Lake Turkana Archaeology: The Holocene

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Abstract. Pioneering research in the Holocene archaeology of Lake Turkana contributed significantly to the development of broader issues in the prehistory of Africa, including the aquatic civilization model and the initial spread of domesticated livestock in East Africa. These topics are reviewed following retrospective discussion of the nature of pioneering fieldwork carried out in the area in the 1960s. The early research at Lake Turkana uncovered the oldest pottery in East Africa as well as large numbers of bone harpoons similar to those found along the Nile Valley and elsewhere in Africa. The Lake Turkana area remains one of the major building blocks in the interpretation of the later prehistory of Africa as a whole, just as it is a key area for understanding the early phases of human evolution.

> *Our way had at first led us up hills of volcanic origin. I can't imagine landscape more barren, dried out and grim.*
>
> *At 1.22 pm the Bassonarok appeared, an enormous lake of blue water dotted with some islands. The northern shores cannot be seen. At its southern end it must be about 20 kilometers wide. As far as the eye can see are barren and volcanic shores. I give it the name of Lake Rudolf.* (Teleki 1965 [1886–95]: 5 March 1888)

> *From yesterday's campsite we could overlook nearly the whole western and northern shores of the lake. The soil here is different again. I observed a lot of conglomerates and fossils (petrification).* (Teleki 1965 [1886–95]: 17 March 1888)

Lake Rudolf, known to the Turkana people as Anam, was "discovered" in 1888, late in the European era of African exploration, by Count Samuel Teleki and Ludwig von Höhnel (von Höhnel 1894). In the first epigraph above, Teleki provides a vivid description of the barren landscape that he

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encountered as well as his initial view of the body of water that he named Lake Rudolf. In the second epigraph, from two weeks later, Teleki provides the first observation by a European of fossils in an area that would eventually become one of the richest sites in the world for human origins research. In a nutshell, the area has since produced one of the oldest possible hominid fossils at Lothagam, the oldest species of australopithecine (*A. anamesis*), one of the oldest skulls belonging to the genus *Homo* (the famous 1470 skull), the most complete *Homo erectus/ergaster* skeleton known (the Nariokotome boy, discovered by K. Kimeu), some of the oldest stone artifacts known (at Lokalalei and in the Omo Shungura formation), possibly the oldest use of fire (site FxJj20 Main at Koobi Fora), some of the oldest known anatomically modern human skulls (Omo skulls), many early Holocene fishing communities with elaborate bone harpoon heads, the oldest pottery in East Africa, and the oldest domesticated livestock in eastern Africa.

The transformation of this little-known and desolate area into one of Africa's primary anthropological "gardens of Eden" is a multifaceted story that unfolds in several articles in this special issue. My own part of the tale, as a pioneer in helping to uncover the "later" archaeological record of the area, is told below. I use the name "Lake Rudolf" when referring to early work that was accomplished before the lake was renamed Lake Turkana, after the Turkana people. When referring to more recent work, I use "Lake Turkana."

In this article I emphasize the historical significance of the research in the broader context of the development of African archaeology as a whole. In doing so, I am concerned with the Holocene, or the past ten thousand years.

Why Initiate Archaeological Research at Lake Rudolf?

My research at Lake Rudolf, like that of many other students who have worked in African archaeology, was initially inspired by J. Desmond Clark. Clark viewed the Lake Rudolf Basin as a natural corridor connecting the heartland of East Africa with the Sudan/Nile Valley to the northwest and Ethiopia to the north. It had already been well established, on the basis of faunal similarities, that there was a former connection between Lake Rudolf and the Nile drainage system. As Karl Butzer (1980: 51) has noted, the existence of a former connection was "first argued by Höhnel, Rosiwal, Toula and Suess (1891, 130–40)."

Before 1949, when radiocarbon dating began to be used in archaeology, the high beach levels of Lake Rudolf were generally "dated" by the typological characteristics of Stone Age artifacts found on the surface of

the deposits. Of course, no one knew when the connection to the White Nile existed, because there were no ways of absolutely dating the deposits in the early days of research. Sir Vivian Fuchs, working in 1934, found evidence of a series of high beaches that indicated a substantially larger lake. Fuchs (1939) dated the beaches by discovering hand axes believed to be from the Lower Paleolithic or Early Stone Age (Butzer 1980). However, the radiocarbon revolution in the late 1960s and early 1970s on Lake Rudolf demonstrated that most of the pronounced high beaches dated either to the early or the middle Holocene.

