increased sophistication through time, as proportionately less construction defends and controls ever larger territories and populations.

This highland sequence can be compared with that from the narrow coastal strip, where habitation concentrates in the irrigable floodplains of rivers descending rapidly from the Andes. Willey's (1953) settlement-pattern survey of the Virú Valley showed a similar increase in the sophistication of fortifications. Early defenses of the Early Intermediate Period consisted of places of refuge in which the residents of small agglutinated villages sought protection. Later in that period, the Gallinazo people evidently unified the valley politically, and fortifications were constructed which defended the valley as a whole. Defensive constructions were subsequently deemphasized as the small valley was incorporated into a series of political units whose boundaries lay far to the north and south; the narrow valley neck leading into the highlands continued to be intermittently fortified, however. In contrast to the highland sequence, the Virú Valley sequence has "great" walls appearing only during the Middle Horizon and early part of the Late Intermediate Period.

The most interesting results of our survey of coastal defenses pertain to an early phase of the Late Intermediate Period, when the Chimu were beginning their political expansion out of the Moche Valley. Two fortresses were built in the Moche Valley and a third in the Chao Valley. All of these are impressive, well-designed structures, and ceramic evidence indicates rapid construction; curiously, the lack of refuse indicates that none was occupied for any length of time, and a habitation area adjacent to the Chao fortress was never completed.

The two Moche Valley fortresses ocntrolled access up and down the valley at a point 15 km inland where flanking chains of hills form a neck only 1 km wide. The two forts, one on each side of the valley, stand at the apex of the wide alluvial plain which fans out toward the ocean. Paralleling the sides of the alluvial fan are two "great" walls. These walls cannot be associated directly with the fortresses, but together they all serve to isolate the rich, irrigated lower valley from the middle valley at the apex and the stretches of desert between the Moche Valley and the Chicama and Virú Valleys to the north and south. Independent dating of the northern "great" wall (C. Beck, personal communication) indicates a very rough contemporaneity with the fortresses, as well as with the other "great" walls in the Virú Valley.

The reasons for the occurrence of "great" walls in the highlands and on the coast during quite different temporal and developmental stages is not yet understood and forms one of a number of problems that the project will investigate in future seasons.

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New Evidence on the Use of Microliths from the Lake Turkana Basin, East Africa[1]

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Microlithic technologies, which emphasize small geometrically shaped tools, are characteristic of early Holocene cultures in Africa, but there is now a growing body of data demonstrating that they are considerably older than was previously believed. For example, Matupi Cave in Zaïre (Van Noten 1977) has yielded evidence of microlithic technology dated to about 40,000 years ago. Other sites containing microliths have been dated to about 18,000 years ago in Zambia (Miller 1971) and approximately 15,000 years ago in the Lake Victoria region (Van Noten 1971). This new evidence indicates that microliths are at least as old in sub-Saharan Africa as in any other part of the world.

Microliths are generally thought to demonstrate increased reliance on composite tools in which bladelets and various geometrically shaped stone implements were hafted in series along the edge of a bone or wooden shaft. The bow and arrow may have been one of the most significant inventions reflecting microlithic technology. Escaping prey could not easily dislodge the barbed arrow tips, and the resulting blood spoor could be followed by hunters.

While there is direct evidence that microliths were used to tip arrows in ancient Egypt (Clark, Phillips, and Staley 1976), the situation concerning the function of microliths is less clear in Africa south of the Sahara. In East Africa, Leakey (1931) found a series of microliths lying in a position suggestive of hafting into a wooden or bone shaft that had since disintegrated. Because data confirming that some microliths were used as composite arrow or spear points are rare, the following information is of interest.

