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Precolumbian Ground, Polished, and Incised Stone Artifacts from the Cordillera de Tilarán

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INTRODUCTION

Roof combs do not stand, Tikal-like, above the canopy of the Costa Rican rain forest. Nor do stone-walled ballcourts stretch through Costa Rican archaeological sites. Great cities, with canals and pyramids and thousands of inhabitants, did not greet the sixteenth-century Spanish when they reached Costa Rica. But what the small country of Costa Rica lacks in prehistoric architecture it compensates for in artifacts; the Precolumbian Costa Ricans excelled in the production of intricately carved stone sculpture and ground stone tools. Some of the metates found throughout Costa Rica, for example, are among the most elaborate and interesting artifacts in the New World.

This chapter describes and compares the 224 ground, polished, and incised artifacts recovered during survey and excavation in the 1984 and 1985 field seasons of the Proyecto Prehistórico Arenal. We also analyzed fifteen ground- and 6 polished stone artifacts from the Jiménez family collection. The pieces from the Jiménez collection are all from the Silencio cemetery (G-150), but cannot be assigned to specific contexts. The project collection is from a variety of site types, and is probably representative of the range and variety of morphological types of prehistoric ground stone artifacts in the Cordillera de Tilarán region.

Terminology used in this chapter follows Hummer (1983). The term "ground stone" refers to all artifacts for which grinding was the final technique used in their manufacture. Polished stone

flakes. The percussion manufacture of utility cutting flakes from irregular cores made of local materials was established by 4000 BC and continued to be the primary means of making cutting edges in the Arenal area for the next 5,500 years, an impressive record of continuity and success.

In summary, the almost nine thousand lithic artifacts discovered by the Proyecto Prehistórico Arenal facilitated a successful adaptation to a tropical rain forest environment over many millennia. It was a broad-spectrum adaptation; although maize was known before 2000 BC, it never became a staple crop, and the diet continued to focus on wild species. Stone boiling was devised in the Archaic if not earlier, and remained as a major cooking technique in spite of the sophistication of ceramics in the area from about 3000 BC to the Conquest. The main means of producing utility cutting flakes was by percussion removal from informal cores made of locally available materials. Apparently, the household was the primary locus of production and consumption of lithic implements.

Bifacial manufacture of projectile points and knives began in the area in Paleo-Indian times and continued through the Archaic. After a lapse in the two millennia before Christ, it was resumed in the Silencio and Tilarán phases. Bifacial manufacture of blanks for ground stone celts was done from the Tronadora Phase to the Conquest with no lapse.

By utilizing locally available materials, and manufacturing within the household or village, settlement self-sufficiency was maintained. Economies of dependency were avoided, in contrast to so many villages in the northern Intermediate area or Mesoamerica that came under the economic and political domination of expanding states. This, I suggest, is a major reason why social stability is such a deep-seated characteristic of the Arenal area. Long-term social stability was not characteristic of so many other areas of Middle America.

ACKNOWLEDGMENTS

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artifacts are those for which polishing was the final production technique. We divided the ground stone artifacts into types based on morphology and use. Morphology is the initial criterion for categorization; however, the morphological designation has to be supported by the use wear evident on each artifact. The most recent use is the ultimate criterion for classification. For example, a broken metate leg reused as a mano is categorized as a mano.

We performed analyses in the field laboratory. We examined artifacts for use wear under a 10× to 70× stereo microscope, or a 10× hand lens, in the case of items too large to fit under the microscope. We subjectively recorded the degree of production grinding in three levels: (1) fine, (2) moderate, and (3) rough. We described the raw material for the ground stone artifacts as either nonvesicular or vesicular. We listed the average size of the vesicles as (1) small (less than 2 mm in diameter); (2) medium (2 mm to 3 mm in diameter); or (3) large (greater than 3 mm in diameter). We subjectively recorded use wear as heavy, moderate, or light.

A stone's vesicularity affects its suitability for shaping. For example, stone with large vesicles is unsuitable for the production of elaborate metates such as those found in Guanacaste. Decorated metates in the Arenal area were also carved from nonvesicular stone; however, vesicular stone may have been preferred as a grinding surface. As a metate is worn through use, vesicular stone retains a rougher grinding surface that does not require pecking for sharpening.