In a sense, the Lake Rudolf area until the mid-1960s was an archaeological terra incognito. The standard textbook on East African archaeology during the 1960s (Cole 1963), mentions no archaeological sites in the area beyond the Omo fossil locality (fig. 1). The nearest well-known archaeological excavations were at Magosi waterhole in the adjacent Karamoja District of Uganda. However, a bone harpoon had been found in the 1930s at Nanaropus at the northwestern end of the lake during the pioneering paleontological work of Camille Arambourg at the Omo (1947). In addition, Thomas Whitworth (1960, 1965a, 1965b), working on the geology of the Lothidok (Losidok) and Labur hills in 1959, had found several more bone harpoons and parts of two fossil human skulls at Kabua, near Kalakol, then known as Ferguson's Gulf (fig. 1). The skulls found by Whitworth's team were historically significant because they were the first human fossils found at Lake Rudolf, but their ages and affinities were uncertain (Whitworth 1960). Additional human remains and a bone harpoon were recovered to the south of Kabua, at Kangatotha, in 1963 by Bryan Patterson's team from Harvard at a location where the 220-foot (80-meter) beach was cut in half by the lower Turkwel River (Thompson 1966) (fig. 1). Freshwater oyster shells (*Etheria elliptica*) recovered from the 220-foot beach at Kangatotha were radiocarbon dated to 4,800 +/− 100 years before the present (BP) (Thompson 1966). As far as I am aware, the date from Kangatotha was the first published radiocarbon date obtained from the Lake Rudolf area, and it was also the first date that was believed to be associated with human remains from the area. Coon (1971: 163) described the fossil human mandible from Kangatotha as "indubitably a Negro, which evidence places Negroes along the banks of lakes and rivers in East Africa well before the invasions which brought modern Sudanic-speaking and Bantu-speaking tribes into that region." This was an important finding because of the scarcity of human remains bearing on the later prehistory of black African populations and the prevalent assumption that Caucasoid influences were prominent in East Africa (see Cole 1963: 266). The bone harpoon finds along the western side of Lake Rudolf were also of major interest to archaeologists because they suggested relationships to either the Nile Valley site

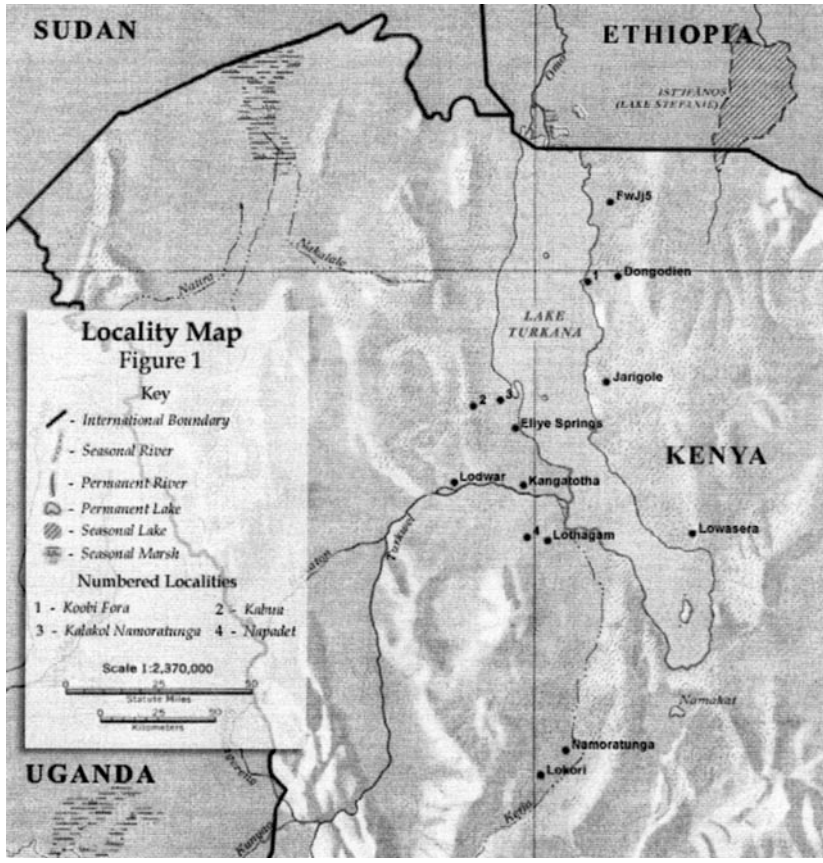

Figure 1. Locality map

of Early Khartoum, or the eastern Democratic Republic of Congo site of Ishango, where similar bone harpoon points had been found (Arkell 1949; Heinzelin 1957). My initial research project as a graduate student sought to provide new information on these possible relationships as well as to shed light on the general archaeology of the area.

Archaeological Fieldwork at Lake Rudolf in 1965–1966

In August of 1965, together with my Kenyan field assistants, I found the site of Lothagam Hill, situated just behind the Kerio River delta, about seven miles from the shore of the lake at that time (figs. 1 and 2).

Figure 2. View of Lothagam site Holocene shell beds

Lothagam was the first major Later Stone Age fishing settlement discovered in Kenya, and as such it was very important in a historical sense because it focused attention on Lake Turkana in several major theoretical contexts in African archaeology (Robbins 1967, 1972, 1974, 1980). Lothagam eventually produced over two hundred barbed bone spear/harpoon points, numerous microlithic tools, undecorated pottery, an abundance of fish bones, as well as the fragmentary remains of twenty-one human skeletons, most of which were burials. Lothagam is one of the richest bone artifact sites in Africa (fig. 3). The results of my fieldwork there have already been described, but the conditions of the fieldwork have only been mentioned in passing. At the time when the work was done, the general circumstances surrounding the fieldwork were taken for granted and, naturally, took "a back seat" to the presentation of the results of the research. For this reason, more extensive comments about the conditions of my initial research at Lake Rudolf follow.