The site of Lopoy, situated near the Turkwel River delta west of Lake Turkana (Robbins 1976), has as one of its major components a hunting and butchering camp radiocarbon-dated to about A.D. 850 (1,100 ± 80 B.P. [UCLA 2124H]). This component was unusually rich in well-made microliths, which were being eroded out of the deposits and lay scattered among the fragmentary remains of zebra, bovids, and other animals no longer found in the immediate area. Because of the large number of microliths (up to 15 per square meter of surface area), the site was ideal for following up on Leakey's suggestion. A 2 × 4-meter area was chosen at random to examine the question of whether the microliths occurred in significant clusters. The area contained 76 microliths, most classified as crescents or lunates. It was divided into 50-cm-square cells, allowing for at least 1 microlith to occur in each cell. The implements were then recorded with reference to x and y coordinates, and chi-square analysis, employing the computer program CROSSTABS, was used to determine if the distribution was random (Nie et al. 1975). The results demonstrated that the distribution was not random with a level of significance of .0389. This evidence lends support to Leakey's early conclusions. Despite the nonrandom distribution of these microliths, however, the data from Lopoy do not prove that the implements served as projectile heads.

More direct evidence concerning the use of microliths was obtained from the Lothagam Late Stone Age fishing settlement, located near the Kerio River delta west of Lake Turkana (Robbins 1974, Lynch and Robbins 1977). Two recently obtained radiocarbon dates indicate that Lothagam dates to between 6,000 and 7,000 years ago (charcoal sample from upper excavation, 6,300 ± 800 B.P. [UCLA 2124A], and shell sample

[1] This research was funded by the National Science Foundation. We thank the Government of Kenya for permission to do the research. In addition, we are grateful to S. E. Telengoi, J. Salenyi, S. Tekal, and others who helped with the fieldwork.

from lake beds abutting Lothagam Hill, 7,000 ± 80 B.P. [UCLA 2124F]). Burials were excavated at this site in 1965–66 and in 1975 (Angel et al. n.d.). While uncovering the foot of Lothagam Burial 18, we recovered two small lava backed bladelets with slightly convex-backed edges and sharp points (see fig. 1). The first was stuck vertically between the second and the third cuneiform of the left foot. Adjacent to this, less than 2 cm away, the second was found resting horizontally on the navicular of the same foot. Since only the two tightly flexed legs of this burial remained in situ because of erosion, it was impossible to determine the age or sex of the individual or observe further signs of violence. However, the position of the artifacts implies that they were used as projectile points.

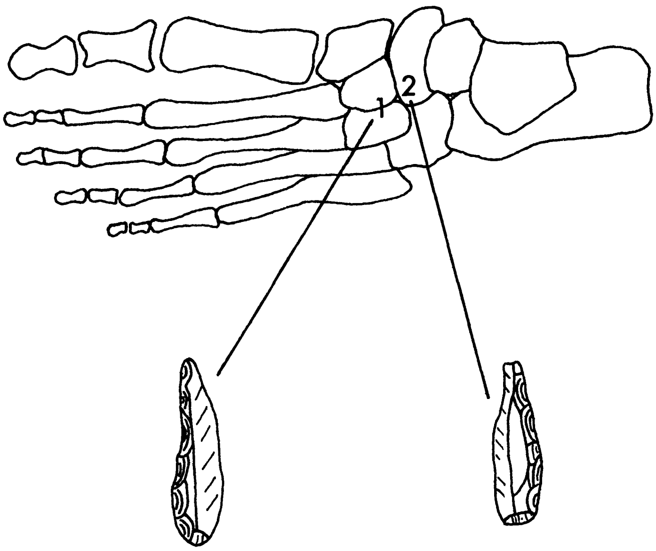

FIG. 1. Two small lava backed bladelets found in association with the foot of Lothagam Burial 18. *1,* location of the first bladelet, found stuck vertically between the second and the third cuneiform; *2,* location of the second, found resting horizontally on the navicular.

This new information from East Africa clearly supports evidence obtained from other areas which suggests that some kinds of microliths were used as either arrow or spear points.

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Erratum

■ On p. 331 of the June issue, in Read and LeBlanc's reply to comments on their paper, an error introduced in the copy-editing was overlooked: in line 4, instead of "fact," read "claim."