Reports

Early Human Cultural and Skeletal Remains from Guitarrero Cave, Northern Peru

Abstract. *An early man site in highland Peru yielded a rich cultural assemblage in stratigraphic association with faunal remains, botanical remains, and campfire remnants that furnished secure radiocarbon dates. A human mandible and teeth, showing interesting patterns of occlusal wear, were found in a stratum dated by a charcoal sample to 10,610 B.C., the oldest such date in South America.*

Guitarrero Cave (site PAn 14-102) is one of a series of preceramic sites identified in the Callejón de Huaylas during the summer of 1968. Excavations undertaken in 1969 are part of an archeological investigation of the early use of the diverse environmental zones in this Peruvian intermontane valley. Seasonal occupation of such sites, by transhumant hunters and gatherers, preceded the appearance of villages and temple centers supported by intensive sedentary agriculture (*1*).

Guitarrero Cave is located at the base of the Cordillera Negra in the Comunidad de Shupluy, about 6 km south of the former town of Yungay. The cave roof shelters a floor area of approximately 100 m^2, resulting in nearly perfect desiccation, except at the rear and in the lowest levels, where seeps have dampened the deposits. A wide variety of organic materials, including artifacts and plant remains, have been preserved for up to 10,000 years and will broaden our understanding of early Andean cultures. Guitarrero Cave is also remarkable for the length of its human occupation, throughout most of the preceramic sequence known in the Americas, and sporadically through later times up till the present.

The preceramic deposits can be divided into two major components on the basis of stratigraphic position, gross differences in the sediments, radiocarbon dating, and artifact typology. The upper preceramic levels (Guitarrero II) are overlain by mixed deposits of later date, which nearly always include derived preceramic artifacts. As tombs were constructed in later times, parts of the preceramic layers were excavated and redeposited. Finally, tomb robbers have further mixed parts of the cave fill and contributed their own modern artifacts, such as cigarette butts, to the restratified upper layers.

Archeological excavations in the undisturbed prehistoric deposits yielded an abundant industry and a series of highly consistent radiocarbon dates for the upper, Guitarrero II, preceramic component. In two separated excavation areas the beginning of this stratigraphic unit dates to 8,585 and 8,525 B.C. (10,535 ± 290 years ago, sample GX 1778; 10,475 ± 300 years ago, sample GX 1780). In the same stratigraphic columns the uppermost levels of the unit date 5,625 and 5,730 B.C. (7,575 ± 220 years ago, sample GX 1860; 7,680 ± 280 years ago, sample GX 1861). These age determinations were made on samples of wood charcoal, using the Libby half-life of 5,570 years. The samples represent the scattered remains of campfires, and their dates would seem to be secure in terms of the material analyzed, stratigraphic association, and cultural association. This favorable situation is very rare in South American early sites.

The dated Guitarrero II levels include artifacts of wood, bone, antler, and fiber cordage, in addition to the stone industry. There are lanceolate points of the general Ayampitín/willow leaf class, including some with tangs or at least shoulders, but also, less expectably, smaller lanceolate or leaf-shaped points and even concave-base Ichuña/Arcata points (Fig. 1). Representatives of these two latter types were found in the lower part of the Guitarrero II occupation. A single grinding slab was also identified near the bottom of the stratum, although numerous scrapers dominate all other classes of tools in the industry.

The oldest cultural component at Guitarrero Cave can be positively identified only at the rear of the deposits