Kenya had been independent for two years when I initiated my work in 1965. At that time the main route to Lodwar (the administrative headquarters of Turkana District), from Nairobi was via Kitale and subsequently through southern Karamoja in Uganda. This route crossed the international border and eventually led over the Rift Valley escarpment into the barren

Figure 3. Bone harpoon embedded in shell beds

Turkana plain below. At the top of winding road that led down the Rift Valley escarpment, there was a sign that depicted a skull and crossbones and stated, "Private Burial Ground for Reckless Drivers." Entrance into Turkana District required a special pass, and a visitor to the district commissioner's headquarters after dark at Lodwar encountered an armed guard at a barrier.

All of the diesel fuel for my Land Rover, as well as any fresh food, had to be trucked in from Kitale by special arrangement with the shops in Lodwar where I would pick it up and transport it across the desert to my camp. The only petrol or diesel in Lodwar that was not personally imported belonged to the government. There was no tarmac on the road after leaving Kitale, and there were no bridges across either the Turkwel River or the Kerio. The sun could be shining in Lodwar and rain falling miles away, above the escarpment in the highlands, which could suddenly flood the normally dry riverbeds in Turkana. When this happened, depending on the intensity of the flood, the rivers could not be crossed. Normally, the floodwaters receded after one waited a few days at the crossing point. The alternative was to circumnavigate the flooded river area and attempt to bypass the flood further upstream. That effort entailed a couple of days' driving. Conducting research between the two river systems, when in flood, was

even more difficult. Sometimes, we had to wade through the flooding Turkwel at Lodwar to get our supplies and bring them to the south side of the river. One of my clearest recollections is being guided across the muddy waters of the flooding Turkwel River in November 1965 by one of my Turkana field assistants; another vivid image is of crossing the Turkwel River in the Land Rover with water pouring over the hood and spilling through the vents and over the dashboard onto our laps. Once we had successfully crossed the river we could not get back to the south side because of the deepening water; eventually we had to drive several hundred miles to circumnavigate the headwaters and return to the exact spot on the other side en route to our camp, which was situated to the south of the river. My field notes for 9 November 1965 read: "Return to Lodwar, camped on south side of Turkwel. Circumnavigated river by passing from Kapenguria, skirting the Cherangani Hills and down through the Suk plains and to Lokichar (mileage 295 from Kitale). 10 Nov—Got supplies by crossing river on foot, returned to camp feeling shot."

When I first worked in the Lake Turkana desert, at Lothagam Hill, there were no roads in any of the areas that I was surveying. We drove cross-country, much of the time in four-wheel drive, and established our own track with the aid of Turkana assistants who pointed out the best way to go to avoid the deepest sand. We established a "road" between Lodwar and Lothagam. It took about half a day to drive the thirty to forty miles from Lothagam to Lodwar, assuming one did not get stuck in the deep sand, or get multiple tire punctures from thorns. When we did get stuck, it would usually take a couple hours of shoveling and laying out a track of cut Doum Palm fronds to get the vehicle going again. We kept two spare tires with us on the vehicle and were often repairing punctures in camp, or sometimes at the scene of the flat tire. The foot pumps for putting air in the tires would periodically get sand in them and would have to be taken apart and cleaned. We broke a rear spring on the rough terrain, but I kept a spare spring (that had mainly served to anchor my tent from the gale-force winds that blew through the area on a regular basis), and we were able to change it by digging a hollow in the sand under the vehicle to create working space. Our starter motor and our battery also died, and there were long periods when we could not risk cutting off the engine until we found a hard surface and a slight grade, which would allow us to push the vehicle to jump-start it.

I camped adjacent to Lothagam, where we had found the Later Stone Age fishing settlement between the two hills collectively known as Lothagam. There was no shade at the site, and the daily temperatures were normally well over one hundred degrees Fahrenheit. The view of the horizon from the site itself was expansive and beautiful, but blowing sand and dust, originating from the lakeshore area and nearby dunes, sometimes obscured

it. My camp was situated on the west side of Lothagam in one of the few areas with enough trees to provide shade. We could reach the site itself by driving over a sandy area that covered the hill. During the day, Turkana people were almost always at my camp, which was of course on their land. I quickly got used to seeing men with shoulders scarred from killing an enemy. They carried spears or lay down in the sand outside my tent, propped up on their *ekitchelongs* (wooden stool/headrests). Eventually one was made for me, and I would sit on it from time to time and be sociable. Sometimes we would buy a goat and have a traditional dance at camp with the local people. Water was not available near our camp. We obtained it from about five miles away in a well (four to six feet deep) that we excavated in the sand of a dry riverbed. Turkana people also had wells in the river, and they did not mind our using the water from our well. Since I had the only vehicle between Lodwar and the Kerio delta, I frequently transported local people to Lodwar, especially those who needed to go to the hospital. Water was hauled to camp from our well in forty-four-gallon drums that had a slight taste of oil.

