Four middle Holocene pillar sites in West Turkana, Kenya

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Megalithic architecture is associated with spread of food production in many parts of the world, but archaeological investigations have focused mainly on megalithic sites among early agrarian societies. Africa offers the opportunity to examine megalithic construction—and related social phenomena—among mobile herders and hunter-gatherers with no access to domestic plants. In northwest Kenya, several megalithic "pillar sites" are known near Lake Turkana, but few have seen systematic research. This paper presents the results of archaeological survey and test excavations at four pillar sites in West Turkana 2007–2009, and describes the sites' spatial arrangements, depositional sequences, and material culture. Radiocarbon dates suggest that pillar sites near Lothagam were used ca. 4300 B.P. (uncalibrated), just as early herding began near Lake Turkana, while pillar sites near Kalokol may be slightly later (ca. 3800 B.P.). Comparisons of material cultural point to possible differences in use of contemporaneous pillar sites, and suggest monumental architecture had multiple forms and purposes in middle Holocene Turkana.

Keywords: megaliths, pillar sites, herding, Turkana, eastern Africa, Kenya

Introduction

Construction of prehistoric megalithic sites entailed coordinated labor by large groups of people (Chapman 1995; Sherratt 1990). Like other kinds of monumental architecture (Chazan 2008), megalithic constructions required the integration of extended social groups via hierarchical or heterarchical links. Megalithic sites therefore may be regarded as indicative of social complexity—defined here as the integration of discrete social units to constitute an emergent entity (see Wynne-Jones and Kohring 2007)—amid prehistoric populations.

Many studies have examined the economic underpinnings and social significance of megalithic sites in or adjacent to agricultural societies, especially in Europe. Early research linking these monuments to emerging inequalities and territorial claims among farmers (Renfrew 1976; Chapman 1981; Fleming 1982) was followed by efforts to probe the social meaning of particular monumental complexes (e.g. Hodder 1984; Thomas 1988, 1999: 34–61; McMann 1994; Boado and Vazquez 2000; Parker Pearson *et al.* 2006). Megalithic research has also expanded to include sites in non-agrarian economic contexts elsewhere in the world (Wendorf 1998; Peters and Schmidt 2004; Johanson 2004; Wright 2007; Frachetti 2008: 61). In this article, we present new data that clarify the economic context and social significance of early megalithic construction in eastern Africa.

"Pillar sites" near Lake Turkana (northwest Kenya) have linear arrangements of basalt blocks, sometimes accompanied by stone cairns, elliptical rings of stones, and/or platforms (Lynch and Robbins 1978; Nelson 1995). They have long been attributed to the region's first herders, but few have been subject to excavation or radiometric dating. Prior statements about their economic context and social significance have been regarded as preliminary, and implications of monumental constructions by herders and/or hunter-gatherers have not been explored in depth. The Later Prehistory of West Turkana (LPWT) research group undertook three campaigns (2007–2009) of survey and test excavations at four previously known and newly documented pillar sites near Lothagam and Kalokol (FIG. 1).

Survey and surface observations indicate differences in pillar sites' settings and architectural elements. Material culture comparisons suggest strong affinities between middle Holocene ceramic traditions around Lake Turkana. Possible functional differences among West Turkana pillar sites suggest that their builders had elaborate conceptions of non-domestic architecture.

Test excavations yielded the first dates for these four sites. They are roughly contemporaneous with early herding sites in East Turkana (ca. 4000 B.P.) (Barthelme 1985: 23). Like megaliths in Egypt (Wendorf 1998),

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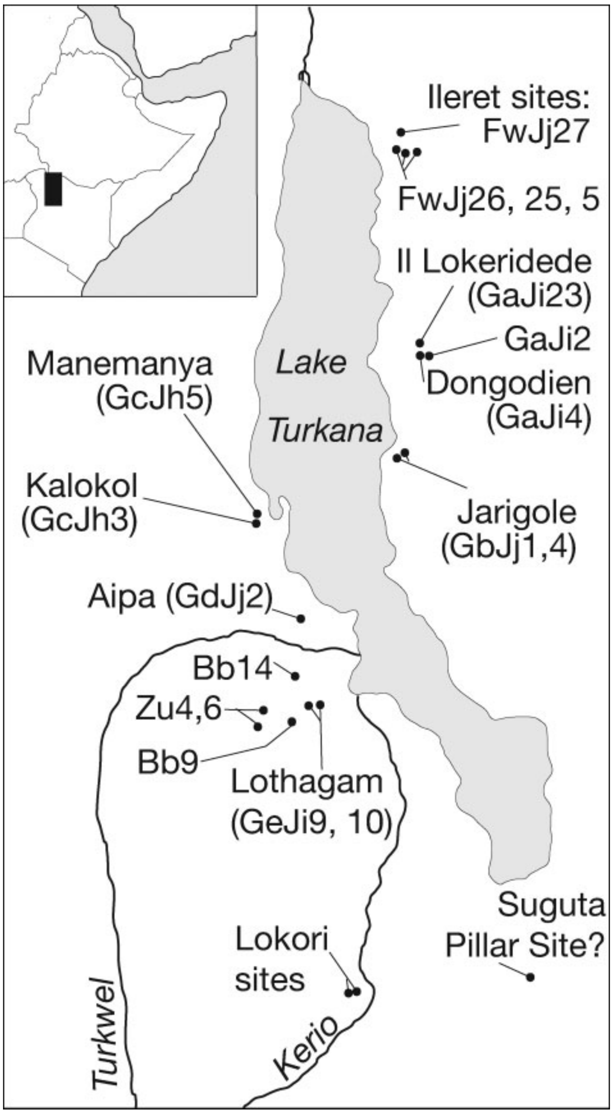

Figure 1 Location of sites mentioned in text.

West Turkana pillar sites pre-date farming or fully sedentary occupation in the region. They help establish an emerging pattern in Africa, whereby monumental architecture is created by mobile populations with no access to storable surpluses of domestic plants. This pattern contrasts with many well-studied megalithic sites in Europe, and may find parallels in other parts of the world.

Economic Contexts for Emerging Social Complexity

Studies of the emergence of social complexity were focused initially on hierarchies in prehistoric agrarian societies (e.g. Wittfogel 1957; Carneiro 1970; Wright 1977). Lately, archaeologists have begun to investigate more flexible kinds of organization and non-hierarchical forms of social differentiation covered by the term "heterarchy" (Crumley 1987; Ehrenreich *et al.* 1995). Research has also shown that diverse economic bases can support complex societies (Price and Brown 1985; Kidder and Fritz 1993; Friesen 1999; Ames 2001; Frachetti 2008).

Herding is an intriguing economic context for examining emerging social complexity. Most farming societies settle permanently, and produce stored surpluses that support wealth accumulation, specialization, and institutionalized inequality (Scarre 2009: 190–191). Herders, in contrast, move frequently, weather boom-bust cycles of stock loss/recovery, and build extensive risk-sharing networks (e.g. Cribb 1991: 15–20, 24; McCabe 2004). These central aspects of their lives may foster distinct attitudes toward land rights, and/or level inequities before they become fixed inequalities.

Ethnographic studies of herders attest to elaborate social networks, diverse forms of social differentiation, and organization ranging from hierarchical to egalitarian (Bernus 1990; Salzman 1999, 2004: 43–53). A rich array of social institutions are present among northeastern and eastern African herding societies such as the Nuer and Dinka (Evans-Pritchard 1940; Deng 1984; Kelly 1985); Toposa, Mursi, Dasenech, and Hamar (Almagor 1978; Lydall and Strecker 1979; Roth 1994; Turton 1991); Turkana (McCabe 2004); Ariaal, Rendille, Samburu, and Maasai (Dahl and Hjort 1976; Sperling and Galaty 1990; Galaty 1993; Roth 1994: 134; Fratkin 2004: 47); as well as Mukogodo hunter-gatherers who recently adopted herding (Cronk 1991). These institutions include segmentary lineage-reckoning to determine intra-ethnic allegiances, codified roles for giving and receiving brideprice, intra-ethnic territorial divisions, kin-based control of wells, networks for loaning stock between kin and age mates to mitigate or recover from catastrophic loss, and permanent defense groups whose membership alternates between generations. Among many of these pastoral societies, age grade systems allow social differentiation for assigning labor, but nevertheless are egalitarian in that each person passes through each age grade.

Social interactions within pastoral groups are contingent on routine and exceptional movements dictated by rainfall, vegetation, disease, and social events. Annual patterns of aggregation and dispersal vary from group to group, depending on local environmental factors: some herding societies aggregate during the dry season at fixed points with water and disperse during the rains, while others may come together during part of the rainy season and disperse when the rains are over. A pastoral group or section may assemble periodically at a predetermined point for age-grade rites of passage, and may also gather on short notice at a quickly chosen location for an emergency discussion of a pressing social or environmental dilemma (e.g. Turton 1985). Competing pastoral groups may assemble for a peacemaking ceremony near the recognized boundary between their territories (Turton 1991: 164).

Projection of modern African herders' social institutions into prehistoric times requires extreme caution for three reasons. First, institutions and interaction patterns vary among pastoral groups today, even within eastern Africa. Second, because direct historical links between present and prehistoric herders are ambiguous, connections between present and past institutions necessitate the careful construction of relational analogies (Wylie 1985). Third, archaeological evidence for many of the institutions listed above may be elusive, making it difficult to establish their presence/absence in prehistoric times.

Still, ethnographic perspectives provide useful counterexamples to the kinds of social elaboration cited among farmers, which feature stored surpluses, specialization, wealth accumulation, hereditary elites, and ownership of territory under regular cultivation (Flannery 1972: 401–403). Herders are more mobile; their wealth (stored on the hoof) can be wiped out in a single epidemic, and their land-use is often ephemeral or dependent on environmental conditions at a given moment. While the leveling mechanisms in such economic systems can undercut inequalities in wealth, a complex set of social networks and elaborate ceremonies may nonetheless be viewed as vital to the group's continuing existence.

Megaliths In and Out of Africa

Megalithic sites and other forms of monumental architecture mark the appearance of some form of social complexity, or group-oriented society in many parts of the world (Renfrew 2007: 126–133). Thoroughly researched sites in Atlantic Europe (Renfrew 1985; Cunliffe and Renfrew 1997; Parker Pearson *et al.* 2006; Midgley 2008) were thought to arise in farming societies or on their expanding margins (Renfrew 1973; Sherratt 1990). Limits on arable land, the role of kinship in land holding, and the potential for storable surpluses initially led scholars to view these sites as instrumental in enacting territorial claims, maintaining lineage identity via ancestral rites, or bolstering the position of emerging elites (Renfrew 1976; Chapman 1981; Fleming 1982; Barrett 1996).

