generally narrower shaft at *c* and a higher fibular crest at *d* in crane. The distal end is distinguished by a broader intercondylar fossa at *e* in crane and a projection or knob at *f* in crane, which is not present in turkey.

A final element of sandhill crane that may be confused with the common turkey is the tarsometatarsus illustrated in Figure 5. The proximal end of this element is distinguished by a higher protuberance at *a* in crane; the presence of a groove at *b* in crane, which is absent in turkey; and little or no hypotarsal ridge at *c* in crane. The distal end is distinguished by a more obliquely angled distal foramen at *d* in crane and the pointed extension of the trochlea for digit 3 at *e*, which occurs in turkey but not in crane.

It is hoped that the characteristics discussed above will preclude errors in the identification of these species. Of course, all identifications should be confirmed by the proper comparative materials. Accurate identifications are the first step to useful ethnobiological studies of avifauna from archaeological sites.

Acknowledgments. This study was made possible by a grant from the Max C. Fleischmann Foundation. We are also grateful to Jeoff Dann for the photographs and to Dr. Amadeo Rea for reviewing an earlier draft of this report.

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A MAYA DAM IN THE COPAN VALLEY, HONDURAS

B. L. Turner II and William C. Johnson

A prehispanic Maya dam is reported in the Copan Valley of Honduras. The dam is situated in the foothills above the river bottom at the headwaters of a small tributary, the Quebrada Petapilla. Constructed of cut stone and mortar, the dam was built immediately downstream from a spring and once created a small, flowing pond. The function of the dam is uncertain, although the creation of a greater head of water for the irrigation of the quality farmlands in the foothill zone is a possibility. The dam probably dates no later than the Late Classic period (A.D. 650–800).

Recent research has demonstrated that the prehispanic Maya civilization utilized a variety of sophisticated techniques that allowed the intensive occupation of numerous environs in the lowlands of Mexico, Guatemala, Belize, and Honduras. Although much further work is required to establish the areal extent and intricacies of these forms of land manipulation, it is recognized that the Maya constructed such features as large precipitation catchment basins or reservoirs (Harrison, personal communication); small underground chambers of multiple functions, one of which may have been water storage (Matheny 1978; Puleston 1971); large canals of unknown function (Matheny 1978; Siemens and Puleston 1972); raised-field and drainage systems to cultivate inundated terrain (Puleston 1977); large-scale agricultural terrace works (Turner 1974); and irrigation systems (Matheny 1976). Despite the numerous investigations of land manipulation, evidence that the Maya impounded flowing water for any purpose has not previously been presented. This report announces the discovery of a prehispanic Maya dam in the Copan Valley of Honduras.

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The Copan River flows through the extreme western section of Honduras, creating several wide valley reaches or pockets (Figure 1). The Copan Valley is the largest and westernmost pocket formed by the river before it flows into Guatemala. This pocket approaches 6 km at its greatest width and displays four basic physiographic zones that correspond with changes in elevation from the river to the ridges. These zones include a narrow floodplain, river terraces, rolling foothills, and upper ridge slopes. The floodplain is small but is excellent agricultural land. Rising 5 to 20 m above the floodplain are river terraces that form the largest section of the valley bottom. The ruins of Copan, once a large and important Maya center, are situated on the fertile alluvial soils of the terraces. Its once sprawling population extended considerable distances along the terraces and into the foothills of the Copan pocket (Willey and Leventhal 1978). The foothills rise abruptly from the terraces, often to form gently rolling terrain; they are suitable for cultivation in their upper reaches. The foothills merge upward into steep slopes that are often dominated by pines and tend to be poor for cultivation because of rocky, acidic soils. Small tributaries or *quebradas* drain the ridges and foothills. Some of these *quebradas* flow perennially, fed by small but numerous springs at geological contacts. It is in the upper reaches of the Quebrada Petapilla, adjacent to such a contact, that the dam was discovered.

The Quebrada Petapilla descends 130 m from a gently rolling zone below the northern ridges of the valley to the Copan River. A series of relic features, including flat shelflike surfaces on hillsides, *aguadas* (permanently or seasonally water-filled depressions), rock-slab agricultural terraces, and house sites, occur on either side of the *quebrada*. The house sites are of ancient Maya origin, and the other features are probably associated with them. The dam, located upstream from most of these relics, is situated between short but steep slopes with remnants of agricultural terraces and house sites.

Initially the dam appeared to be a rock outcrop that crossed the *quebrada* at the first of at least three small springs in the headwaters of the stream. This interpretation was suggested by the position of the dam between and upon several large boulders, by a thick tufa (travertine) deposit that concealed most of the front wall, and by sediments behind and on top of the wall. Only the exposure of a small segment of the stone blocks suggested that this feature was artificial. Removing the 50 to 60 cm tufa deposit from the front of the feature exposed a large, thick wall of cut and mortared stone.