Doing archaeology in Turkana District at that time was both difficult and invigorating. The discoveries were exciting, and there was a myriad of fundamental questions to examine. However, the extreme heat, wind, blowing sand, and ubiquitous flies were much to contend with, and for one month I lost vision in my right eye due to an infection. When it did rain, which was very rare, my camp (consisting of used British Army tents, a small table, some chairs, and drums of water and diesel) was transformed into a floating morass, and our well was inundated with camel dung swept in by the flooding river. My field notes for 2 November 1965 remark: "Brief but violent rainstorm flooding camp. Six inches of water sweep through the tent and 25 yards behind tent a torrent raged, which was deep enough to swim in. A 44 gallon drum literally floated out of camp."

We also had to contend with spitting cobras, sand vipers, scorpions, failed diesel fuel deliveries at Lodwar, and the possibility of bandits known as Ngorroko. The above comments about my work, of course, contrast significantly with today's multidisciplinary projects, where logistical constraints are greatly reduced.

Holocene Lake Turkana and the "Aquatic Civilization of Middle Africa"

The first comprehensive work on dating the Holocene lake levels was conducted by Butzer (1980), who was working on the Omo project. Butzer's work, as well as that of others (Owen et al. 1982; Barthelme 1985; Grove

1993), clearly demonstrated that Lake Turkana had been a huge lake during the early Holocene, between approximately ten thousand and eight thousand years ago. The level of Lake Turkana reached a height of approximately 80 meters above the 1968 water level of 376 meters (Butzer 1980). This means that the lake was a little more than twice as deep in the early Holocene as it was in 1968 when the measurements were taken (the maximum water depth at that time was seventy-three meters). In some areas on the western side of Lake Rudolf, such as near Lothagam, the beach was approximately ten miles to west of the mid-/late 1960s lakeshore (Robbins 1972). The current deltas of the Turkwel and Kerio rivers would have been under the waters of the enlarged lake, and there was a large bay between Lothagam and the Napedet Hills. At the north end of Lake Rudolf, along the Kibish Lake plain, the shore was located sixty to one hundred kilometers further to the north and northwest of the 1968 lake edge. During the early Holocene, Lake Rudolf had overflowed its basin and contributed water to the Nile. The abundance of data on the greatly enlarged early Holocene Lake Rudolf became an important building block in documenting and understanding the geographically broad paleoclimatic changes that had occurred simultaneously elsewhere in East Africa, as well as along the Nile Valley and in the Sahara (Butzer et al. 1972; Grove 1993; Thompson et al. 2002).

Work carried out in 1969–70 to the west of Lothagam, in the large early Holocene inlet between Lothagam and the Napedet Hills, resulted in additional finds of bone harpoons but, most important, in the first discovery of wavy line pottery buried within early Holocene lake sediments dated to ca. 7,960 +/− 140 BP (Robbins 1972: fig. 6; Robbins 1980). The discovery of this early Holocene pottery, in a pre–food production context in Africa south of the Sahara, challenged the prevailing point of view. Most workers believed that pottery had been introduced into sub-Saharan Africa much more recently and that it was almost certainly associated with the advent of either food production and/or the spread of "Iron Age" peoples. This discovery of wavy line pottery, as well as the undecorated pottery at Lothagam, was a significant breakthrough, even though it did not alter the main picture that in most other areas of sub-Saharan Africa, with the exception of southern Africa, the earliest pottery was, in fact, associated with the first iron-using peoples.

Work carried out by colleagues on the eastern side of Lake Turkana added to the growing body of information regarding the early and middle Holocene adaptations to the ancient beaches. Clearly, Lothagam was not a unique or isolated site. John Barthelme (1985) investigated a four-kilometer section of Holocene lake sediments on the eastern side of the lake in the

vicinity of Koobi Fora. He found thirty sites (including both bone harpoon and Pastoral Neolithic sites) and sampled fourteen of them, including seven Later Stone Age fishing settlements associated with the seventy-five-to-eighty-meter lake stage (1976 lake level). Significantly, twenty-nine radiocarbon dates were obtained for these sites, including the Pastoral Neolithic sites that I will discuss later. Large numbers of bone harpoons were found in the fishing settlements. Barthelme's (1985) work confirmed the association of the wavy line pottery with the early Holocene deposits. Another large, later Stone Age fishing settlement containing bone harpoons and pottery was excavated by David Phillipson (1977a) at Lowasera, almost due east of Lothagam on the eastern side of the lake (fig. 1).

What did the new discoveries at Lake Rudolf imply? Similar wavy line and dotted wavy line pottery, as well as bone harpoons, had previously been found at sites along the Nile, such as Early Khartoum and in the Sahara, which was wetter during the early Holocene. As long ago as 1972, I argued that the Late Stone Age peoples of Lake Rudolf shared in the general cultural adaptation seen at Khartoum and along the Saharan rivers and lakes. The ceramic similarities, the bone harpoons (including one from Lothagam with a cross-hatched pattern of decoration identical to that evident at Khartoum), and the emphasis on fish procurement in the enlarged waterways of the early Holocene generally supported this conclusion. I had also argued that contact between groups along the enlarged waterways was probably facilitated by the use of boats. My suggestion regarding boats was primarily based on the discovery of a large bone harpoon at Lothagam that was found embedded in deep water lake deposits dated to between seven thousand to eight thousand years BP (fig. 3). More recently, an actual dugout canoe dated to approximately eight thousand years ago has been recovered near Lake Chad (Breunig 1996).