Recent studies have uncovered evidence for more mobile settlement and dispersed burials than previously supposed for the region (Thomas 1999: 9–10; King 2001). Others have shown variability in use of domestic versus wild plant and animal resources (Lidén 1995; Thomas 1999: 23–33). Together, all these studies suggest that European megalithic monuments were not tied to any one economic strategy or social order, but developed in locally distinct ways shaped by the manner in which each community used and transformed its material culture (Thomas 1999: 221–228).

Research outside of Europe has documented megalithic architecture in non-agrarian contexts: among intensive hunter-gatherers in Turkey (Peters and Schmidt 2004), agropastoralists in South Asia (Johanson 2004), and early herders in Egypt (Wendorf 1998) and central Asia (Frachetti 2008: 61; Wright 2007). Because land-use practices, labor allocation for subsistence tasks, and mobility patterns differ tremendously between agrarian, pastoral, and hunter-gatherer populations, one might expect motives for building monumental sites to vary depending on economic strategies. Archaeological investigations of megalithic construction among hunter-gatherers or herders may reveal a more diverse range of purposes—and related social structures—for megalithic construction than those envisaged for early farmers.

Northern and eastern parts of Africa can contribute to these perspectives, because they saw long periods of herding without agriculture. Herding economies spread—albeit patchily—across the Sahara and Sahel 7500–6500 B.P. (Marshall and Hildebrand 2002). Farming was limited to the Egyptian and north Sudanese Nile, and to southwest Asian crops (Hildebrand 2007; Wetterstrom 1993), until pearl millet was domesticated in the southwest Sahara (ca. 3500 B.P.) and spread rapidly through western Africa (D'Andrea 2002; Neumann 2005). In eastern Africa, domestic animals appeared in Turkana at Dongodien and GaJi2 by ca. 4000 B.P. (Barthelme 1985, Nelson 1995), but there is no evidence for crop production until ca. 2500 B.P. in Ethiopia (Boardman 1999) or 1100 B.P. in Kenya (Ambrose 1984).

Pillar sites near Lake Turkana—monumental architecture with no nearby signs of habitation—are attributed to early herders (Lynch and Robbins 1979; Nelson 1995). Investigation of pillar sites can show whether eastern African megaliths are associated with hierarchy, or perhaps with more heterarchical forms of social differentiation. Comparing contemporaneous pillar sites can show if they were all used in the same way, giving some indication of the degree of complexity of ritual activities. Such comparisons could also show whether all of the sites were used by people with similar material culture, or the sites existed in a heterogeneous social landscape. Pursuing these social questions requires determining the sites' ages, material cultural associations, and structural variability.

Prior Research

At pillar sites, numerous basalt columns stand (usually upright or slightly tilted) in straight or curved linear arrangements within or around a platform. The pillars are not dressed. They usually have a rounded quadrilateral cross section, measuring ca. 30–35 cm on each side. The platform is a nearly level circular or ovoid area that is flatter and higher than the surrounding natural land surface, and appears to have been created by humans via deposition of a mix of sediment, pebbles, and cobbles. Some pillar sites have cairns (shallow conical rock piles), stone circles (cobbles arranged in a ring), and/or a curb of cobbles encircling the platform.

Pillar sites have long been important landmarks to modern Turkana residents, who call them *namoratunga* ("stone people"). Turkana legends say ancestral spirits appeared at a dance and were laughed at for wearing unusual attire; piqued, they turned living people into stone pillars. Pillar sites are documented in four areas around Lake Turkana: Jarigole, Lokori, Lothagam, and Kalokol (FIG. 1). Reports of a fifth in the Suguta Valley await confirmation, and only Lokori has radiometric dates from excavated contexts. Because several namoratunga are now known, others may be discovered, and their distribution may extend beyond areas currently inhabited by Turkana people, we hereafter refer to these sites by place name and/or SASES designations (Nelson 1971).

Jarigole

Excavated by Merrick and Nelson, Jarigole (GbJj1) is on a recessional beach ca. 70 m above the 1973 lake level. Prehistoric people made an oval platform (>1000 sq m) with a circular mound (120 cu m of sediment), and moved more than 28 stone pillars over 2 km to stand on the platform (Nelson 1995). The site has not been fully published, and its ceramics are under study by one of us (KG). Preliminary reports by Nelson suggest its human remains may be secondary interments. Artifacts (40,000) include pottery, flaked stone, and beads of ostrich eggshell and other materials. Marine shells indicate contacts with the Indian Ocean. Ceramic figurines depict several wild taxa and a domestic animal (cattle) (Nelson 1995).

Dates and cultural traditions for Jarigole were based on Nelson's (1995) classification of its pottery as Nderit. This ware type was first described in Wandibba's (1980) typology for the Pastoral Neolithic of eastern Africa, as typically having carinated, narrow-mouthed bowls with panels of "cuneiform-like" impressions on exterior surfaces, and grooved interior surfaces. The earliest known sherds of this type are at Dongodien, an early herding site in northeast Turkana dated with charcoal and humic acid residue to 4100–3890 B.P. (Barthelme 1985). In addition to Classic Nderit sherds *sensu* Wandibba 1980, Dongodian and Jarigole share several other decorated and formal types (e.g. "burnished ripple," "channeled ground," "evulsed") that Nelson (1995) included more broadly as Nderit. Similarities between their ceramic assemblages suggest that Jarigole and Dongodien are contemporaneous (Nelson 1995).

Lokori

In southwest Turkana, Lynch and Robbins (1978, 1979) found 173 stone cairns and rock art on two nearby hills between the Kerio and Kangatet rivers. Referred to as "Namoratunga I," these sites yielded dates of 2285 ± 165 B.P. on bone apatite and 1200 ± 100 B.P. on bone collagen (Lynch and Robbins 1978, 1979; Soper 1982). Most excavated graves at Lokori have a pit ca. 2 m deep with horizontally layered slabs encircled by upright stones. Typically, they contain a single body, lying flexed on its left side (Soper and Lynch 1977), but one bundle burial was noted (Lynch and Robbins 1979). Faunal remains suggest use of domestic animals rather than fishing or hunting (Robbins 1984). No ceramics resembling Nderit were described.

Kalokol

Two hundred km north of Lokori (FIG. 1), Lynch and Robbins (1978) found another pillar site, "Namoratunga II" or "Namuratunga Site 3" (Lynch and Robbins 1979: 320). Now registered as GcJh3, it is on a bench of sediment on the east edge of the Losedok Hills, a series of basalt ridges. No Nderit pottery has been found on its surface. Nderit sherds at the National Museums of Kenya labeled "Kalokol Road Site" (Charles Nelson personal communication, 2010) were found near the road ca. 800 m east of Losedok ridge (Robbins 1980: 90; personal communication, 2010). Lynch and Robbins (1979: 321) noted differences in layout between the Kalokol and Lokori sites, but thought Kalokol's slab cairn looked similar to burials excavated at Lokori and suggested the two sites were contemporaneous. Archaeoastronomical alignments were proposed (Lynch and Robbins 1978), challenged (Soper 1982), and re-measured (Doyle and Wilcox 1986), but remained controversial because the site was never dated.

Other sites

In West Turkana, a pillar site at Lothagam, GeJi9, was described by Nelson (personal communication, 1994) and Christopher Koch (personal communication, 1994), who also noted a second pillar site nearby; we described the latter site and registered it as GeJi10. Local leaders were not aware of other pillar sites, but Joseph Etabu found one at Manemanya during our 2008 survey. Registered as GcJh5, it is ca. 1 km north of GcJh3 (see below). Robbins (1972) and Phenice and colleagues (1980) noted other sites with Nderit pottery but no pillars at Apia/GdJj2, Bb14, and west of Lothagam (Bb9, Zu4, Zu6) (FIG. 1).

In East Turkana, pillar site GbJj4 (ca. 600 m northeast of Jarigole) has Nderit pottery, ceramic figurines and obsidian on the surface (Kamau 1991; Christopher Koch personal communication, 1994). Dongodien (GaJi4) has no pillars, but Nderit pottery, and domestic animals (Barthelme 1985; Marshall *et al.* 1984). Two km to the north, Il Lokeridede (GaJi23) has a 500 sq m mound, and sandstone slabs, but its status as a pillar site is not certain. Surface finds include Nderit pottery, ceramic figurine fragments, ostrich eggshell beads, and charcoal dating to 4180±60 B.P. (Githinji 1991; Koch *et al.* 2002). Middle Holocene occupation sites near Ileret are under study (FwJj5, 25–27) (Ndiema *et al.* 2010).

South of the lake, Robbins and Lynch checked reports of a pillar site in the Suguta Valley, but had to turn back before finding it (Lawrence Robbins personal communication, 2010).

Key Issues

Monumental architecture around Lake Turkana reflects substantial labor investments by groups who (at least at Jarigole and Lokori) were familiar with stock-keeping, and may have shared a common cultural tradition (Lynch and Robbins 1978; Nelson 1995). Yet key gaps remain: radiometric dates have been obtained only at Lokori (using bone, whose degradation potential has long been known) and at Il Lokeridede, which may or may not have had standing pillars. While Nderit pottery served as a cultural marker at several middle Holocene burial and settlement sites (above), it is not found at some major pillar sites (Lokori, GeJi10, or Kalokol). Finally, variation in size, layout, and purpose of pillar sites has not been critically assessed.

Before considering the social significance of these sites to prehistoric people, one must provide concrete answers to two questions. First, were sites constructed and used over a single, well-defined time period? Second, does material culture at these sites suggest a single cultural tradition? We attempted to answer these questions by testing four pillar sites in West Turkana: GeJi9, GeJi10, GcJh3, and GcJh5.

Methods

Our surface reconnaissance (2007, 2008) aimed to determine whether the four sites selected for study differed in setting, architectural features, and material culture (TABLE 1). EH and JS used a Brunton pocket transit and pacing to map each site and its environs, including nearby basalt outcrops and drainage systems. We mapped the location of specific pillars, and the size and distribution of cairns (piles of bedrock) and stone circles (circular or elliptical lines of distinctive stones on the surface, surrounding a central core of less distinctive stones). We also described and photographed sites and surface artifacts. Logistic constraints (time limits, uncertainty about site locations, long commutes from base camps, and unfamiliarity with local security) argued against bringing expensive, sensitive mapping equipment to Turkana during the first three field seasons. Our current maps suffice for interpretations presented here, and improved logistics will allow us to use a Total Station for precise mapping in future fieldwork.

Our excavations (EH, JS, KG, and crew) aimed to assess the depth of deposits and density of artifacts, collect samples for radiocarbon dating, and examine material cultural. To achieve this at all four sites in a short time, we limited excavations to two test units per site. To gain an initial impression of intra-site variation in deposits and activities, we placed the two test units in different parts of each site.

One unit aimed to capture an intact stratigraphic sequence in a central activity area. This unit was typically excavated in the center of the platform (GeJi9, GeJi10, and GcJh3). Because GcJh5's platform was less distinct, we placed the unit near the largest cluster of upright pillars (avoiding tilted or recumbent pillars that appeared to have undergone minor or major displacement).