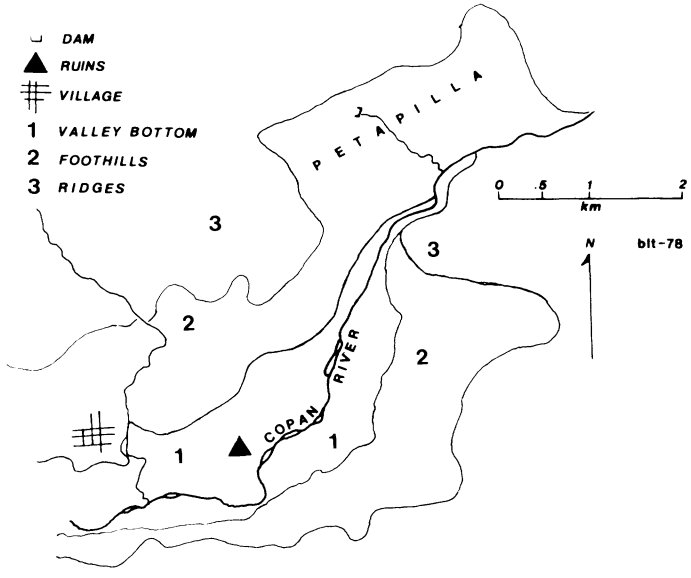

Figure 1. The eastern end of the Copan Valley.

The dam extends 4 m across the channel (Figure 2). It is composed of neatly cut and laid rectangular blocks of stone of various composition, typically measuring 15 by 35 by 20 cm. The south end of the wall abuts a rock outcrop, and the bottom of the wall rests on two large boulders, one of which has rotated forward, exposing a sediment-filled cavity in the northern portion of the wall. The height of the dam from its top to the base of the boulders is 145 cm, and the wall proper is 108 cm high. The first and largest spring along the *quebrada* flows from under the boulders that anchor the base of the dam. Excavation of the earth fill on top of and behind the dam revealed that the dam averages 85 cm in thickness across the top. A notch 23 cm deep and 50 cm wide in the top center of the wall was apparently a spillway (Figure 3). The rear wall reaches 90 cm at its highest point and rests primarily on one of the large boulders, which supports the front of the wall. Although the front wall is featureless, a stone shelf or step protrudes 6 cm from the rear of the dam (Figure 4). This shelf is situated 45 cm from the top of the dam and extends most of the length of the rear wall.

The dam is of sufficient size to have created a small pond, perhaps 32 m^2 in surface area and 20–25 m^3 in capacity. Initially we thought that this pond would have been too small to have justified the construction of the dam and that the feature was probably built to protect the spring water from the ravages of silt-laden runoff from upstream. The position of the dam immediately over the spring seemed puzzling, however, despite the stuctural advantages of the boulders. Furthermore, the apparent spillway, which would have drained excess water from the pond, would have emptied directly into the spring in front of the dam. Excavation of the sediments behind the wall revealed that the dam had actually been constructed immediately downstream from the spring, whose original source was 85 cm below the northern sector of the dam. Several sherds found in the sediments adjacent to the spring suggest that the water originally surfaced at this location. It is probable that the function of the dam was to provide a spring-fed pond and perhaps

Figure 2. View of the front of the dam; notice the large boulders on which the dam is anchored and the hole in the wall created by the forward movement of the right boulder.

Figure 3. Close-up view of the front wall; notice the apparent spillway in the top-center of the wall and the anchoring of the south side of the wall against a rock outcrop.

an elevated water surface or head. Evidently sedimentation behind the dam buried the spring source, but its continued flow eventually loosened one of the large anchoring boulders, causing it to move forward and permitting the spring water to seep under the wall.

Other evidence supports this conclusion. The large amount of tufa deposit on the front wall of the dam indicates that the carbonate-rich spring water originally flowed through the spillway and did so for a considerable length of time. Water from surface runoff would not have created such an accumulation of tufa. In addition, snail shells taken from the upstream side of the dam at depths ranging from 20 to 60 cm are those of *Pachychilus* sp. (identification by A. Covich), a variety that lives only in fresh running water. These shells are probably indigenous to the pond, although they may have been washed down the channel or deposited by predators in their excavated location. It is doubtful, however, that a permanent flow of water ever existed up-channel from the dam, precluding the possibility that the shells were washed down from a source above. The varied sizes of the shells also suggest that the snails had not undergone selection by predators. Our knowledge of the ecology of this genus in the foothill environment is limited, but the shell evidence does support the argument that a fresh-flowing pond once existed behind the dam.

The depth of the sediment behind the wall cannot be used to establish possible dates for the origin of the dam because the rates of sedimentation for the intermittently flowing channel above the dam are not known and have probably fluctuated through time in response to land-use changes in the Petapilla area. The cultural remains taken from the sediment—sherds, lithics, and obsidian—could have been washed into the location, rendering their value for dating the dam suspect. The location of the dam and its structural characteristics, however, strongly suggest that the feature is of pre-Hispanic origin, probably constructed during the Late Classic period (A.D. 650–800) of Maya occupation of the area.