I had also believed that an abundance of fish, especially large Nile perch (often weighing over one hundred pounds), and other aquatic resources, such as crocodiles, hippopotamuses, soft-shelled turtles, and so on (plus hunted and gathered resources) would have provided a relatively secure and predictable food supply. Later on, detailed work carried out by Stewart (1989) showed that at first people concentrated on Nile perch and cichlids at Lake Turkana, and that subsequently when the lake level fell species diversity increased. Stewart argues that the initial fishing adaptation during the early Holocene at Lake Turkana "represent[s] small hunting groups exploiting fish resources on a seasonal basis" (237).

The widespread distribution of wavy line pottery, numerous bone harpoons, and the appearance of cemeteries along the lake edge made sense to me when the information was initially obtained because of the nature

of the enlarged and rich lakeside environments. Such a reconstruction was also consistent with views of the nature of early Holocene adaptations that were being fostered by the "New Archaeology" during the period when I carried out my Lake Turkana research.

John Sutton (1974, 1977), carried the argument about the exploitation of aquatic resources further when he proposed the existence of an "aquatic civilization in Middle Africa." Sutton (1974) argued for broad cultural and linguistic relationships across a vast region, extending over a large part of the Sahara to the south into East Africa. Sutton (ibid.) plotted the distribution of bone harpoon sites and wavy line/dotted wavy line pottery, as known in the early 1970s, and showed that there was a striking correspondence to Joseph Greenberg's (1963) linguistic map of the distribution of Nilo-Saharan languages. Using the prevailing racial categories of the time, employed by many physical anthropologists, Sutton (1974: 535) also suggested, on the basis of human skeletal remains, that the population associated with the Aquatic Civilization "is likely to have been more or less Negroid." One of the important consequences of Sutton's contribution was that it further demonstrated that Africans had played a significant role in contributing to the rich variety of cultural adaptations that occurred in many parts of the world during early post-Pleistocene times. Yet Sutton's (1974) use of the term *civilization* differed substantially from the conventional cultural evolutionary definitions used by most archaeologists interested in the origin of the state.

The aquatic civilization model developed by Sutton (ibid.) attracted much attention because of the apparent fit between multiple lines of evidence including paleoenvironmental, archaeological, linguistic, and human skeletal data. It was indeed a broad-brushed approach, which opened the concept of an aquatic civilization to criticism. Phillipson (1977b: 46) argued, with regard to the association of wavy line pottery and bone harpoons, that "these similarities are, however, insufficient to support the hypothesis of a unified widespread 'aquatic civilization' as proposed by John Sutton (1974)." Stewart (1989) stressed that the exploitation of aquatic resources was not a new and revolutionary mode of subsistence in Africa that first appeared in the early Holocene. She also contended that "*contra* Sutton, the associated barbed bone points and fish remains at most northern and eastern African sites represent local hunter/fisher bands which, throughout the early Holocene, have expanded their subsistence activities in response to more plentiful aquatic resources. Whether there was some diffusion of barbed bone point technology and design between regions is a moot point" (Stewart 1989: 234). There is now much earlier evidence of intensive freshwater fish procurement elsewhere in Africa (Rob-

bins et al. 2000). Moreover, the distribution of barbed bone points has recently been found in the Kalahari, far to the south of the previous finds, in an area where the most likely makers of the artifacts were Khoisan peoples rather than Nilo Saharans (ibid.). In a recent detailed review of barbed bone points in Africa, John Yellen (1998: 195) emphasizes that "the data clearly show that this tradition does not map onto any tightly defined linguistic or biological group and does not serve as a marker for any 'cultural' entity as defined by common anthropological use of the term."

Despite all the criticism that is primarily aimed at the overgeneralization of the model, the extensive distribution of bone harpoons, fish exploitation, and various forms of wavy line pottery is, in fact, almost entirely associated with early to middle Holocene times in most of the geographical areas initially described by Sutton (1974). The unresolved questions largely concern the possible meaning of these associations and the extent to which one is seeing local or regional relationships.

What role did Lake Turkana have, if any, in the dissemination of the earliest African ceramics and bone harpoons? The answer to this question is not yet fully understood. However, it now appears that the ceramics may be derived from the Nile Valley in Sudan, while the bone harpoons spread from East/Central Africa to the north (Haaland 1993; Mohammed-Ali and Khabir 2003; Brooks and Smith 1987).

Lake Turkana and the Pastoral Neolithic

A growing body of evidence suggests that the oldest domesticated cattle in the archaeological record are humpless cattle (*Bos taurus*) from the eastern desert of Egypt; dated to about nine thousand years ago, whereas domestic sheep and goats originated in the Near East (Blench and MacDonald 2000; Marshall and Hildebrand 2002; Hanotte et al. 2002; Bradley 2003). It is reasoned that the initial spread of domestic livestock in Africa south of the Sahara was most likely associated with desiccation at about forty-five hundred years ago, which would have forced herders out of the Sahara and opened tsetse-free corridors, facilitating the spread of cattle (Gifford-Gonzalez 2000). Tsetse flies carry trypanosomiasis, which kills cattle.

