have been eroding out from the deposits. An archeological feature consisting of solid lumps of charred clay was definitely eroding from the site. This feature has been radiocarbon dated to 5020 years ago, a date that is in close accord with the Kangatotha date (38). If these dates are applicable to the scored pottery, then the pottery is much earlier than one might have suspected. It is possible that the Turkana material could be derived from earlier forms of stamped pottery in the Lake Rudolf basin. To the north, in the Omo area, impressed pottery has been found in sediments dated back about 5450 years (39).

Gumban sherds are found in conjunction with a variety of tool complexes. At Kangatotha, for example, the pottery occurs on the same surface with fine microlithic tools made from chert and chalcedony agates. These artifacts, which do not appear to be culturally mixed or derived from secondary deposits, could easily belong in a Wilton assemblage. Just to the east of Napedet, there is a very large and homogeneous surface site (Zu-11) with numerous scored sherds, as well as sherds of other styles of pottery. This site is characterized by a uniform stone industry featuring lava blades, and an associated wild game fauna. The two lithic complexes mentioned above are very different typologically, but they may not represent different traditions of toolmaking. Instead, they may reflect the kinds of activities carried out at the respective sites and the raw materials available for making tools. In only one instance was there found a stone bowl at a site yielding scored sherds.

The Gumban sherds are frequently found on the edges of shallow, natural depressions that even today are transformed into sizable temporary ponds after one of the infrequent rainstorms. After a rainstorm, grass germinates quickly, and the Turkana move their stock into the area for grazing and watering. The modern situation suggests that a slight increase in precipitation would transform the environment into one that could support a sizable population based on food production. The Kangatotha sites are not far from