The majority of ground stone artifacts in the project assemblage are made of plagioclase-phyric basaltic andesite (Melson, personal communication, 1984). Most of the polished stone artifacts consist of hydrothermally altered plagioclase-phyric andesite. We recorded the weight, length, width, and thickness, or height, for each item. Averages of those data are presented in Table 12-1.

GROUNDSTONE

TENONED STONES

Tenoned Stone Platform (1 Complete Specimen)

We found a large, decorated, tenoned stone platform at Site G-181 during survey (Fig. 12-1). To my knowledge, this type of artifact has not been previously reported in Costa Rica. Although the artifact is broken, we recovered four pieces representing at least 90% of the object.

The platform portion of the object is rectangular with a flat upper surface. The platform is 30 cm long, 24 cm wide, and 11 cm thick. A shallow pecked design is present on all four sides and consists of one set of concentric diamonds between two sets of concentric rectangles. The upper portion of the tenon carries a design very similar to that on the sides of the platform. The remainder of the tenon is shaped but undecorated and not well smoothed. The height of the entire object is 44 cm.

The top of the platform exhibits very little evidence of grinding; what is present is probably a result of manufacture. There is, however, some evidence of pecking and battering on the surface. The battering suggests the preparation of some item—perhaps food, pigment, or other substance. The lack of grinding indicates that corn was not prepared on the surface. It is also possible that the pecking scars are a result of production. The stone has small vesicles and was quarried from a volcanic deposit (Melson, pers. comm., 1985).

Site G-181, where we found the tenoned stone platform, is a cemetery utilized during the Arenal and Silencio phases. The cemetery context for the stone platform and its uniqueness and elaborateness suggest that it had a ceremonial rather than a utilitarian function.

Possible analogs for the tenoned stone artifact are the carved stone "seats" from Guanacaste and Nicoya (Snarskis 1981b, catalog numbers 99 and 100). These, however, are rounded in plan view, have projecting zoomorphic faces, and are not tenoned. Although the morphology of our tenoned stone object differs greatly from that of the stone seats, it is conceivable that it was a seat rather than a platform. The tenon could have been placed in the ground to hold the object upright.

Stone (1972) reports tenoned stone sculpture from Guanacaste-Nicoya, and Squier (1860) illustrates numerous stone statues supported by tenoned bases at Zapatero in Nicaragua. These monumental pieces are zoomorphic and anthropomorphic sculptures. The tenons are mainly quadrilateral, with only a few appearing to be cylindrical like the tenon on the Arenal artifact. Tenoned stone heads have been found in the Atlantic Watershed region (Mason 1945; Snarskis 1978, 1981a; Graham 1981). Columnar sculptures from Nicaragua and Nacascolo, Costa Rica, are illustrated by Richardson (1940:fig. 39). Nothing, however, with a flat platformlike surface, such as the Arenal specimen, has been reported.

TABLE 12-1
METRIC DATA FOR COMPLETE GROUND- AND POLISHED STONE ARTIFACTS

Artifact	*Length (cm)*	*Width (cm)*	*Height (cm)*	*Weight (g)*
Metates				
Rectangular decorated	33.5	22.5	13.5	7,450.00
Rectangular tripod with zoomorphic head	39.5	22.2	15.0	667.00
Rectangular tripod	49.0	26.1	19.6	11,575.00
Rectangular tripod with cylindrical legs	29.5	22.0	14.0	No data
Ovoid tripod	50.5	29.8	17.0	12,300.00
Ovoid with knob legs	45.5	28.0	9.5	No data
Ovoid nonlegged	29.0	20.0	8.5	6,700.00
Oval tripod	29.5	20.7	9.0	6,250.00
Basin	21.0	29.0	9.5	No data
Unshaped boulder	32.0	26.0	13.0	13,500.00
Manos				
Bar	23.45	5.9	4.6	1,308.25
Ovoid	14.93	8.25	4.05	764.80
Oval	9.5	7.15	4.3	440.00
Loaf-shaped	12.15	6.62	4.75	747.22
Grinding stone	5.15	4.7	3.45	135.90
Burnishing stone	3.3	3.0	2.9	36.00
Nutting stone	11.5	6.1	5.4	255.00
Tenoned stone	30.0	24.0	44.0	No data
Celts				
Flaring-bit	5.9	5.2	3.3	145.00
Straight-bit	7.6	3.8	2.4	138.90
Rounded-bit	7.2	3.2	1.9	66.70

Note: Measurements are the average of the items in each category.