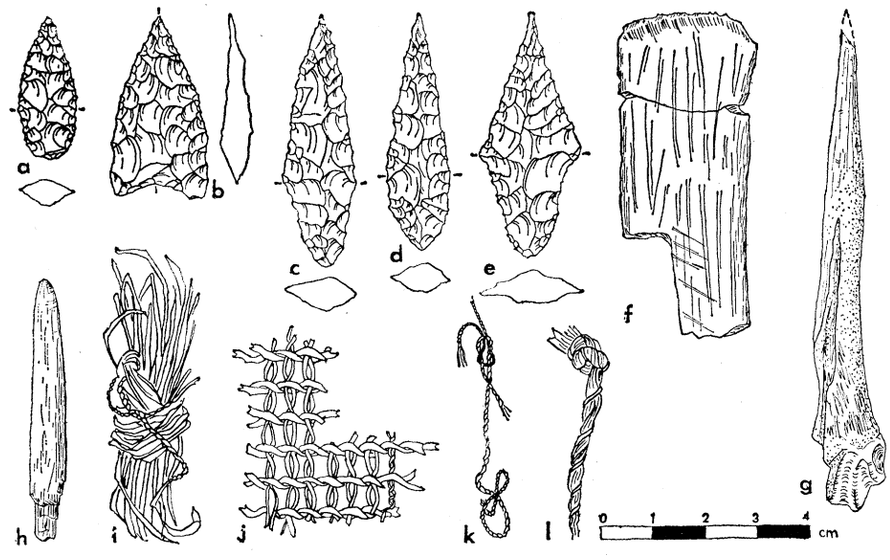

Fig. 1. Representative projectile points, bone, wood, and fiber artifacts. All but (e) are from the Guitarrero II complex. (a) Small lanceolate or leaf-shaped point; (b) concave-base Ichuña/Arcata point; (c) shouldered lanceolate point; (d) Ayampitín/willow leaf point; (e) stemmed point with projecting shoulders and triangular blade from lowest stratum; (f) bone flesher or scraping tool; (g) cannon bone awl; (h) wooden peg; (i) bundle of plant fiber tied with cord; (j) textile fragment showing loose, single-warp twining; (k and l) knotted, Z-twist cordage. All artifacts drawn to same scale, as shown at lower right. Dashes at edges of drawings indicate orientations of cross sections.

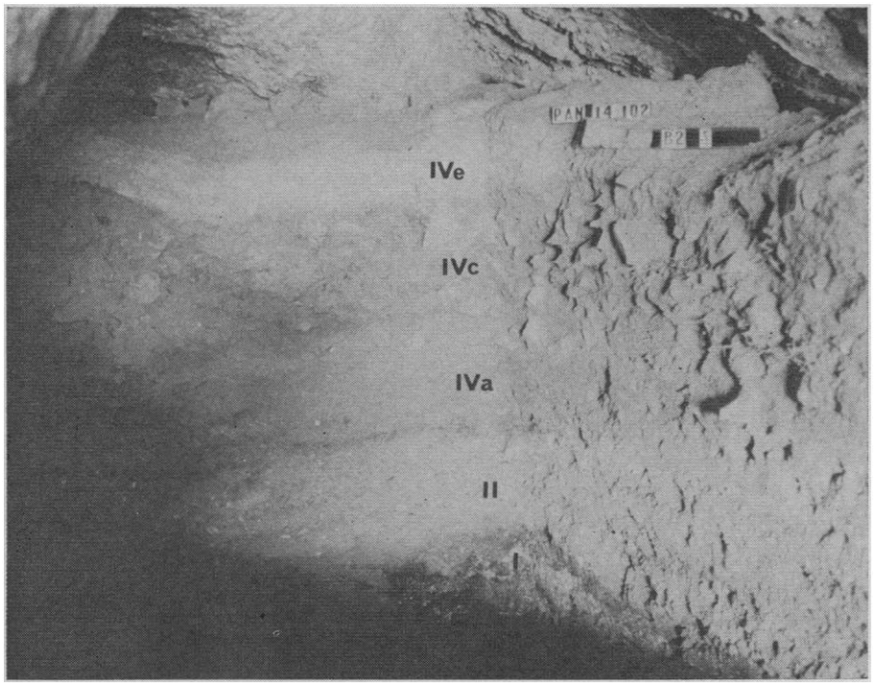

Fig. 2. View of trench walls 1 m south and 1 m west of mandible found in stratum I. Note unbroken layers of stratum II covering the darker, bottommost unit, which is mostly in shadow. In the center of the photograph at the trench corner, the distance from the top of stratum IVc to the bottom of stratum IVa is 40 cm.

where conditions are less favorable for the preservation of organic matter. However, wherever found, Guitarrero I lies under the undisturbed layers of the Guitarrero II stratigraphic unit, and thus it should be more than 10,500 years old. In confirmation of the great age of this lowest stratum, which is discrete in terms of both color and texture, one charcoal sample tested at 12,560 ± 360 years ago (10,610 B.C., sample GX 1859). Another much smaller sample yielded the anomalous result of 9,790 ± 240 years ago (7,840 B.C., sample GX 1779), or 745 years *later* than sample GX 1778 which lay 15 cm *above* it in the same stratigraphic column. Nevertheless, with the possible exception of two microblades and a single projectile point, out of character in the rest of the Guitarrero I collection, there were no indications of disturbance or contamination in these carefully dug levels. The point (Fig. 1e) came from just below sample GX 1779, which provided the anomalous date. The microblades came from near the surface of the Guitarrero I stratum, and they might easily have worked their way down during the succeeding occupation, but it is very difficult to explain away the presence of the projectile point. It is stained with the orange color of the lower sediments and thus must have lain there a considerable time, rather than having fallen in from above during excavation (Fig. 2).