The second unit at each site was located more peripherally, to determine the extent of platform building and other activities. At GeJi9 and GcJh3, these peripheral units were just inside the edge of a stone ring encircling the platform. At GeJi10 and GcJh5, no stone rings were visible and lower reaches of these sites seemed vulnerable to erosion, so we placed the peripheral units a few meters upslope from the site's uppermost cairns or pillars.

We avoided cairns for three reasons. First, they have high potential to contain human remains, which would have required slower, more extensive excavation and the presence of a bioarchaeologist for proper

Table 1 Attributes of the four pillar sites studied by the Later Prehistory of West Turkana (LPWT) research team.

Trait	GeJi9 Lothagam North	GeJi10 Lothagam West	GcJh3 Kalokol	GcJh5 Manemanya
Unobstructed horizon views*	350°–50°	185°–360°	315°–90°	315°–135°
Platform	Large	Small	Small	?
Pillars	48	30	19	13
Linear arrangements of pillars	3	2	3	? (displaced)
Additional pillars	16	5	4	3
Stone circles†	9	–	–	–
Cairns†	5	6	5	–
Cairns >30 m from pillars	–	+	+	–
Nderit pottery	+	–	–	+
Human remains	+	–	–	+
Lithic raw materials	Mostly obsidian	Mostly chert	Mostly chert, basalt	Diverse
Beads	+	–	–	+

* 0°=North, 90°=East, 180°=South, etc.
† Within 30 m of main pillar area.

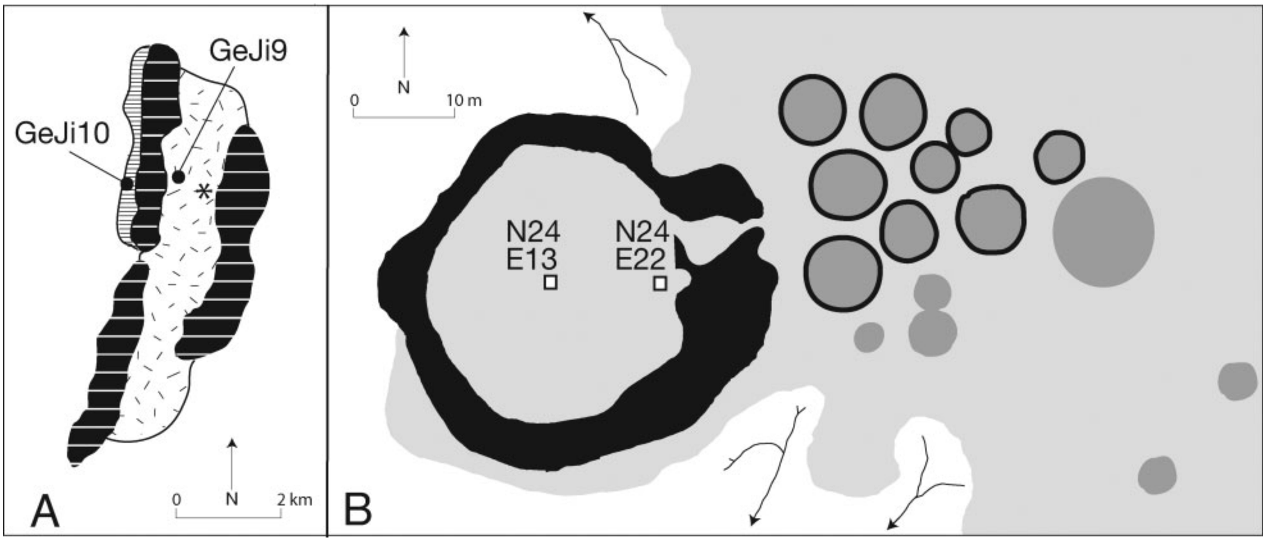

Figure 2 A) Geological schematic of Lothagam: basalt ridges (black with white horizontal lines), western bench of Pliocene deposits (fine horizontal lines), Pliocene "red beds" between the ridges (white with cross-hatch), surrounding plains with recent Holocene aeolian deposits (white), and a remnant of early Holocene beach deposits (*) investigated by Robbins (1974); B) Plan view of GeJi9's main architectural features: western platform surrounded by thick ring of large cobbles and pillars (black), nine stone rings (dark gray with black border) and five cairns (dark gray with no border). Artifacts are present on the surface areas marked in pale gray; other areas (white) are eroding.

removal. Second, they are not suitable for excavation by small test units which our time limits required. Third, most cairns are peripheral to the main platform area of each site, and might represent a different phase of activity. It seemed best to postpone cairn excavations until we had a larger team and more generous budget for dating.

Excavation followed natural levels when possible, using 5-cm spits where natural stratigraphy was not evident and when artifacts were present, and 10-cm spits in sterile sediments. We used 2-mm sieve mesh to maximize recovery of datable materials.

Results

Lothagam North Pillar site (GeJi9)

At Lothagam, ca. 8 km southwest of the Kerio River delta, two parallel volcanic ridges run roughly north-south (FIG. 2). A 1×4 km trough between them holds deposits from Pliocene to Holocene times. GeJi9 is on an elevated bench of these deposits, ca. 1 km northwest of the early Holocene beach deposits excavated by Robbins (1974). GeJi9 has a flat surface surrounded by gullies, including a small one that separates it from slightly sloping benches below the western volcanic ridge (FIG. 3).

A cluster of pillars separates the eastern and western portions of GeJi9. The western side is a nearly circular platform (D. 30 m), whose edges are eroding into nearby gullies; three pillars lie within it. The eastern portion has five cairns and nine stone circles or ellipses, most clustered within 25 m of the east side of the platform (FIG. 2). Nderit sherds and obsidian pieces are visible all over the site, and one cairn has protruding pieces of bone or tusk. Excavation unit N24E22 (1.6×1 m) is on the east edge of the platform; its eastern edge lies at the E23.6 line, near a row of pillars. Unit N24E13 (1 sq m) is in the center of the platform. The surface of N24E13 is 32 cm higher than that of N24E22.

Excavation unit N24E22 produced 22 cm of silty deposits and 53 cm of loose sand above bedrock (FIG. 4: top). The base of its sequence is a soft, fine, red-brown sandstone. Surface irregularities and small, friable protrusions suggest low-energy erosion of the bedrock surface. Overlying sands have quartz and basalt particles, with no sign of cross-bedding (Layer F); sublayers F_4–F_1 vary in the size of sand particles, and the proportion of silt particles. We interpret these as low-energy fluvial deposits of local materials. Their loose condition suggests they may have accumulated during late Pleistocene or early Holocene times.

A layer of flat rocks—mainly tabular sandstone pieces 18–24 cm across, similar to ones on the surface of eastern portions of the site today—caps the sand sequence 20–25 cm below surface. Their well-fitted arrangement indicates intentional placement. Smaller rocks and some artifacts are found, perhaps packed deliberately in the interstices of these slabs, in a matrix (Layer E) that combines elements of overlying (silty) and underlying (sandy) deposits.

Two sandy silt layers overlie the stone slabs. The lower is lightly compacted, with scant rounded basalt pebbles ca. 5 cm across (Layer D). The upper is looser, with many rounded pebbles of the same size (Layer C). These could reflect the construction of a pebble floor, or intense colluvial activity before erosion of the gully that separates the site from Lothagam's west ridge today. An ostrich eggshell

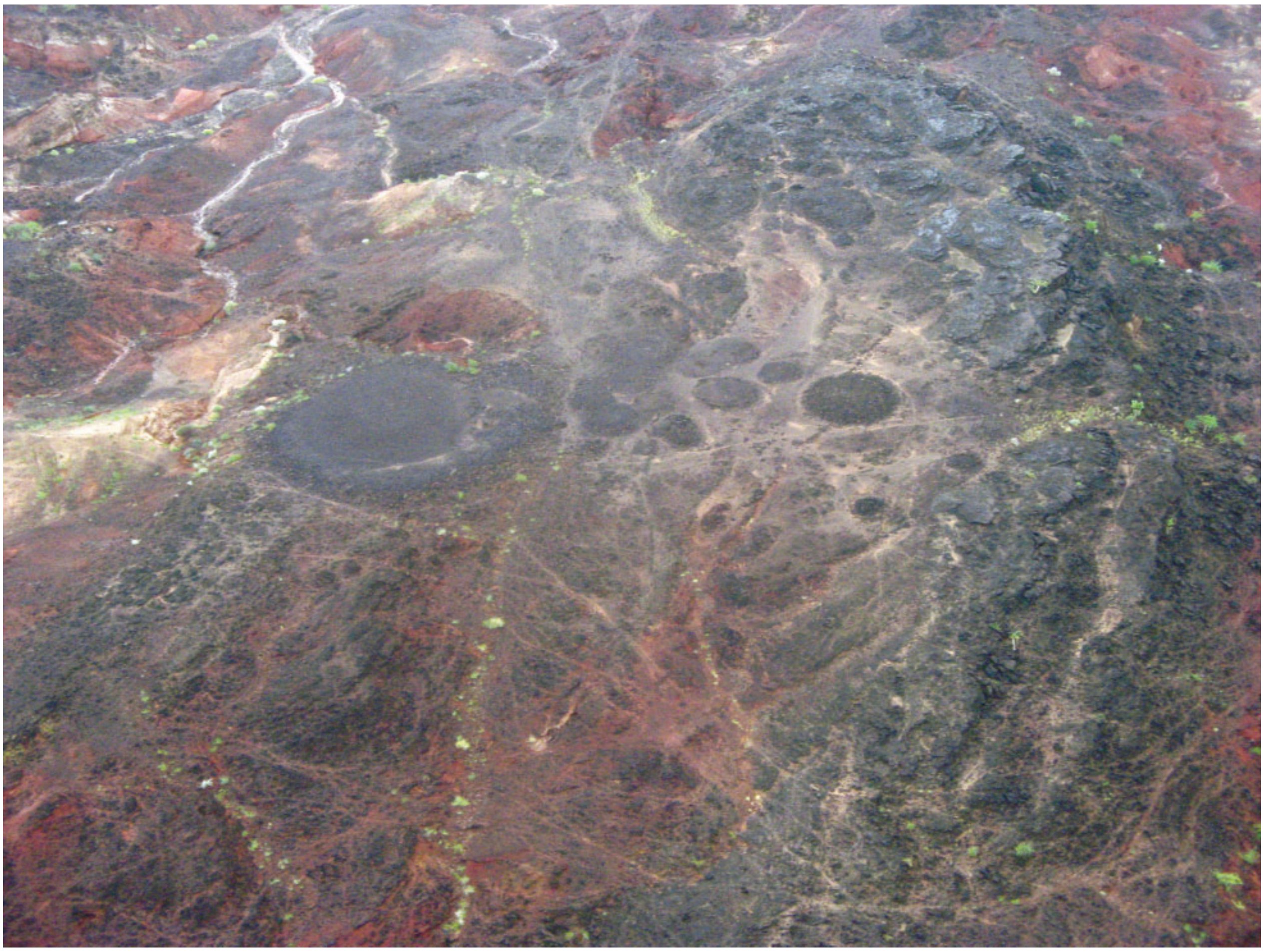

Figure 3 Aerial photo of GeJi9 (EH, August 2007).

bead near the top of Layer C dates to 4385±15 B.P. (TABLE 2). Near the surface of N24E22, a clay-silt matrix (Layer B) and a clayey vesicular A horizon (Layer A) underlie a desert pavement.