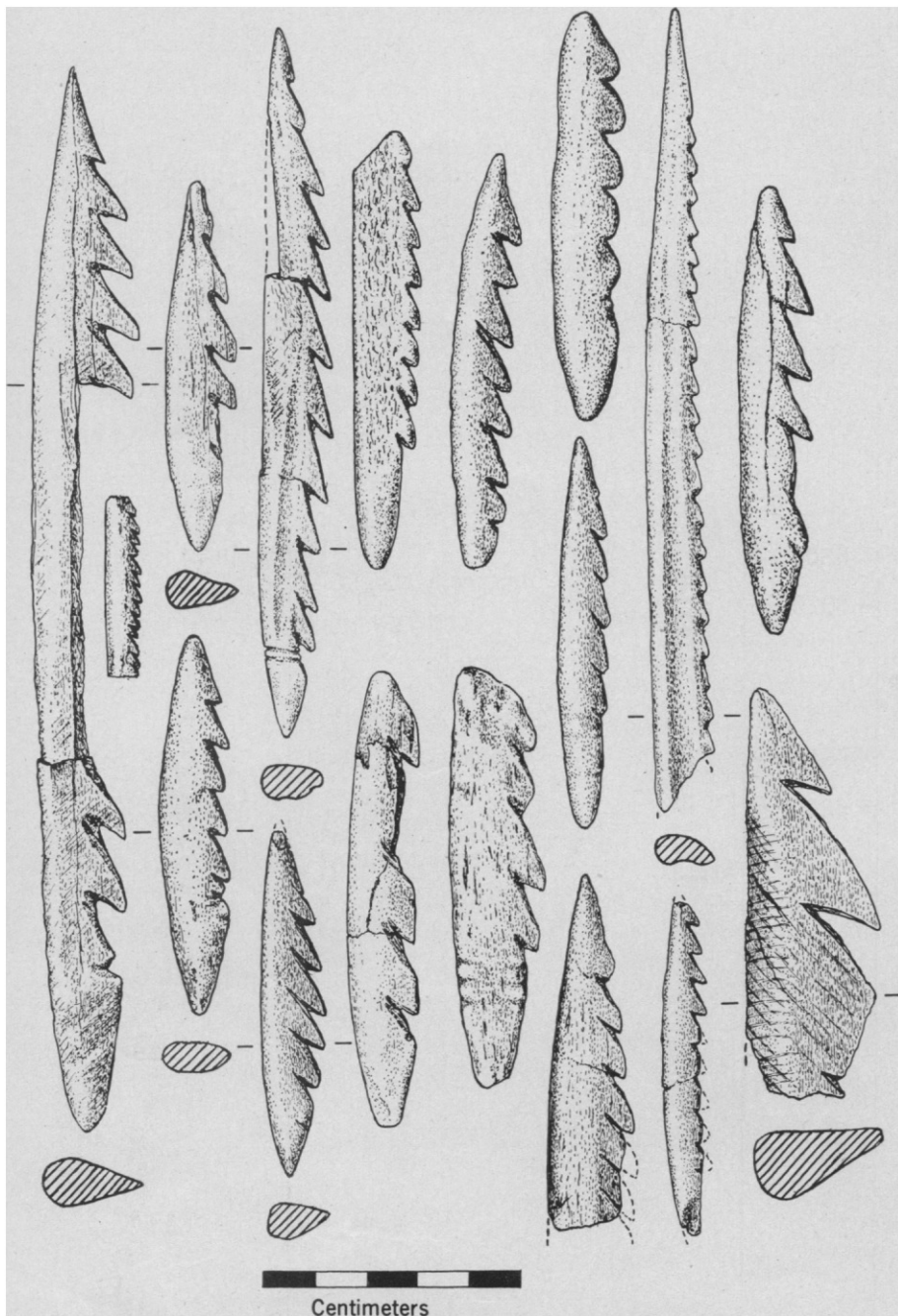


Fig. 5. Bone artifacts from Lothagam, with range of variation. Surface of shell beds dated to approximately 7500 years ago. The lower right specimen has Khartoum-style decoration.

the Turkwel Delta, whose sorghum has been cultivated by the Turkana since at least 1888 (33). Millet occurs in a wild state in nearby southwest Ethiopia (40). This tempts me to speculate that the earlier Turkwel River folk were also cultivators. There is, however, no direct archeological evidence for this.

The water level of the lake fell from the Kibish IVb after about 3000 years ago (4). From that time until about 1500 years ago, the archeological events are inadequately known. In northwest Turkana, along the escarpment, there is a scatter of patinated, Late Stone Age chert artifacts that may belong to this period. The hills along the escarpment receive more rainfall and were undoubtedly favorable areas for retreat during drier episodes.

### The Stone Age-Iron Age Transition

A final tradition of the Late Stone Age is associated with a variety of incised pottery that is distinguished by parallel grooves (Fig. 6, Nos. 4-6). This pottery is widely distributed on surface sites, from near the escarpment in western Turkana to the Kerio Delta. I have found similar incised sherds as far north as the Kidepo Valley in northeast Uganda and as far west as Napak Mountain near the Karamoja-Teso border. Wilson has recently stated that this pottery is linked through oral evidence with a people known as the Oropom, who inhabited much of the area before the expansion of the modern Paraniotes (Nilo-Hamites) (41). The Oropom were essentially a Late Stone Age people who raised stock and cultivated plants.

The incised pottery, then, evidently spans a considerable length of time and offers a unique opportunity to bridge the gap between the Late Stone Age and oral history. In southern Karamoja, I have excavated sherds of this type from a site just below Kadam Mountain, where they were associated with microlithic tools and iron. Apparently the pottery was in use when iron was being introduced to what was otherwise a Late Stone Age technology. In central Turkana, the ware is densely distributed near the Turkwel irrigation scheme, where radiocarbon evidence suggests it dates back about 1500 years (42). This is consistent with other Early Iron Age dates for East Africa.

Little can be said about the settlement patterns in Turkana on the basis

of these transitional Stone Age-Iron Age sites. Most of the evidence comes from the base of inselbergs, rock shelters, and open sites. There are certainly no signs of large-scale settlements in Turkana. However, the general distribution pattern of the sherds does indeed suggest cultural unity over a very wide area.