Archaeological findings have revealed that Lake Turkana has a central role to play in our understanding of the initial dissemination of domesticated livestock into East Africa from the north (Robbins 1984; Barthelme 1984). The earliest livestock bones in East Africa were recovered by Barthelme (1985) at Dongodien, in the Koobi Fora area on the east side of Lake Turkana (fig. 1). The radiocarbon dates suggest an age of approximately four thousand years ago. Both bones of cattle (*Bos* sp.) and goats,

or caprines, were recovered. In addition, early evidence of cattle (*Bos* sp.) and caprines dated to approximately thirty-five hundred to four thousand years ago was also excavated at the Ileret Stone Bowl site (FwJj5) located on the northeast side of Lake Turkana (Barthelme 1985) (fig. 1). The earliest Lake Turkana Pastoral Neolithic sites of about four thousand years ago are associated with a drop in the lake level from + 80 M to 45 M (Barthelme 1985). Perhaps drying climates led to the opening of new pastures/browsing resources in an area that was comparatively free of tsetse.

Fiona Marshall and Elizabeth Hildebrand (2002) have argued that the spread of livestock south of the Sahara occurred before the spread of cultivated crops. This is an intriguing hypothesis because of the absence of domesticated crops on early Pastoral Neolithic sites at Lake Turkana. It is not entirely clear whether the advent of livestock in the Turkana area was the product of an intrusive population movement, or whether the animals were transferred from one population to the next as the result of exchange relationships, raiding, or some other sociocultural mechanism. Perhaps both population movement and "diffusion" of livestock among local populations of hunter-fisher-foragers occurred. Christopher Ehret's (1974) historical linguistic research has suggested that ancestral southern Cushitic peoples moved into the Turkana area from the north in Ethiopia around 5000 BP (see discussion in Barthelme 1985; and Ehret 2002: 121–22). This is about one thousand years earlier than the archaeological record for the first livestock at the Dongodien sites. Are we seeing evidence of a movement of Cushitic peoples into the area, or are we seeing the adoption of new ceramic traditions, livestock, and fishing techniques by local peoples? If these people were ancestral Cushitic speakers, they must have lacked the customary prohibition against eating fish that is documented for the history of Cushitic-speaking peoples (see Ehret 1969: 164 regarding the fish "taboo") because there were remains of fish found at Dongodien (Barthelme 1985). The clear association between fish at the earliest Pastoral Neolithic sites at Lake Turkana could mean that the fish prohibition was a comparatively recent development.

Although the archaeological record following the advent of pastoralism in the Turkana area remains little known, the subsistence patterns appear to have fluctuated considerably during the Holocene. Most likely these fluctuations were related to climatic changes as well as to the kinds of resources that were available in different ecological areas. For example, Diane Gifford-Gonzalez (2003) has demonstrated how foraging persisted until the late Holocene in the arid landscape of the Ele Bor rock shelters, located about two hundred kilometers east of Lake Turkana. I have also shown how aquatic resources were heavily exploited by people who kept

livestock along the western shore of the lake at Lopoy around AD 1000 (Robbins 1980, 1984).

Humped cattle, known as zebu, or *Bos indicus*, are now prevalent in many parts of Africa, including the Lake Turkana area. Zebu are believed to have been initially domesticated in India or Pakistan. Genetic studies clearly show that *Bos indicus* were initially introduced into Africa via the east coast. However the specific route and the timing of their arrival has not been firmly established by archaeologists (Marshall 2000; Hanotte et al. 2002). The most likely scenario, argued by geneticists as well as archaeologists, is that the introduction of *Bos indicus* was associated with the maritime trade that existed along the east coast of Africa beginning in at least the first century AD.

At the present time, the oldest evidence for humped cattle in eastern Africa includes figurines of humped cattle from Axumite sites in Ethiopia dated to the second century AD and bones of humped cattle from Hyrax Hill in Kenya that are about eight hundred years old (Marshall 2000). Other figurines of humped cattle have been reported for Dhang Rial in the Upper Nile basin in Sudan where they appear to date to between AD 1000 and 1500 (Robertshaw 1987) Significantly, these zebu figurines replace earlier humpless cattle figurines, suggesting the movement and spread of humped cattle in the region (Robertshaw 1987). The available morphological evidence on the early Turkana cattle is insufficient to determine whether the species of cattle was *indicus* or *taurus*. It should be noted that the widely cited archaeological evidence for humped cattle in Kenya as early as three thousand years ago has recently been withdrawn by Marshall (2000). Perhaps the change in cattle figurines from humpless to humped cattle noted above for the Upper Nile region is telling us that zebu were introduced to the Lake Turkana area comparatively recently.

Ceremonialism during the Pastoral Neolithic

Traditional livestock herders in East Africa, including the Turkana, have a rich ceremonial and ritual life that is often centered on cattle. Much of this behavior, such as that seen in marriage customs, boast songs, dances, and myths, would at best have "low visibility" in the archaeological record. Fortunately for archaeologists, ceremonialism is reflected in a number of instances in mortuary behavior and rock art sites. In contrast to the later Stone Age cemeteries such as Lothagam where the graves were not marked, early Pastoral Neolithic peoples erected monuments in association with burials (Angel et al. 1980).