Excavations in the central platform unit (N24E13) proceeded for 50 cm before revealing a portion of an infant cranium on the east side. We re-covered the areas of the bone that we had exposed, and halted

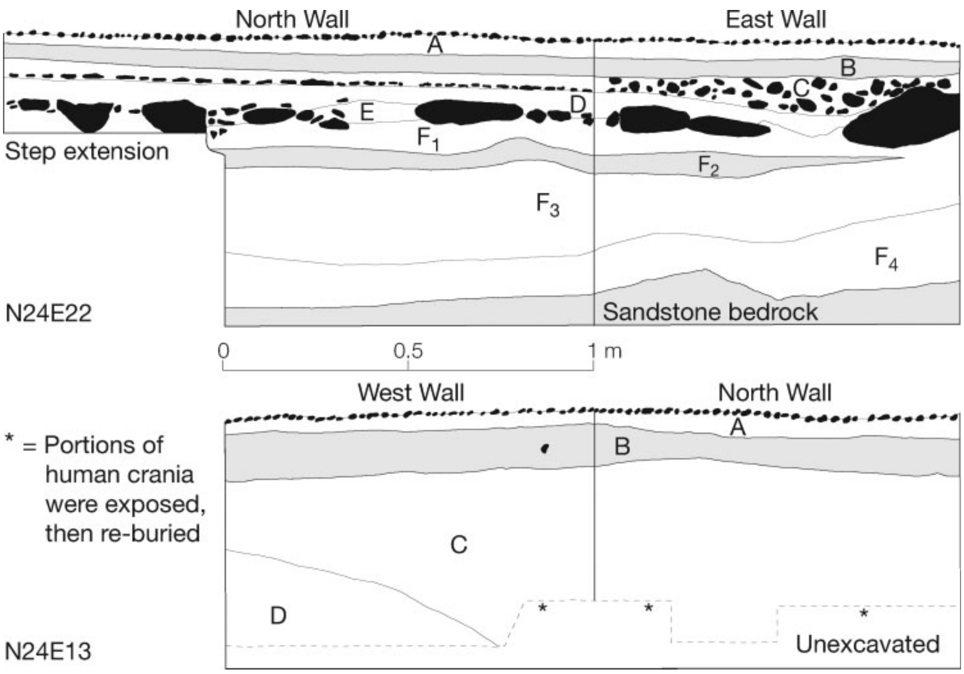

Figure 4 Excavation profiles at GeJi9: N24E22 (top), and N24E13 (bottom).

excavations on the east half of the unit. Continuing excavation on the west half, we found a portion of an adult cranium 63 cm below surface. This caused us to halt before reaching sand or bedrock that would have indicated the base of the middle Holocene sequence. An ostrich eggshell bead 1 cm above this burial dates to 4265 ± 15 B.P. (TABLE 2).

Deposits in N24E13 consisted of four layers (FIG. 4). The lowest (D) is a loose jumble of extremely abundant rounded pebbles in a sparse sandy silt matrix. This layer's sloped top, scant matrix, and jumbled pebbles all suggest dumping or piling of rocks by humans. A thicker layer (C) is above, with fewer, less jumbled pebbles. Above a nearly horizontal layer break, a lightly compacted deposit (B) has smaller pebbles laid down in a flat fashion in a sandy silt matrix with horizontal plates. The top clay-silt layer (A) is similar to the top layer of N24E13.

The GeJi9 ceramic assemblage comes exclusively from deposits attributed to middle Holocene times. The 145 rim sherds recovered belong to a maximum of 99 vessels. Several are nearly complete, but 79 are each represented by a sole rim sherd. Most are closed-mouth bowls with 5–22 cm orifice diameters (FIG. 5:1–3). There is also a possible gourd-shaped bottle (FIG. 5:5). Across the assemblage, paste has well-sorted volcanic inclusions and quartzose particles; 21% of vessels have small amounts of mica. Oxidation is usually incomplete, but most sherds appear otherwise well-fired.

Decorative motifs include miscellaneous grooving or incising on 36 vessels (FIG. 5:3), whole-vessel patterns of cuneiform-like impressions referred to here as Classic Nderit (*sensu* Wandibba 1980) on 27 vessels (FIG. 5:1,2), and burnished ripples (*sensu* Nelson 1995) on 19 vessels (FIG. 5:4). Two other vessels have unclassified rectangular impressions; these and 83% of Classic Nderit vessels are internally scored. One vessel's decorative motif is too weathered to identify, and one is undecorated. Two body sherds have channeled ground decorations (FIG. 5:6) as described by Nelson (1995: 58–62). Three vessels combine motifs: one has grooved and undecorated zones, one has Classic Nderit and undecorated zones, and one has grooved and Classic Nderit zones. Red ochre paint is common on vessels of all decorative types. Gray paint (possibly graphite) is on one grooved and five unidentified body sherds (FIG. 5:7).

The 258 lithic artifacts were recovered in equal proportion from GeJi9's two excavation units (FIG. 6:A–G). Most are obsidian microdebitage (flakes and flake fragments <1 cm long) or small flakes (1–2 cm long). A small proportion are >2 cm long. Few flakes of any size exhibit cortex on >50% of their dorsal surfaces. This suggests raw material sources were far from GeJi9, and tools were knapped from highly "curated" cores. The six cores recovered are single-platform prismatic blade cores. A scraper is the only retouched tool found.

Faunal remains are fragmented. Most are identifiable only to class Mammalia, except some ungulate tooth enamel, a suid molar fragment, and a bovid tooth. N24E13 had remains of humans, other mammals, and fish, but no microfauna or birds. N24E22 had well-preserved fish remains below the stone slabs, and mammal bone fragments (including a human tooth) above. Ostrich eggshell beads occurred throughout deposits attributed to the middle Holocene; beads of Amazonite and unidentified stone were found in N24E13.

GeJi9's stratigraphy and finds suggest the following sequence. After light erosion of Pliocene sandstones, fluvial activity deposited sands, probably during wet phases of the late Pleistocene and/or early Holocene. Ceramics are not found, but the fresh state of the eight (mostly obsidian) lithics, and the good condition of aquatic fauna suggest this deposition occurred under low energy conditions. During the middle Holocene (by ca. 4300 B.P.), humans laid a platform of large but portable sandstone slabs over parts of the site, and dumped jumbles of pebbles in other areas. Slightly later, they brought massive quantities of pebbles and sediment to the site to create a large, flat platform, within which they placed some human remains. Discerning lateral and vertical patterning in ceramic and lithic discard awaits

Table 2 Radiocarbon dates obtained from West Turkana pillar sites. All dates in the article are in ^{14}C years before 1950. All samples were prepared by Hong Wang at the Illinois State Geological Survey for AMS dating at the University of California Riverside. The beads had x, y, and z proveniences to the nearest cm, whereas the charcoal and OES fragments were found via sieving.

ISGS sample no.	LPWT bag no.	Site	Excavation unit and level: cm below surface (bs) and/or stratigraphic context	Material dated	^{14}C B.P.	CAL B.P.	68% range B.P.	Calendar years B.C.
A1491	115	GeJi9	N24E22.6 L. 3, ~16 cm bs, near B/C boundary	OES bead	4385 ± 15	4934 ± 37	4896–4971	2984 ± 37
A1492	405	GeJi9	N24E13 L.13: 65 cm bs, C or D	OES bead	4265 ± 15	4847 ± 5	4842–4852	2897 ± 5
A1424	423	GeJi10	N100E25 L.5: D_1	Charcoal	4290 ± 20	4855 ± 6	4881–4848	2905 ± 6
A1493	448	GcJh3	N105E100 L.4: 29–40 cm bs, D (base), E, or F (top)	OES fragment	3890 ± 15	4348 ± 44	4304–4392	2398 ± 44
A1490	514	GcJh5	TU2 L.8, 89 cm bs, pit fill above burial	OES bead	3805 ± 15	4198 ± 30	4168–4228	2248 ± 30

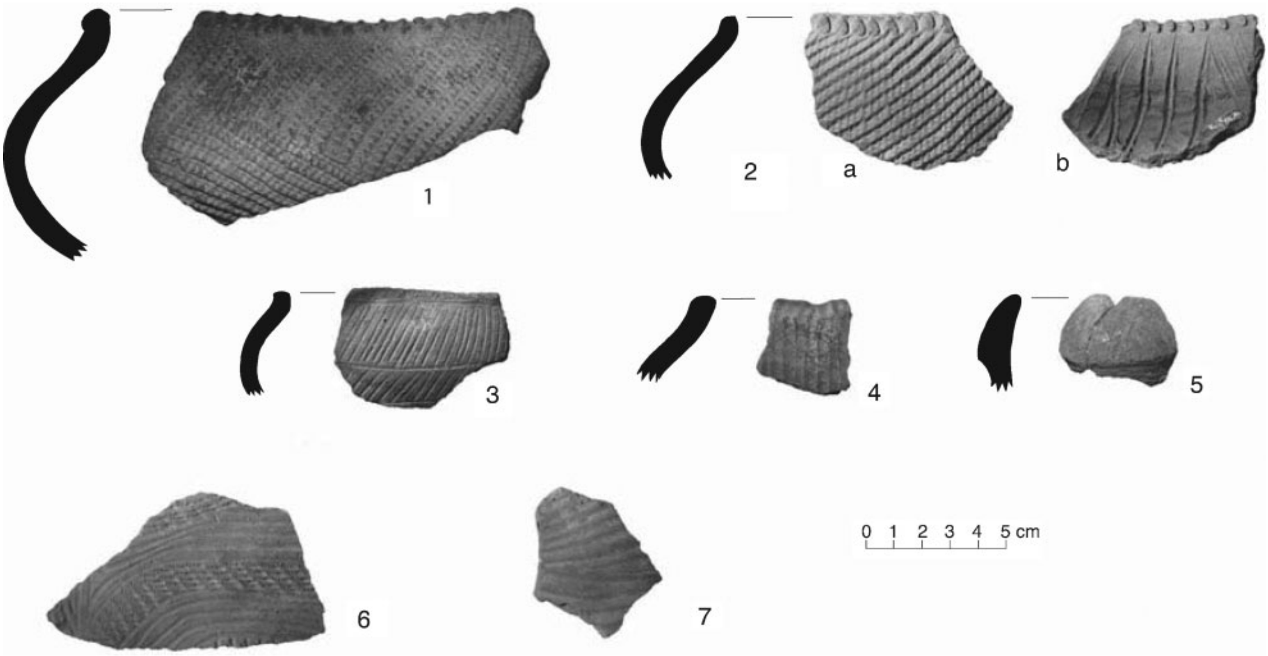

Figure 5 Ceramics from GeJi9. 1–2) Closed-mouthed bowls with Classic Nderit impressions (interior and exterior views of 2 are from the same sherd); 3) Closed-mouthed bowl with miscellaneous incisions; 4) Burnished ripples on sherd from vessel of unidentified shape; 5) Possible gourd-shaped bottle; 6) Channeled ground decoration; 7) Sherd with gray paint and miscellaneous grooved decoration.

larger-scale excavations. At least one renovation of the platform may have taken place, after which GeJi9 was abandoned.