### The Recent Past

If my data for adjacent Karamoja also apply to Turkana, the flaked stone technology was very likely replaced by iron by the 17th century. On Kadam Mountain, a microlithic, Late Stone Age industry has been excavated, including iron artifacts at the Rangi site in layer 2, which appears to date to the 15th century. In the same area, at Kaupokwalot cave, a test pit that was radiocarbon dated to the 17th century yielded iron, but lacked stone artifacts (43).

According to an Ethiopic document,

a people called Galla moved through the Lake Rudolf area and crossed into Ethiopia between approximately 1522 and 1530 (44). Huntingford suggests that these people contributed to the development of the Paraniotes (44). Perhaps their influence also helped to bring an end to the Stone Age.

Although undated, the rock engravings from the Kangetet area of south Turkana could be related to the origin of the modern, pastoral Paraniotes. The engravings include a circle bisected by a central cross (45). I have seen the same design painted in a dung mixture on a rock shelter in northeast Karamoja. According to a local elder, the circle represents a cattle enclosure and the designs are still made today by travelers who pass the ceremonial rock. In addition to the Kangetet engravings, there are other engravings close to the south end of Lake Rudolf which show camels and wild game. The presence of camels suggests that the engravings were executed by a people who were acquainted with domestic stock. How-

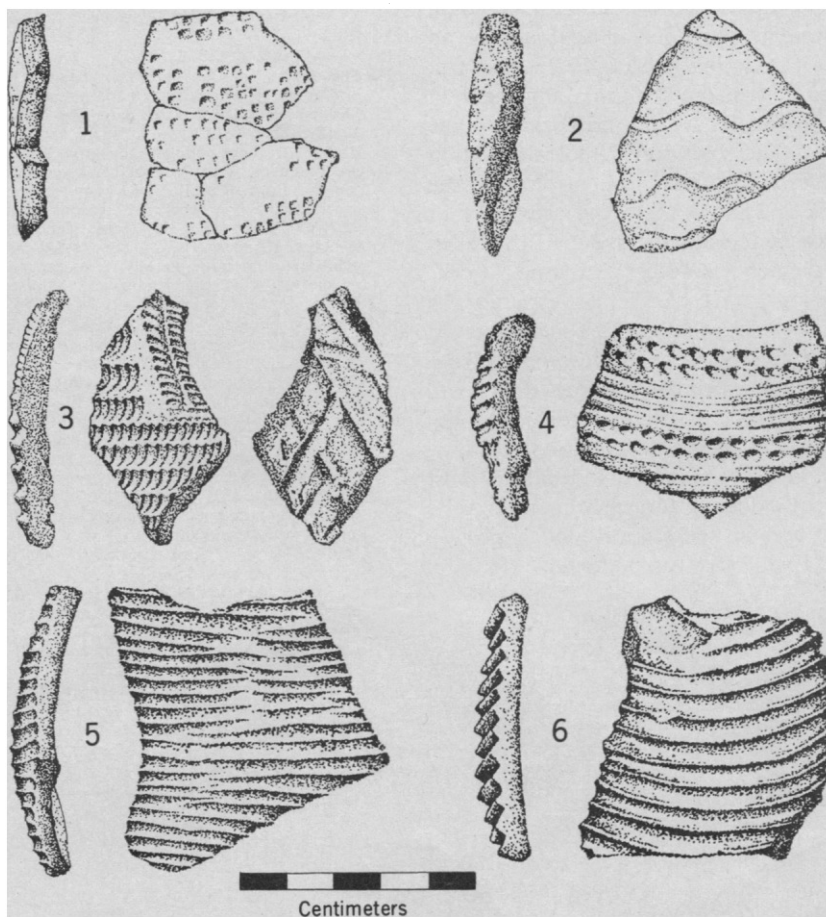


Fig. 6. Pottery: (1) stamped, Zu-6, 10 to 20 centimeters deep; (2) single wavy line, Zu-6, 30 to 40 centimeters deep; (3) scored, Zu-4, surface; (4) incised rim, Turkwel scheme, embedded in surface sands; (5, 6) incised, Turkwel scheme, embedded in surface sands.

ever, the engravings in all likelihood pre-date the arrival of the Turkana, who have no known tradition of engraving stone and who apparently had no camels when they entered the west Rudolf area (46). No rock paintings have been described for Turkana, although I have been told that paintings exist on the remote northern part of the Mogila range and I have seen paintings of giraffes on Kadam Mountain in southern Karamoja (47).