The Jarigole stone pillar site located on the eighty-meter beach on the

east side of Lake Turkana near Alia Bay provides evidence of complex mortuary behavior, large-scale work effort involved in the movement of large pillars, and long-distance and regional exchange networks that reached as far as the East African coast (Nelson 1995) (fig. 1). Jarigole is marked by a large oval-shaped platform, about fifteen to twenty centimeters thick, a mound (about one meter high), and at least twenty-eight basalt pillars. It is primarily interpreted by Charles Nelson (1995) as a mortuary site where the pillars were erected to commemorate the dead. The Jarigole site is believed to date to early in the Pastoral Neolithic based on the discovery at Dongodien of an abundance of Nderit pottery that has been dated to about four thousand years ago.

The central area of the site is believed to contain several hundred overlapping burial pits, one of which has yielded the remains of an old person, who was not buried with any grave goods. The mound and platform at Jarigole produced thousands of Nderit sherds, ostrich eggshell beads, flaked stone implements, and many other artifacts. Importantly, shell beads (*Strigatella paupercula*) derived from the East African coast were recovered, as well as other exotic materials, such as Amazonite beads and pendants. Thus, Jarigole provides the earliest evidence of possible exchange relationships between the Indian Ocean coast and the Lake Turkana area, and if the dates are confirmed, Jarigole documents the earliest use in Kenya of stone pillars as part of a mortuary complex. Another connection between the coast of Kenya and the interior during the Pastoral Neolithic has also been established along the Galana River in East Tsavo Park, where a cowrie shell was found at Kathuva at a level dated to between 1350 and 1425 BP (Wright 2003).

The Namoratunga Sites

The term *Namoratunga* refers to a number of sites marked by large upright stones, or at least in one case pillars, that in Turkana mythology represent dancers who were turned to stone after they mocked a malevolent spirit. The Namoratunga stone pillar site is located on the eastern edge of the Losidok Hills about twelve kilometers from Kalokol (fig. 1). This site contains a series of twenty basalt pillars along with a grave partially circled by upright stones (fig. 4). A partial circle of stone cobbles appears to have surrounded the site. Thus the Kalakol Namoratunga site appears to have some striking similarities to Jarigole, especially in the use of large basalt pillars. As far as I am aware, the Kalakol Namoratunga has not been excavated.

In contrast to Jarigole, Mark Lynch and I did not find any Nderit pottery at this site, though such pottery could occur along the beach deposits

Figure 4. Namoratunga stone pillar site

below the site or lie buried in unexcavated deposits. However, like Jarigole, a number of the pillars ($N = 12$) were decorated with petroglyphs. In the case of the Kalakol Namoratunga site, the petroglyphs are very faint and are described by Lynch (1978: 170) as "heavily patinated and with desert polish." In fact, many of the engravings are very difficult to see. They thus appear to be ancient, in contrast to the fresh engravings described by Nelson (1995) for the Jarigole pillars. Lynch (1978) was able to discern fourteen designs on the pillars at Namoratunga. All of these were also represented at the Namoratunga sites located far to the south, in the Kerio River valley near Lokori (ibid.: 170) (fig. 1). The Lokori sites do not contain stone pillars but are cemetery and rock art sites where graves are circled by large, upright, slab-like stones. The engraved designs are much clearer at the Lokori sites, where Lynch (ibid.: 108) found that 70 percent of the 142 designs found in the rock engravings were recognized by the Turkana as brand symbols (Lynch and Robbins 1978a; Lynch and Donahue 1980). The grave at the Kalakol Namoratunga site that is partly surrounded by upright stones is identical in outward appearance to the graves at the two Kerio Valley sites in relation to being demarcated by a circle of upright stones. For this reason, as well as the use of similar brand symbols in the

rock art at both sites, there are good reasons to link the Kalakol and Kerio Valley Namoratunga sites as Lynch (1978) did. Moreover, at the Kerio Valley Namoratunga sites Lynch (ibid.) found that only males were buried in graves that were marked by upright stones decorated with animal brand symbols. As Lynch (ibid.) argued, it is therefore highly unlikely that the placement of the brand symbols on the upright grave stones of the Kerio Valley Namoratungas would be randomly connected to the grave stones or postdate the use of the sites as cemeteries. This solidly reinforces the connection between the similar engravings found at the stone pillar site near Kalakol with those found at the Kerio River Namoratunga sites near Lokori. There was also no Nderit ware found at the Kerio sites, despite large-scale excavations and an intensive systematic archaeological survey of the general area (about 190 square kilometers) that went substantially beyond the specific sites. Lynch (1978: 222) reported: "A radiocarbon date from a sample of human bone from Namoratunga 1 has yielded a date of 2285 +/− 165 BP (335 BC, Sample GX-5042A)." This date was based on bone apatite. Another date of 1200 +/− 100 BP, obtained on collagen from a human bone sample from Namoratunga 1, was rejected as being too recent (ibid.: 222). As far as I am aware, these are the only dates that have been obtained on the human remains recovered from these sites, whereas there are no carbon dates available for Jarigole. The absence of Nderit pottery at the west Lake Turkana Namoratunga sites and the only radiocarbon dates available, cited above, indicate that these sites are more recent than Jarigole, unless the Jarigole pillars were erected after the period represented by the Nderit pottery (or the date on Namoratunga is wrong).