GeJi9 is the largest and most architecturally complex of the four West Turkana pillar sites we have studied. Its surface configuration is highly distinct from that described for Lokori (Soper and Lynch 1977), and its material culture suggests links to East Turkana middle Holocene sites. GeJi9 pottery forms, paste, decoration, and quantity all echo those of Jarigole pottery described by Nelson (1995). The distribution of ceramics, beads, and human remains at GeJi9 could fit with Nelson's (1995) interpretation of Jarigole as a site where primary flexed inhumations and/or secondary bundle burials and associated pottery were scattered by subsequent digging of burial pits.

Lothagam West (GeJi10)

One km west of GeJi9, GeJi10 lies on a 0.2 (east–west) × 3.7 (north–south) km bench outside Lothagam's west volcanic ridge (FIG. 7), above Pliocene deposits studied by Leakey and Harris (2003), and colleagues. Angular and sub-angular basalt fragments eroding from the ridge give continuous colluvial input to lower areas. The bench dips slightly to the west but is fairly level from north to south, except where gullies cut its surface, exposing thin sediments of mixed collovial/aeolian origin above the Pliocene deposits. Cairns (isolated and in clusters) lie <100 m north and south of GeJi10.

The site has two sets of pillars in nearly linear arrangements roughly from north to south, with five pillars between, and six low cairns east and west of the pillar area (FIG. 8). We saw no pottery on the surface of the site, and only small quantities of chipped stone (mainly chert).

GeJi10's position on the slope suggested strong colluvial input on the eastern (uphill) side of the site, and more active erosion on the western (downhill) side. To maximize exploration of intact deposits and probe differences in stratigraphy along the slope, we placed one excavation unit 6 m east (uphill) of the eastern line of pillars (N200E35), and one unit in the central open area (N200E25). The surface of N200E35 is 55 cm higher than that of N200E25.

Excavations at N200E35 went 75 cm before hitting bedrock on its east side (FIG. 9, top). The soft, cracked basalt bedrock stops abruptly in the middle of the square, possibly as a result of faulting. To the west, a compact, poorly sorted sandy silt with pebbles appears stable. Over both lies a layer of silty sand with many small and large pebbles of varying angularity and probable colluvial origin (Layer F). The silty sands above Layer F show diminished (Layer E) and renewed (Layer D) colluvial inputs. Layers C and B have silt/clay matrices with fewer pebbles; smaller particle sizes indicate low-energy aeolian inputs, and cracked rocks suggest regular wet conditions. Layer A is a vesicular A horizon similar to that at GeJi9.

Reaching >80 cm below surface, N200E25 excavations (FIG. 9: bottom) halted in a sterile, slightly greenish set of silts (Layer F), probably reworked Miocene or Pliocene deposits, with slight colluvial input (a few pebbles). Above this, a layer of darker silt (Layer E) with minor sand and clay components

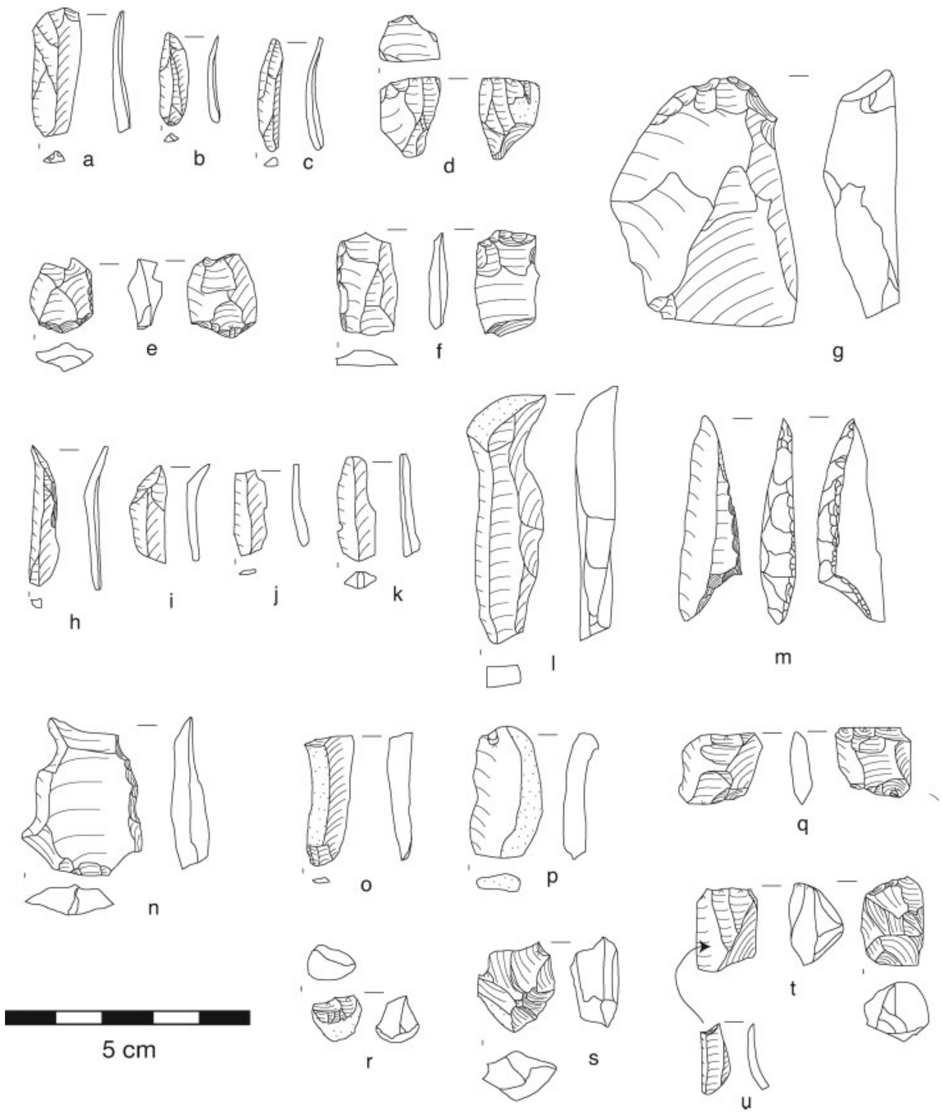

Figure 6 Lithic artifacts from the middle Holocene levels of the pillar sites. GeJi9 (Lothagam North): A–C) Blades; D) Blade core; E) Discoidal core; F) Truncated flake; G) Endscraper. GeJi10 (Lothagam West): H–L) Blades; M) Backed triangle. GcJh3 (Kalokol): N) Noncortical flake. GcJh5 (Manemanya): O–P) Cortical blades; Q) Scaled piece/bipolar core; R) "Micro-chopper" core; S) Discoidal core; T) Blade core; U) Flake fragment (refits to core as illustrated). All are obsidian, except G (basalt), and L–N (chert).

Figure 7 GeJi10: Distant photograph from the top of Lothagam's west basalt ridge, looking west-southwest to the site and the Napadet Hills on the horizon.

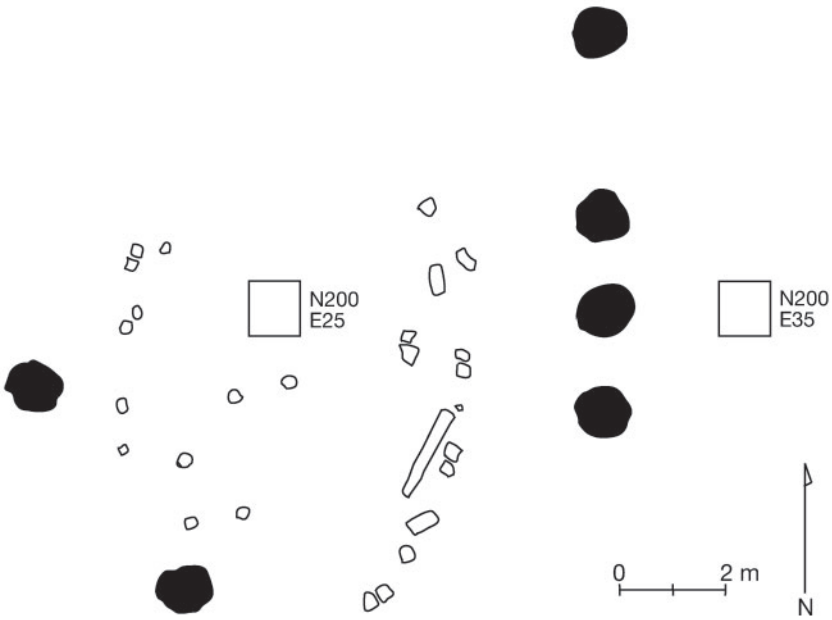

Figure 8 Top: Closer view of GeJi10. Photographer is standing upslope and looking northwest toward pillars. Bottom: Distribution of pillars and cairns, and excavation units N200E35 (upslope from cairns) and N200E25 (center of site).

contained fish scales and many shells. It may be from early Holocene times, when high lake levels would have brought beaches nearby; lithics and bone are present, but no pottery. A pit appears to have been dug through both of these layers, serving as a ramp to angle a nearby pillar into the ground, before straightening it and filling in the ramp. The fill in this pit (Layer D_2), and the layer above it (Layer D_1), consists of a silt-clay mix rich in pebbles and rocks, with lithics, bone, and some shell. Tiny charcoal fragments from these layers date to 4290 ± 20 B.P. (TABLE 2). The two succeeding Layers C and B have silt/clay matrices like the upper layers in N200E35—one rich in rocks, one with few inclusions—before the vesicular A horizon (Layer A).