In 1962 Cardich recovered two remarkably similar stemmed points from the lowest cultural deposit (R) of the Lauricocha-2 Cave, about 170 km to the southeast. A date of 7,575 B.C., from a bone and charcoal sample, has been reported for the first occupation of this site. Known by various type names, other stemmed and shouldered points have been associated with the earliest foliate point complexes of coastal Peru, highland Bolivia, northwest Argentina, and northern Chile (*2*). Since most of these materials are not well fixed in time, the date of 10,610 B.C. at Guitarrero Cave may not be so far out of line as it at first appears.

The rest of the Guitarrero I industry, which can only be described summarily in this report, consists almost entirely of simple flake tools and unretouched flakes—over 500 pieces in all. There are no tools that might be described as "bifaces" or burins, such as have been identified in other early and putatively early collections from the central Andes (*3*). Scrapers, many with steep edges, on large and small flakes predominate (Fig. 3). There are also a few choppers, hammerstones, crude cores and lamellar flakes, graver-scrapers, a small bifacial knife, a piece of red ocher, and some stream-rounded pebbles (bolas?) which were brought into the cave. The Guitarrero I industry shares general characteristics with MacNeish's Ayacucho complex and the early flake industry at Laguna de Tagua-Tagua in central Chile, which has a date of 9,430 B.C. on carbon flecks. The flake scrapers illustrated by Montané correspond strikingly with some nicely worked

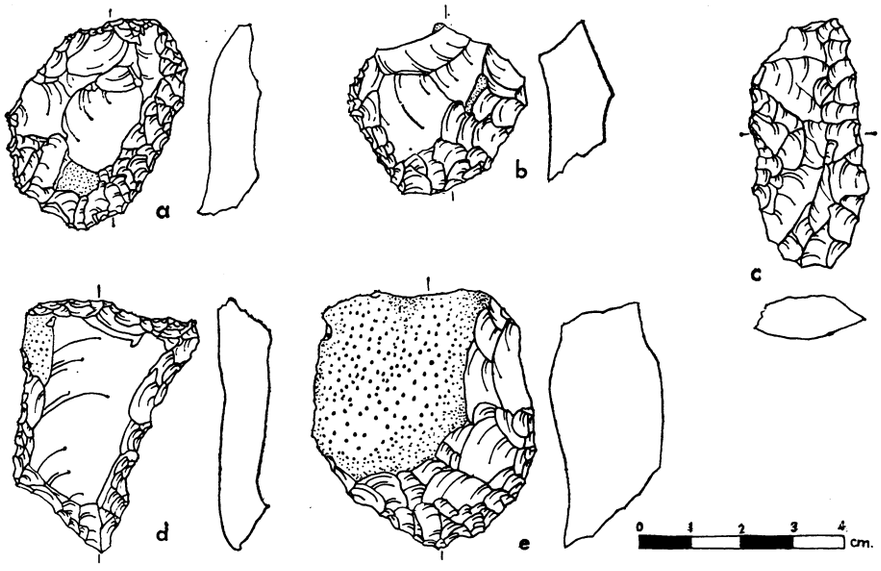

Fig. 3. Sample of chipped stone, Guitarrero I artifacts found in the same excavation square as human mandible. (a) Snub-nosed flake scraper (type QP 28); (b) snub-edged flake scraper (QP 29); (c) round-based bifacial knife (QP 14); (d) large graver-scraper (QP 22); (e) scraper-plane (QP 40). All artifacts drawn to same scale, as shown at lower right. Dashes at edges of drawings indicate orientations of cross sections (*5*).

examples in the Guitarrero I collection. In view of the stratigraphic position and early radiocarbon date of the Guitarrero I industry, many will choose to ignore the isolated projectile point, accept the possibility of some disturbance, and assign the complex to Krieger's pre-projectile point stage. Sample GX 1859 yields the earliest charcoal date on human activity yet reported from South America, although MacNeish's more problematic bone determination of 12,200 B.C., from Ayacucho, precedes it by 1,590 years (*4*).

The possibility of intrusions from above during later occupations is especially critical in the case of a human mandible found in association with the Guitarrero I complex in the lowest stratum of the cave. If this association is genuine, it is the earliest known occurrence of human skeletal remains in South America—and among the best demonstrations of early man and his works in the entire New World.