The arrangement of pillars at the Kalakol Namoratunga site was interpreted as an archaeoastronomical site where the stone pillar alignments closely parallel the traditional calendar system for eastern Cushitic Oromo peoples (Lynch and Robbins 1978b). This relationship was discovered by Lynch, who consulted with Robert Victor, an astronomer at Michigan State University. Lynch estimated a date for the pillar site of about 300 BC, based on the assumed age of the Kerio Valley site, and the appropriate view of the night sky, for the purposes of calculating possible correlations with the Cushitic calendar, was adjusted to that date. The ethnographically documented calendar that was believed to be reflected in the arrangement of the Kalakol stone pillar site is based on the rising of seven stars and constellations: "Triangulum, Pleiades, Aldebaran, Bellatrix, Central Orion, Saiph (Kappa Orionis) and Sirius" (Lynch and Robbins 1978b: 767). The rising of these stars and constellations is used by peoples such as the Borana in combination with phases of the moon to produce a complex calendar year of 12 months and 354 days.

Subsequently the stone pillars at the Kalakol Namoratunga were remapped by Robert Soper (1982), who found that the original measurements established by Lynch were in error, possibly due to the fact that the basalt used for the pillars is magnetic, which might have thrown off the compass in the surveyor's transit originally used by Lynch to map the site. As a result of his work, Soper (1982) disputed the archaeoastronomical interpretation of the site as well as the linkage between the Kalakol site and the Kerio Valley Namoratunga cemetery and rock art site. Moreover, Soper (1982) disputed the association of the Namoratunga sites with the prehistory of eastern Cushitic peoples. Lynch (see Lynch's comments in Soper 1982: 157–61) was able to publish a brief rebuttal to the points disputed by Soper (1982) just prior to his tragic death in California at the hands of a hit-and-run driver. It is important to stress that Mark Lynch was an exceptionally bright young scholar whose research on the Namoratunga sites displayed critical thinking and a methodological approach that was exciting and new in terms of the research paradigms that were operating in the later prehistory of eastern Africa during the period when he carried out his work.

Follow-up work by Laurance R. Doyle and Thomas J. Wilcox (1986) at the Namoratunga pillar site confirmed Soper's findings regarding the measurements. However, the measurement error did not make a difference in the interpretation of the site when Doyle and Wilcox used the tops of the pillars to check the alignments proposed by Lynch (Lynch and Robbins 1978b). Doyle and Wilcox (1986: 126) "found twenty-five two-pillar alignments with the 300 BC horizon rising positions of the seven Borana calendar stars. Twenty-five two-pillar alignments with the 300 BC setting positions of the seven Borana stars were found as well, so that our confinement of this analysis to the eastern horizon rising alignments may be taken as an underestimate of the number of alignments intrinsic to the site." Doyle and Wilcox (1986) used a computer program at the NASA Ames Research Center to determine the statistical probability of finding at least twenty-five alignments such as those found with Namoratunga pillars. They ran their statistical experiment "ten thousand times" (127). The two authors concluded "that the tops of the pillars themselves show a degree of alignment organization toward the appropriate ancient star positions that is only about 0.4 percent likely to occur if the pillars were placed at random" (129). Finally, Doyle and Wilcox stated, "until evidence can be introduced to the contrary . . . the Namoratunga II site pillars were used for the specific purpose of aligning with the 300 BC positions of the Borana calendar stars" (ibid.)

Is there a way to determine more accurately when the Lake Turkana pillar sites were actually established, that is, to assess when the pillars were

placed in the ground? Clearly, this would be an important contribution to the archaeology of Lake Turkana. I suggest that optically stimulated luminescence (OSL) dating samples could be taken from the sediments that immediately underlie selected pillars at Jarigole and the Kalakol Namoratunga site. These sediment samples could be removed without disturbing the pillars by using a sand auger, employing techniques used for dating early sand dune activity in the Kalahari. OSL dating measures the last time that the sediments were exposed to sunlight before they were buried, which, in this case, would have been when the holes were originally excavated to set the pillars in the ground. However, small samples of the rock would also have to be taken to estimate the contribution of radiation from the rock and the sand (George A. Brook, personal communication, e-mail 16 October 2003). The results, when considered with the adjacent archaeological evidence, would allow for a more comprehensive understanding of the comparative age and function of the Lake Turkana pillar sites.

I opened this article on the Holocene archaeology of Lake Turkana by quoting from the unpublished exploration diary of the first European explorer of Lake Rudolf/Turkana. Following the above discussion of the stone pillar sites with their many unanswered questions, it is appropriate to end the essay with the words of a Turkana song about Namoratunga.

> Who knows how the standing stones were forged?
> Who knows how to make the fire of Namoratunga?
> The Hell fire will return worse than ever
> The fires of Hell will come more terrible yet
> Who can count the people in heaven?
> Who can count the stars in heaven?
> The Hell fire will come worse than ever
> The Hell fire will be worse than the last time.
> There is no one who can obstruct fate—no one.
> There is no one not even a diviner.
> The Hell fire will return worse than ever
> The Hell fires to come will be more horrible than the first.
> (Lynch 1978: xv)

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