No pottery was recovered from GeJi10's surface or test units. The 232 excavated lithics (FIG. 6:H–L) are mostly of chert (96%) similar to that found in fissure-fill in extrusive igneous rocks 50 m upslope from the site. Obsidian lithics (<3%) have no known nearby sources; they are mainly debitage and <1–2 cm long microblade cores. Chert artifact shapes vary widely, and retouch is rare; patterns common at sites near raw material sources. The only typologically informative artifact found at GeJi10 is a large chert backed piece (elongated triangle) from N200E35 Level 3 (Layer C or D_1) (FIG. 6:M). Such tools are well-documented components of early to middle Holocene lithic assemblages all over eastern Africa. Non-identifiable mammal and fish bone fragments

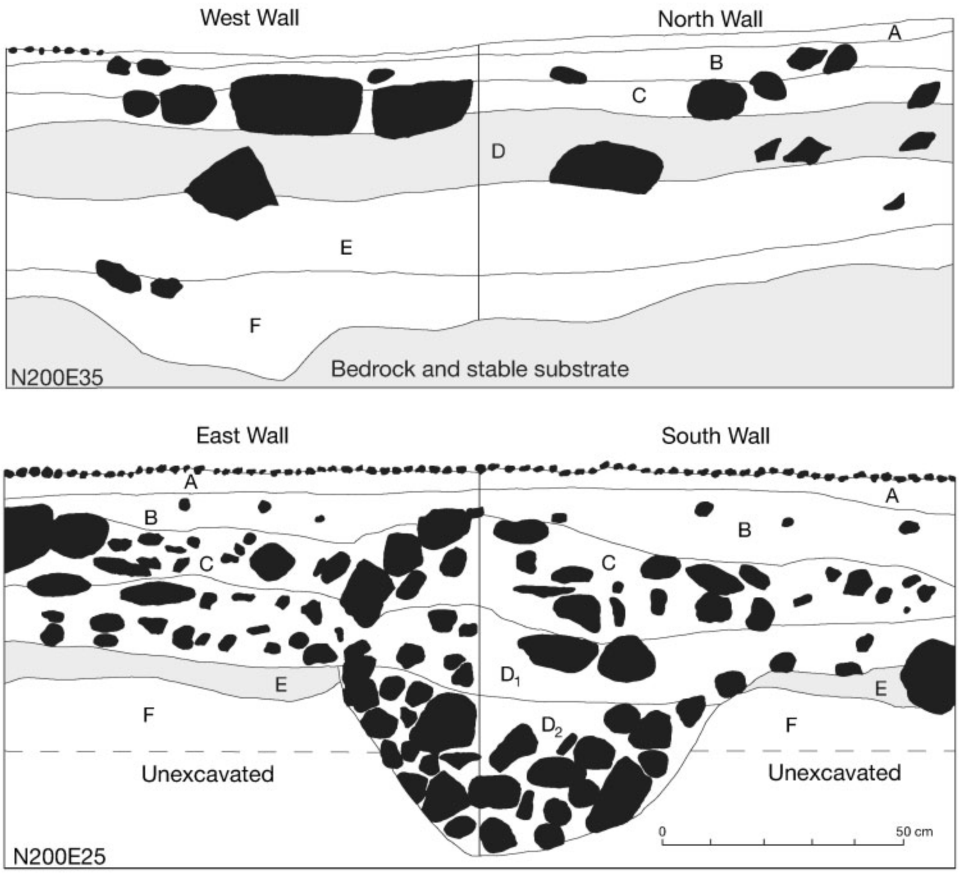

Figure 9 Excavation profiles at GeJi10: N200E35 (top), and N200E25 (bottom).

were found in both units, as well as shell. N200E25 had fragments of tooth enamel (including one Bovidae) in Layer D_1. No ostrich eggshell fragments or beads were found.

GeJi10's depositional sequence begins after Miocene or Pliocene volcanic activity, with the accumulation of silts during the Pliocene (Leakey and Harris 2003). During late Pleistocene or early Holocene Turkana highstands, some of these silts were reworked together with shells from nearby lacustrine settings; a few lithics indicate some human activity but are in no ways distinct from those found in later levels. Around 4300 B.P., middle Holocene people dug pits to help erect pillars, which could have been procured from volcanic rocks <1 km upslope to the east. N200E25's pit fill (Layer D_2) and the overlying Layer D_1 appear to have been deposited deliberately, to support a pillar (D_2) and create a level platform (D_1). Platform building does not appear to have extended into N200E35. Upper layers of both units may be artificial or natural. Unlike GeJi9 and Jarigole, GeJi10 so far has no definitive evidence for burials or ceramics.

Kalokol (GcJh3)

The Losedok Hills divide western hinterlands from plains near Lake Turkana. The Lodwar-Kalokol road follows a gap through these ridges, where passage is easier. At the east end of the gap, GcJh3 lies at the foot of a gentle slope, whose apex 1 km south has natural weathered basalt columns (FIG. 1). On a slightly mounded area, a thin berm of stones encloses at least 19 pillars and two cairns (FIGS. 10, 11). The ground dips steeply north to the road cut, more gradually on its east and west sides, and slightly to the south before the natural hill slope begins to rise. Many pebbles (ca. 5 cm) are piled among the pillars; Turkana from Kalokol say they usually place a stone on the site as they pass by. South and east of the berm, cairns are scattered across the slope. One had been disturbed when we first visited in 2007, but GcJh3 was otherwise intact. Two weeks before our 2009 fieldwork, a local construction company drove across the site and took dozens of rocks ca. 20 cm in diameter off of several cairns, including one inside the berm, for use in a building project. Our team coordinated with Chief John Lolimo of Kalokol to raise awareness of the large size of the site, stop the quarrying, recruit local site stewards, and make a thorn fence to prevent vehicles from driving near the berm.

Excavation unit N100E100 was placed southeast of the southern cairn, inside the berm but away from eroding areas near the road. Unit N105E100, by the southern row of pillars, was excavated to capture stratigraphy related to pillar construction. The surface of N100E100 is ca. 21 cm lower than that of N105E100.

Bedrock, 65–80 cm below the surface of N100E100 (FIG. 12: top), consists of decomposing plates of basalt,

Figure 10 GcJh3. Photographer is standing south–southwest of the site. The Lodwar-Kalokol road is visible behind the site.

like those exposed on the ridge farther south. It exfoliates in layers <1 cm thick, which break into small pieces. Above its irregular surface, rocks (<20 cm) and abundant angular gravels are embedded in a compacted, poorly sorted matrix of sand, silt, and a little clay (Layers F, E). The configuration of some of these rocks initially resembled the top of a cairn, but we later concluded they (and the matrix) are of colluvial origin. Overlying clayey silts (Layers D_2, D_1) have carbonates and pebbles. Three silty clay layers without carbonates follow: Layer C is compacted, with vertical cracks and no pebbles; Layer B is lightly compacted with many pebbles, and Layer A is lightly compacted with few pebbles.

N100E105's 100-cm sequence (FIG. 12: bottom) also begins with bedrock capped by a compacted, poorly sorted colluvial mix (Layer I). Two compacted clay-silt layers (H, G) have no pebbles or rocks. Concretions in G suggest its stratigraphic equivalence to D_1 in N100E100. Three silty clays are above. The first (Layer F) is loose, with many rocks and pebbles. The next (Layer E) is compacted with few inclusions. The third (Layer D) is lightly compacted, with many pebbles. Rocks and pebbles are jumbled and poorly sorted in F, but well sorted and deposited more horizontally in Layer D. Looser, pebble-rich Layers F and D may be a result of platform construction. Unworked ostrich eggshell found via sieve dates to 3890 ± 15 B.P. (TABLE 2); it may be from F, E, or the base of Layer D. Intruding into the top of Layer D, jumbled deposits (Layer C) hint at disturbance and redeposition. Very loose deposits (Layer B) suggest

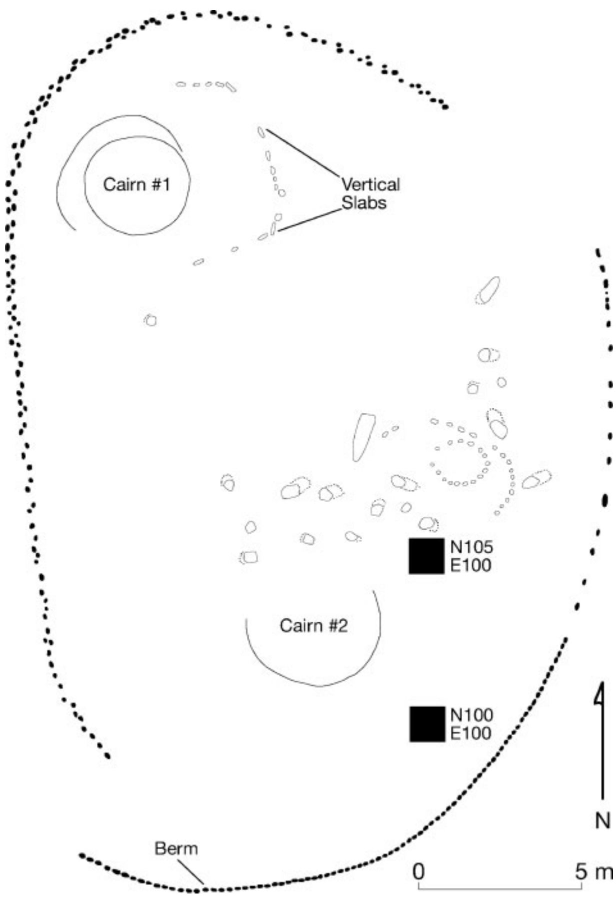

Figure 11 Plan view of GcJh3 (after Soper 1982: 148). Several cairns lie east and south of the depicted area, along the slope below exposed basalt bedrock. Lynch and Robbins (1978: 767) thought slabs near Cairn #1 resembled those at Lokori.