There are also in Turkana numerous stone burial cairns that postdate the Stone Age. According to tribal elders, some of these are recent, while others belong to the Samburu, and still others are attributed to more ancient peoples. Before the expansion of the Turkana tribe in the 19th century, parts of southern Turkana District were inhabited by the Samburu. Oral evidence suggests that the Samburu lived in the Lothagam area at about 1800. They were driven back by the Turkana some time before 1888; Teleki and von Höhnelt encountered substantial settlements of Turkana living near the Kerio Delta in that year (33).

The expansion of the Turkana tribe represents the concluding event in an area containing one of the longest prehistoric sequences known anywhere in the world. Where did the Turkana come from? The most prevalent oral tradition suggests that they split from the Jie tribe and moved into the area west of Lake Rudolf from above the Rift Valley escarpment. Another Turkana legend, striking in its parallel to evolutionary theory, states that the first men emerged from the water and descended from nonhuman primates. Some elders call this place of origin Endikerrio, described as a forested area surrounding a large body of water. Indeed, the most recent evidence for early man suggests that perhaps the Lake Rudolf basin was the Endikerrio for mankind.

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3. For example, in 1898 Sanderson's Gulf, located near the northwest end of Lake Rudolf, was an estimated 36 miles long and about 6 to 7 miles wide [H. H. Austin, *Among Swamps and Giants in Equatorial Africa* (Pearson, London, 1902), p. 194]. The 1932-33 French expedition to Omo found the gulf completely dry [C. Arambourg, *Mission Scientifique de l'Omo* (Museum of Natural History, Paris, 1947), p. 188].
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17. The letters in the site designation refer to grid units in the Kenya map system.
18. Mollusk sample N-1102, dated by Rikagaku Kenkyusho to 8230  $\pm$  180 years ago for site Bb-9. All dates quoted for this laboratory are based on a half-life of 5568 years. Dates for the Lake Rudolf shells may be too old in terms of true age, for reasons cited by K. W. Butzer, F. H. Brown, and D. L. Thurber [*Quaternaria* **11**, 15 (1969)]. Other evidence concerning variations in the amount of carbon-14 in the atmosphere is discussed by M. Stuiver [*Nature* **228**, 484 (1970)].
19. Mollusk sample N-1101 is dated to 6010  $\pm$  155 years ago for site Zu-5, which is located between Lothagam and Napedet.
20. Stone-Age artifacts are commonly collected by Turkana children, who are fond of playing games with brightly colored stones. As a result, small circles of chert and obsidian artifacts resembling features of archeological significance are frequently encountered on the surface. The children use these stones to represent imaginary domestic stock, or for an *omweso*-type game.
21. Mollusk sample N-813 is dated to 7960  $\pm$  140 years ago at site Zu-6.
22. For criticism of the concept of the Boskop physical type see G. P. Rightmire, *Amer. J. Phys. Anthropol.* **33**, 164 (1970). A reconstruction of a fossil *Homo sapiens* skull from site Bb-9 is forthcoming in T. W. Phenice [*Hominid Fossils: An Illustrated Key* (Brown, Dubuque, Iowa, 1972)].