The likelihood of an intrusive burial or similar disturbance is minimal. In the excavation square from which the mandible came, ten levels of unbroken and apparently uncontaminated preceramic deposits lay directly above (Fig. 2). All sediments from these levels were sieved through 3 by 3 (about ¼ inch or ⅔ cm) or smaller mesh screens, and no other human bone was found. Eight of the ten superimposed levels are subdivisions of the stratigraphically and typologically distinct Guitarrero II preceramic complex, which dates from about 8,500 to 5,700 B.C. on the strength of the four charcoal dates cited. Of the two dated samples on the Guitarrero I stratum, sample GX 1859 (10,610 B.C.) from 15 cm below the mandible, was most closely associated with the skeletal remains and is in best agreement with the four very consistent assays on the stratum above. Thus, the mandible, a premolar tooth from a different individual, and a phalanx may be assigned an age of about 12,000 radiocarbon years.

In comparison to the excellent condition of late intrusive burials in other parts of the site, this small sample of skeletal remains is rather poorly preserved and can be instantly distinguished from the later bones. The left ramus of the mandible is missing except for the gonion, and only the gonial portion of the right ramus is present. The following eight teeth are in place: right first and second premolars, right first and second molars, left lateral incisor, left first premolar (fragmentary), left second premolar, and left first molar. The isolated right first premolar, from another individual, shows little wear on the occlusal surface, which suggests that it belonged to a young subject. The phalanx is adult and complete except for the head at the distal end.

The mandible is small and apparently female. A general rugosity and strong pterygoid ridging are salient characteristics. There is considerable muscularity of the mylo-hyoid ridge and pronounced genial tubercles; however, the chin is median in form and the ramus-corpus angle is very obtuse. All teeth have erupted, and various features suggest an age of possibly 30 to 40 years at the time of death. Senile changes can be seen in the reduced height of the corpus at the level of the molars and in the moderate osteoporosis around the alveoli. Occlusal attrition of the teeth is moderately low and dentine lakes are small. The third molars had erupted but were lost before death.

The dental health of this individual was good. If there were abscesses of the third molars, the absorption continued to the point of normal correction at a period of several months to a year. There is no evidence of caries, and the rather small teeth are not crowded, with general dental anomalies being absent.

The pattern of occlusal wear is rather interesting, especially the low degree of attrition of the molar teeth. This is in sharp contrast to the left lateral incisor, which is a peg root without enamel. Although it is risky to infer much from a single mandible with an incomplete set of teeth, it may be that the anterior portion of the mouth was used for certain activities other than the mastication of food. Molars and premolars show the direction of wear to be buccal. The low degree of molar wear, even on the first molars, suggests a diet of soft foods that were free from grainy and foreign elements. Perhaps this corresponds to the stress on hunting and meat eating, which has frequently been proposed for the first Americans.

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5. For descriptions of numbered artifact types established at Quishqui Puncu, see T. F. Lynch, *Excavations at Quishqui Puncu in the Callejón de Huaylas* (Occasional Papers, Idaho State Univ. Museum, Pocatello, in press).
6. We thank W. Stini for technical advice and B. Lynch for preparing the illustrations. Additional field assistance was provided by J. Alden, L. Gaarder, A. Ranere, and J. Ranere. We are grateful to the Patronato Nacional de Arqueología for permission to excavate, and to the Comunidad de Shupluy, I. Masías M., C. Oré, A. Ramirez V., R. Romero, and R. L. Vasquez for their helpful cooperation. Most especially, we mourn numerous former employees and friends who died in the 31 May earthquake and avalanches. Supported by NSF grants GS 1969 and GS 2399.

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Water on the Moon?

Abstract. *If the planets formed at falling temperatures with volatile substances accreting last, the low abundance of lead, bismuth, indium, and thallium in lunar rocks implies an initial water content of no more than 370 grams per square centimeter, and probably much less. The depletion of volatile substances might be expected a priori if the moon accreted as an original satellite of the earth.*

Did the moon ever contain large amounts of water? The Apollo 11 and 12 rocks certainly show no water, no hydrated silicates, and no signs of aqueous alteration (*1*). And the present escape time of water molecules from the moon is very short, less than 1 year (*2*). Nonetheless, this evidence does not preclude the possibility that the moon once had substantial amounts of water. Various surface features, such as sinuous rills, mare fillings, ghost craters, and domes have been attributed to the effects of an early hydro-