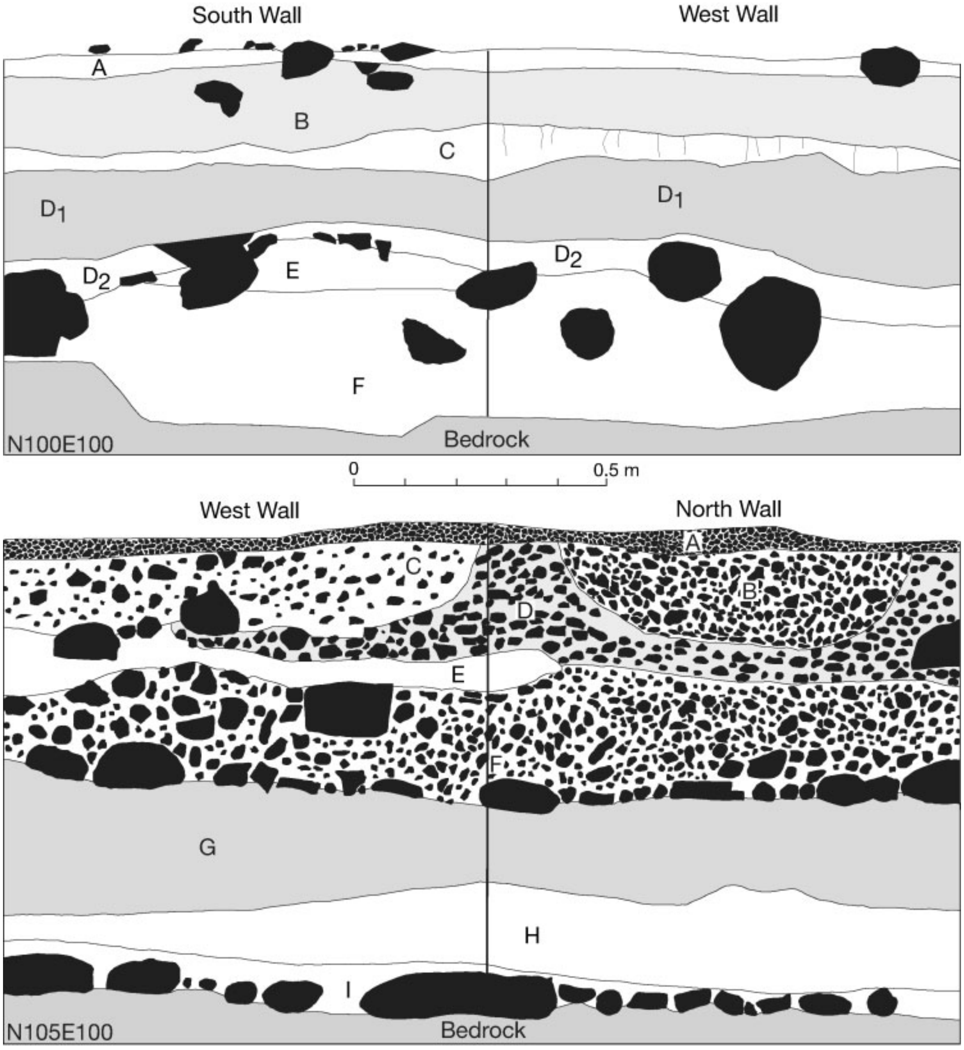

Figure 12 Excavation profiles at GcJh3 N100E100 (top), and N105E100 (bottom). The lower view shows pebbles and cobbles, and depicts their flat deposition in Layer D (possible platform construction) versus the more jumbled orientation in Layers F (possible platform construction), C and B (recent disturbances).

a pit was excavated and filled before the Turkana began their tradition of placing stones amidst the pillars (Layer A).

GcJh3 yielded 13 undecorated body sherds. All are from the top 24 cm in N105E100 (Layers D–A), and come from a single, slightly oxidized vessel of unidentified shape. Unlike typical Nderit, it has a smooth burnished exterior and thin (ca. 4.2 mm) walls. Considering these sherds come from shallow contexts within which two strata (Layers B, C) indicate subsequent disturbance/reworking of Layer D deposits, the vessel is probably of more recent age than deposits associated with pillar construction and platform accumulation (Layers F–D).

Most (n=65 or 68%) of GcJh3's 96 lithics are from the top 10 cm of the excavation units (FIG. 6:N). Raw materials are mostly chalcedony and basalt, but eight obsidian tools (9% of all lithics) occur in the top 10 cm of N100E100 and 39–49 cm below surface in Layer F of N105E100. There are few cores and no unambiguous retouched tools. Flake size varies, but most are 1–2 cm in length. Most larger flakes are of basalt. Smaller flakes include more fine-grained and highly siliceous rocks (quartz, chalcedony, jasper). No typologically diagnostic lithic artifacts were recovered.

Each excavation unit yielded a sole mammal bone fragment that could not be more precisely identified. Both units have shells—especially oysters and small bivalves—in all strata except for the basal colluvial mix. Large quantities of shell in the upper layers of N105E100 suggest that people were using lake resources during the main period of site use. No beads were found.

GcJh3's sequence begins with colluvial deposition and minor aeolian inputs. Overlying clayey silts with carbonates indicate fast aeolian deposition and soil formation. The lack of both leaching indicators and varves suggest these silts accrued under moderate rainfall that was not strongly seasonal. Loose pebbles in N105E100 Layer F give the first sign of human construction activities near the pillars, around or before 3890 B.P. Pebble-free silty clays (probably natural) then accumulated across

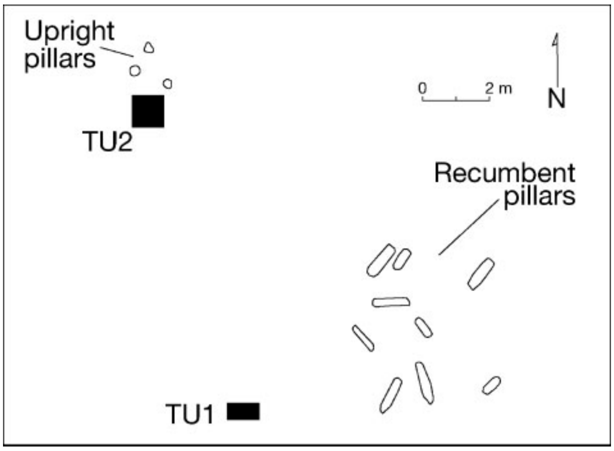

Figure 13 Plan view of GcJh5. Exact boundaries of the site are not well defined.

the site (N100E100-C, N105E100-E). Later, loose pebble-rich sediments (N100E100-B, N105E100-D) were deposited naturally or by humans. Near the pillars, these are reworked in two separate episodes (N105E100-C,B). The final pebble layer (N105E100-A) was deposited recently, by the Turkana.

GcJh3 has few artifacts and, so far, neither beads, nor Nderit pottery, nor human remains. The strongest indication of platform construction (N105E100-F) is right next to the main pillar cluster, and has no stratigraphic parallel in excavations just outside the south cairn. These findings echo those at GeJi10.

Manemanya (GcJh5)

GcJh5 is on a plain 1 km north of GcJh3 and 1 km east of Losedok Ridge. Sloping down to the northeast, the plain is cut by gullies, typically <1 m deep, which expose underlying beach deposits from early Holocene times. GcJh5 is lower than GcJh3 and offers a less commanding view, but both sites share access to the gap through the Losedok ridge system that separates Lake Turkana from the hinterlands.

Manemanya has a cluster of nine pillars ca. 20 m west of a shallow gully running north–northeast (FIG. 13). All are recumbent, or stand at angles <45° from the ground surface. Four other pillars are visible: one lies flat, perpendicular to the slope, 32 m north–northeast from the main cluster, and three stand upright 15 m north–northwest of the main cluster. The site surface is fairly flat, and only the pillars distinguish it from neighboring sections of the plain to the north and south. Numerous revisions of our views on the extent of the site, and whether its surface is natural or artificial, held us back from setting a northing/easting grid. Test Unit 1 (TU1, 0.5 × 1 m) is 5 m west of the nine-pillar cluster. Test Unit 2 (TU2, 1 × 1 m) is just south of the three upright pillars.

Forty cm of excavations in TU1 yielded three stratigraphic layers (FIG. 14: left). The lowest (Layer C) had silty clay, sub-angular pebbles in complex beds, and abundant bivalves. It may be interpreted as a beach deposit of probable early Holocene age. Layer B was a loose mix of clay and fine-medium sand, with gastropod shells. Layer A was more compacted, with no lithics, a few shell pieces, and the unit's only pottery, a single Nderit sherd.

TU2 excavations halted ca. 90 cm below the surface on finding human bone (FIG. 14: right). The lowest excavated stratum (Layer E) had compacted clayey silt with scant basalt pebbles, capped on the southwest with a lens (1 cm thick) of bivalves and gastropods (Layer D). Human remains appear to have been laid in a pit that intruded into Layers D and E. An ostrich eggshell bead 1 cm above them dates to 3805 ± 15 B.P. (TABLE 2). Pit fill is similar to the 40 cm of subsequent loose clay-silt deposits (Layers C, B). Sub-angular/sub-rounded basalt pebbles become more abundant toward the surface; larger cobbles hold fairly constant. Sub-angular to sub-rounded pebbles dominate the top silty clay (Layer A).

Ceramics include 11 body sherds, all from the top 64 cm of deposits. No rims were found, so we could not identify individual vessels. Six sherds are undecorated with brown to reddish-orange exterior surface colors; two of these have blackened interior surfaces. The remaining five sherds have the burnished ripple design. They are similar in form and decoration to those found at GeJi9 and Jarigole, but have more abundant white mineral inclusions.

The lithic assemblage is small (n=68, all from TU2), but diverse (FIG. 6:O–U). Raw materials include basalt, chalcedony, red jasper, quartz, obsidian, chert, and an as yet unidentified rock (possibly indurated sandstone or quartzite). The surface of GcJh5 has raw nodules (pebble–cobble size) of all these materials except obsidian, which our Turkana guides report to be available from sources within 10–20 km. Finer-grained siliceous rocks (quartz, chert, chalcedony, jasper, and obsidian) are mainly micro-debitage (<1 cm) or small flakes (1–2 cm long). Larger flakes of all materials and all cores retain significant amounts of cortex (e.g. FIG. 6:O,P), suggesting local raw material sources. In TU2, lithics are more abundant in lower deposits, and obsidian is present in all excavation levels. No typologically distinctive artifacts were found.

No bone was found in TU1, but TU2 held a few, highly fragmented mammal bones, including one rodent phalanx. We observed better preserved mammal bone at the base of TU2 (ca. 86 cm below surface), but left it in place for future excavation and analysis. Shells included small bivalves and gastropods and a few oyster shell fragments. All beads recovered were ostrich eggshell.

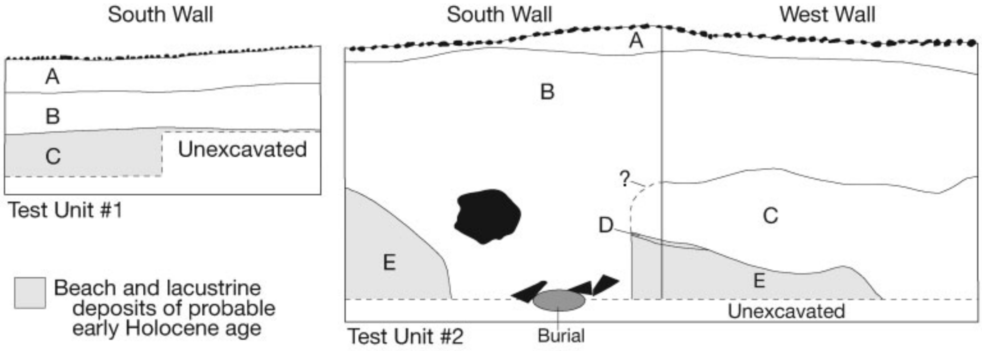

Figure 14 GcJh5 profiles. Left: south profile of Test Unit 1 (0.5 × 1 m). Right: south and west profiles of Test Unit 2 (1 × 1 m).

Shells in basal deposits in both excavation units suggest GcJh5 was near the shore or even submerged during early Holocene highstands. Human remains at the base of TU2 appear to have been placed in a small pit that was dug into beach deposits after the lake receded. An ostrich eggshell bead just above gives a *terminus ante quem* of 3805 ± 15 B.P. for the burial. Loose, pebble-rich deposits from middle and upper portions of the sequence contain many ostrich eggshell beads, and appear to be of anthropogenic origin.