Two dams have been constructed in the valley during its modern occupation. These dams are

crude structures made of cement and uncut stone, and they are situated across *quebradas* near their confluences with the Copan River. In contrast, the Petapilla dam is situated in the foothills and is characterized by a style and quality consistent with the finer buildings at the ruins of Copan. The small step or shelf that runs along the rear wall of the dam is of unknown function and is a feature that does not occur on the modern, valley-bottom dams. Other structural evidence suggestive of the dam's affiliation with the Classic Maya includes a set of five cut stones that lead from the south bank of the *quebrada* to the top of the dam (Figure 5). The arrangement of four of these five stones clearly resembles steps; the fifth stone has apparently fallen out of place. Steps would have facilitated movement from the steep bank to the dam. Regardless of the function of these five stones, they represent an emphasis on detail and an extravagance characteristic of Classic Maya structures and not of the work of modern or post-Hispanic peoples. Finally, the sherds taken from the sediment behind the dam date to the latter part of the Late Classic period (ceramic identification by G. R. Willey), but we do not know how or when these materials were deposited.

The evidence indicates that the Petapilla dam is of ancient Maya origin and was probably constructed during or after the Late period of Classic Maya occupation of the Copan Valley. This conclusion is consistent with the settlement evidence, which suggests that the valley bottom had

Figure 4. View of the top and rear wall; notice the shelf that protrudes rearward or up-slope. The dam is anchored on the large boulder extending under the wall.

Figure 5. Five stones or steps. The fifth stone, to the right of the measure stick, has apparently fallen from above. The appearance of these stones is suggestive of a stairway leading from the south bank to the top of the dam.

become crowded and that populations had begun to spread into the Petapilla foothills by at least the Late Classic period. The upper Petapilla zone offered gently rolling, fertile agricultural land, and the springs provided a permanent supply of water.

The function of the dam is puzzling. It seems unlikely that household demands for water would have overtaxed the spring flow, necessitating the creation of a larger pond. More interesting is the possibility that the pond and spillway created an elevated head that permitted irrigation of the land that lies at elevations above the spring. Northeast of the dam is a large area of level terrain that lies at an elevation slightly higher than the spring. The elevated head created by the dam may have been high enough to have channeled water to this zone. This possibility is under examination.

Although the function of the dam is not clear, its presence indicates the intricate nature of Maya land use. This evidence, added to what is already known, demonstrates that the pre-Hispanic Maya knew and used a variety of hydraulic and other techniques to manipulate the landscapes that they inhabited. The ancient Maya apparently did not differ from other early civilizations in their ability to manipulate land and resources.

Acknowledgments. We thank Gordon R. Willey for inviting us to participate in the 1977 National Science

Foundation-Peabody Museum, Harvard University, Copan Sustaining Area Project. We appreciate the assistance of Richard Leventhal, William Fash, and Barbara Fash. We also acknowledge the Instituto Hondureño de Antropologia e Historia, without whose cooperation our investigations would have been impossible. Support was provided by the National Science Foundation (GR BNS 75-23381) and the Research Council, University of Oklahoma.

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PALEODEMOGRAPHY OF THE VALDIVIA III PHASE AT REAL ALTO, ECUADOR

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The Early Formative site of Real Alto on the southern coast of Ecuador yielded a minimum of 72 human burials attributable to the Valdivia III phase. The construction of an abridged life table represents the first demographic analysis of a prehistoric South American population. Expectation of life at birth was 21 years and at age 15 was 18 years. Comparison with model life tables suggests a crude birthrate of 0.048, a generation length of about 26 years, and completed family size of 6.4 children. The fact that the sample represents a natural population argues against the suggestion that the skeletons largely represent victims of ritual sacrifice.

MATERIALS AND METHODS

The archaeological site of Real Alto, OGCH-12, located on the Santa Elena Peninsula of Ecuador about 4 km northwest of the town of Chanduy, was excavated during the year beginning August 1974 under the direction of Donald W. Lathrap and Jorge G. Marcos. The site was occupied for an extended period of time (3400-1500 B.C.), which spanned most of the phases of the Valdivia culture and part of the Machalilla period (Lathrap and Marcos 1975) within the Early Formative.

The Early Formative inhabitants of Real Alto were a sedentary group who, recent evidence suggests, became increasingly reliant on maize cultivation supplemented by both marine and terrestrial sources of animal protein (Byrd 1976; Lathrap and Marcos 1975; Lathrap et al. 1977; Zevallos et al. 1977; Marcos et al. 1976; Pearsall 1978). The settlement supported a ceremonial plaza whose construction was begun near the end of Valdivia phase II. During Valdivia III a

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