23. Observations pertaining to the pottery sequence were first based on a seriation analysis, following the methods described by C. W. Meighan [*Amer. Antiq.* **25**, 203 (1959)], W. S. Robinson [*ibid.* **16**, 293 (1951)], and G. W. Brainerd [*ibid.*, p. 301]. The sequence was then confirmed by radio-carbon dates.
24. Mollusk sample N-1100 is dated to 8420  $\pm$  165 years ago. Pottery was recovered from 10 centimeters below the level that yielded the carbon-14 sample.
25. Shell sample UCLA-1247 E, quoted as 5610 B.C.  $\pm$  1000 years by D. W. Phillipson [*J. Afr. Hist.* **11**, 1 (1970)].
26. K. W. Butzer, F. H. Brown, D. L. Thurber *Quaternaria* **11**, 15 (1969).
27. A. J. Arkell, *Early Khartoum* (Oxford Univ. Press, London, 1949).
28. — and P. J. Ucko, *Cur. Anthropol.* **6**, 145 (1965); J. de Heinzelin, *Sci. Amer.* **206**, 105 (June 1962).
29. *Corbicula africana*, *Corbicula artini*, *Mutela nilotica*, *Melanoides turberculata*, *Caelatura rothschildi*, *Caelatura chefnuexi*, *Biomphalaria stanleyi*, and *Cleopatra bulimoides* were identified by B. Verdcourt and G. Mandahl-Barth (personal communication) in Holocene beds at Lothagam, which have been dated back about 7500 years.
30. L. H. Robbins, *Azania* **2**, 69 (1967).
31. B. M. Fagan, in *The Late Stone Age Fishing Settlement at Lothagam, Northern Kenya*, L. H. Robbins, Ed. (Michigan State Univ. Museum, Ann Arbor, in press).
32. Charcoal sample N-812 is dated to 6200  $\pm$  125 years ago for site Zu-10, which is located between Lothagam and Napedet. The sample was excavated from a stain believed to be the remnants of a hearth.
33. L. von Höhnelt, *Discovery by Count Teleki of Lakes Rudolf and Stefanie* (Longmans, London, 1894).
34. E. M. Van Zinderen Bakker, *Palaeobotanist* **15**, 128 (1966); J. A. Coetzee, *Nature* **204**, 564 (1964).
35. Domestic cattle and a Late Stone Age industry have been dated to between 2910  $\pm$  110 years and 2690  $\pm$  80 years ago at Prospect Farm, Nakuru District, Kenya [M. Cohen, *Azania* **5**, 27 (1970)]. Domestic stock have also been dated to the first millennium B.C. at the Narosura site, Narok District, Kenya [N. Chittick, *Azania* **4**, 189 (1969)].
36. Gumban A is included in J. E. G. Sutton's pottery class B for the Kenya highlands [*S. Afr. Archaeol. Bull.* **19**, 27 (1964)].
37. Sample of *Etheria elliptica* dated to 4800  $\pm$  100 years ago is quoted in K. S. Thompson [*Breviora* **243**, 1 (1966)].
38. Sample N-814 is dated to 5020  $\pm$  220 years ago.
39. K. W. Butzer, personal communication.
40. J. D. Clark in *Background to Evolution in Africa*, W. W. Bishop and J. D. Clark, Eds. (Univ. of Chicago Press, Chicago, 1967), pp. 613-615.
41. J. G. Wilson, *Uganda J.* **34**, 125 (1970).
42. Charcoal sample N-909 is dated to 1500  $\pm$  100 years ago.
43. Rangi-bone sample N-863 is dated to 510  $\pm$  105 years ago. This sample is believed to be the most reliable of three post-1500 A.D. dates because of its position under a large boulder. Kaupokwalot-Charcoal sample N-865 was dated to 330  $\pm$  105 years ago.
44. G. W. B. Huntingford, in *History of East Africa*, R. Oliver and G. Matthews, Eds. (Oxford Univ. Press, London, 1963), p. 76.
45. R. C. Soper, *Azania* **3**, 2 (Fig. 1-d) (1968).
46. P. H. Gulliver, *The Family Herds* (Routledge, London, 1955), p. 260.
47. L. H. Robbins, *Uganda J.* **34**, 79 (1970).