Discussion

Our research near Kalokol and Lothagam demonstrates several important points regarding the distribution and chronology of pillar sites in West Turkana. Comparing material culture from similarly placed excavation units (TABLE 1) suggests that each locality had two spatially proximate, contemporaneous pillar sites that served distinct social functions at the same time. Prehistoric people appear to have placed human remains, beads, and Nderit pottery in platforms at GeJi9 and GcJh5, but there is no evidence for these materials at GeJi10 or GcJh3. One might reasonably propose that GeJi9 and GcJh5 were foci for mortuary activities, while GeJi10 and GcJh3 accommodated gatherings for other purposes. The latter's use by a completely different social group must also be considered.

The recent discovery of GcJh5 suggests that while several pillar sites have long been known around the basin, others await detection. Joseph Etabu and Chief Lolimo, longstanding residents with deep knowledge of the landscape, were previously unaware of Manemanya's existence. This leads us to think more pillar sites may be found by survey of areas <2 km from major basalt outcrops. The appearance of pillar sites in pairs in four different places around the lake (GbJj1/4, GcJh3/5, Geji9/10, and at Lokori) seems to indicate a general pattern, which may relate to distinct site functions or meanings.

Setting and architecture

While all sites lie on elevated sedimentary benches below major basalt ridges, they have different potential areas of celestial observation (TABLE 1). Lothagam's ridges block eastern horizons at GeJi9 and GeJi10, and the Losedok Hills obscure western and southern views at GcJh3 and GcJh5. The only common point of potential horizon observation from all four sites is straight north. If these sites were used for astronomical observation, as suggested by Lynch and Robbins (1978), either different sites were used to observe phenomena in different parts of the sky, or celestial observations targeted the meridian or the northern horizon.

All four sites have evidence for at least one episode of platform building via placement of loose, pebble-rich sediments. GeJi9, GeJi10, and GcJh3 have linear arrangements of pillars. Many pillars at GcJh5 appear to have undergone displacement that makes it difficult to assess their original configuration. Other aspects of architecture vary (TABLE 1). GeJi9 has more pillars, a larger platform, and the only small stone circles, while GcJh3 has the only visible large enclosure ring. Cairns, which may postdate other architectural elements, are on GeJi9's eastern margin and scattered near GeJi10 and GcJh3, but are not found near GcJh5. Further exploration may show the purposes of each architectural element and the implications of their presence/absence at different sites.

Labor

Construction of pillar sites requires cooperation far beyond that of a few extended families. Toppled pillars found on the surface are usually 2–2.5 m long. A typical pillar of ca. 0.26 cu m in volume would weigh 790 kg (CSG Network n.d.). Assuming an adult could safely carry 25 kg over rough ground for 100 m at a time, transport of one pillar might require two alternating teams of 32 carriers, or 64 strong adults. Because only one or two pillars might be transported thus during a single day, sites with many pillars would have required weeks of work (possibly spread from year to year). Preparing a strong, stable web of ropes for transport, maneuvering the pillars onto it, and emplacing the pillars after arrival would have been delicate, time-consuming tasks.

Platform building also would have been labor intensive, requiring shorter-distance transport of sediment, pebbles, or cobbles in baskets or skin bags. Assuming (conservatively) that Jarigole's 1000 sq m platform (Nelson 1995) is only 0.5 m high on average, it would have required transport of 500 cu m of earth and cobbles, plus 120 more for the circular mound. GeJi9's platform has a smaller area (750 sq m) but its deposits may well be deeper, so that 500 cu m is a fair volume estimate. EH's experience handling soil samples suggests that 10 liters of sediment can be carried safely by one person for short distances without breaking the basket, skin bag, or back of the carrier. Construction might easily have entailed 50,000 short back-and-forth trips from sediment source to platform. Adjacent cairns and stone circles would have required additional effort.

Chronology

Our fieldwork has provided the first absolute dates for West Turkana pillar sites (TABLE 2). Dating material was scant at GeJi10 and GcJh3, but abundant at GeJi9 and GcJh5. Dates are nearly contemporaneous within each pair of nearby pillar sites. Calibrated dates for GeJi9/10 overlap, while those for GcJh3/5 may be as little as 76 years (2–3 generations) apart. Average calibrated ages for the two site pairs have a difference of ca. 600 calendar years, suggesting that the Lothagam sites may have been used before the Kalokol/Manemanya sites. Of course, dating more samples may diminish this chronological gap between the two site pairs.

Dates for West Turkana pillar sites have an uncalibrated range of 4900–3790 B.P., which overlaps fully with the date for Il Lokeridede (4180 $\pm$ 60 B.P.). Dating Jarigole remains an urgent priority. West Turkana pillar site dates precede the earliest date for Lokori (2285 $\pm$ 165 B.P.) by 1300 years. Archaeoastronomical alignments previously proposed for GcJh3, based on presumption of its contemporaneity to Lokori (Lynch and Robbins 1978), merit reexamination in light of its 3890 $\pm$ B.P. date.

West Turkana pillar sites' date ranges bracket those for East Turkana habitation sites GaJi2 (4270–3910 B.P.) and Dongodien (4080–3830 B.P.), which hold the region's earliest evidence for domestic stock. The West Turkana pillar sites were built around the time that herding was first practiced around the lake.

Material culture

Ceramics from GeJi9 and GcJh5 are comparable in forms, paste types, and decoration to Nderit pottery from Jarigole, Dongodien, and other East Turkana sites. The functions of Nderit pots at mortuary sites such as GeJi9 and GcJh5 are still unknown, but future research may show whether pots were intentionally broken on site, and assess other potential uses. So far, Nderit sherds are absent at GeJi10 and GcJh3; pottery from the top of GcJh3 excavations is unlike Nderit ceramics, and probably dates to a later period. Unlike at Jarigole, no ceramic figurines have been found at the West Turkana pillar sites.

Lithic assemblages from the pillar sites seem to reflect two different technological strategies. The first, executed mainly with local volcanics, cherts and chalcedony, is expedient and opportunistic. Flakes are short and thick with little retouch or other modification. The second, applied mainly to obsidian, involves more curation and specialization. Obsidian artifacts are mostly bladelets, debris, and prismatic cores. The former are presumably hafted components of mobile toolkits. Future research on these obsidian artifacts will try to identify their sources in order to test hypotheses about the pillar sites' links to regional exchange networks (Ndiema *et al.* 2010).

Like at Jarigole (Christopher Koch personal communication, 1994; Nelson 1995), faunal assemblages from West Turkana pillar sites are fragmented and have few identifiable elements. The presence of only one microfaunal element suggests that the sites were not used enough to attract significant rodent populations. The ubiquity of shells (all units at all sites) indicates people brought material from the nearby lakeshore to the sites.

Conclusions

It has long been thought that middle Holocene herders in Turkana erected megaliths as focal points for periodic gatherings and/or interments (Lynch and Robbins 1978; Nelson 1995). Our dates place all four West Turkana pillar sites (4385–3805 B.P., or 4934–4198 CAL B.P.) firmly in this period. Finds of Nderit pottery at two pillar sites (GcJh5, GeJi9) solidify the case for a common tradition of material culture and monumental architecture, operating on both sides of Lake Turkana at the same time. The wide distribution of these monumental sites, and the distinctive Nderit pottery which is thought to have been so time-consuming to decorate, argue for a high degree of social integration across a large area at the time herding was first practiced. We cannot be sure whether pillar sites were built by herders, hunter-gatherers, or people mixing the two subsistence strategies, but it is clear that they were built in a time of economic change, and by people who did not have an agrarian subsistence base. To begin probing possible similarities and contrasts in the social significance of megalithic sites in distinct economic contexts, we compare aspects of the Turkana pillar sites to those in other contexts of early food production around the world, but especially in Atlantic Europe.

Do pillar sites hold any evidence for emerging hierarchies, as were attributed to European megalithic sites? Finds of marine shell at Jarigole (Nelson 1995) raise the possibility that certain segments of the society had differential access to products obtained through exchange, but do not demonstrate inequality. Scattered human remains in platform deposits at Jarigole (Nelson 1995), GeJi9, and GcJh5 neither support nor contradict notions of hierarchy. West Turkana excavations were limited to test units that deliberately avoided the contexts (cairns) most likely to contain individual burials that might show status differentiation. Future excavations by our team will target cairns and expose larger areas of pillar site platforms, to explicitly evaluate differences in burials that might indicate achieved or ascribed social differences.

While territorial expression is an oft-cited *raison d'etre* for megalithic sites among farming settlements in Atlantic Europe, mobile herders and hunter-gatherers might have conceived of territory in different ways. The distribution of pillar sites around Lake Turkana is distinctive. Appearance of pillar sites in pairs suggests that the population that created them was not concerned just with erecting a central monument but had multiple purposes in mind. Also, spacing between the pairs of pillar sites is more distant than between megalithic sites in many parts of Europe, such that any territorial expression bound up in their creation would cover a vast area (FIG. 1). Rather than defining territorial limits, we think it more likely that pillar sites served as loci for periodic assembly of otherwise dispersed populations.

Attempts at understanding the social significance of the Turkana Basin pillar sites are just beginning. Our results do not support a unified archaeoastronomical purpose for all pillar sites, because their celestial exposures and layouts vary markedly. Rather, our data suggest different pillar sites had distinct social meanings to people living in Turkana: some appear to have strong mortuary significance, while others were used for social activities that (so far) seem to have left few artifacts. Future excavations will examine these different purposes more closely, but for the moment it is clear that the makers of the sites made a distinction not only between private and monumental architecture, but also between different *kinds* of monumental architecture.

Differences between pillar sites may be interpreted in a number of ways. They might have reflected social divisions within groups (e.g. men vs. women, or elders, lineage heads or initiates vs. others) or between groups (newcomers vs. longstanding residents). Alternatively, the two sites in each pair could have represented opposite endpoints on a spiritual or symbolic journey, or been the settings for different social events (e.g. mortuary activities vs. initiations or feasts), perhaps signaled by specific astronomical occurrences.

The well-organized labor necessary to transport and erect basalt pillars and construct large platforms, would have required the integration of many small social units into a cohesive whole. Pillar sites offer a compelling case for large-scale social events by mobile herders and/or hunter-gatherers in middle Holocene Turkana. They demonstrate a complex form of social organization among people who were not sedentary, had no access to domestic plants, and whose only storable surpluses (livestock) would have been vulnerable to drought and disease.

Our results from eastern Africa join a rapidly growing global literature (Wendorf 1998; Wright 2007) documenting large-scale social integration and monumental construction by mobile people whose lives did not center on agrarian food production. Future research in the Turkana Basin, and in other parts of the world, must examine more deeply the different ways in which these various non-agrarian societies were organized, whether social differentiation was hierarchical or heterarchical, and how their diverse social structures evolved as food production intensified and exchange systems expanded.

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