Tenoned Stone Artifact (1 Fragment)

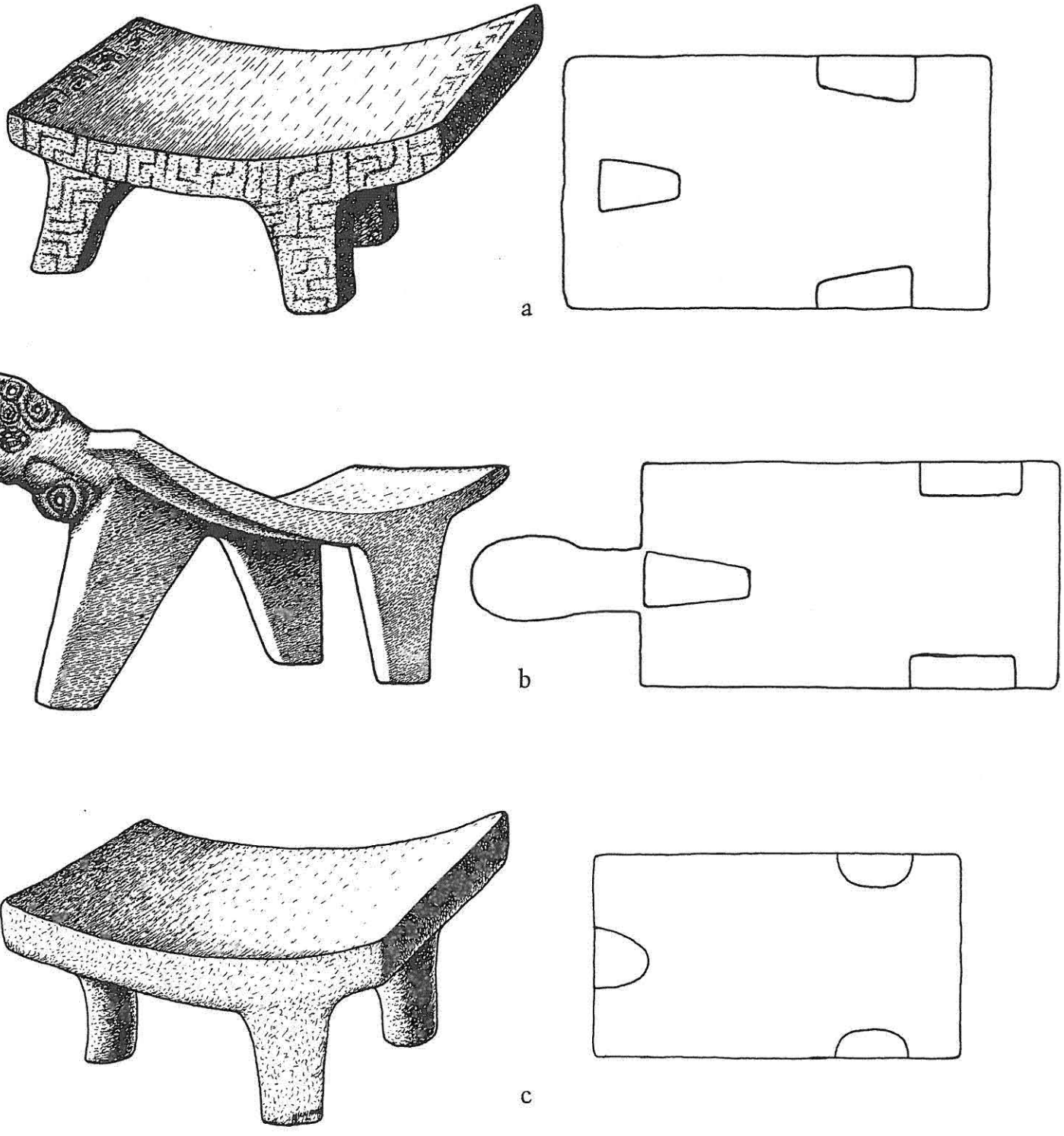
We recovered a portion of a tenoned stone artifact from the surface at the Silencio funerary site (G-150). It consists of a large cylindrical tenon (20 cm long and 20 cm in diameter), and a broken, irregular upper section. This artifact may have been a tenoned platform like the one described earlier, but we did not recover enough of the upper portion to identify it positively. The tenon is shorter and broader than that of the platform described earlier.

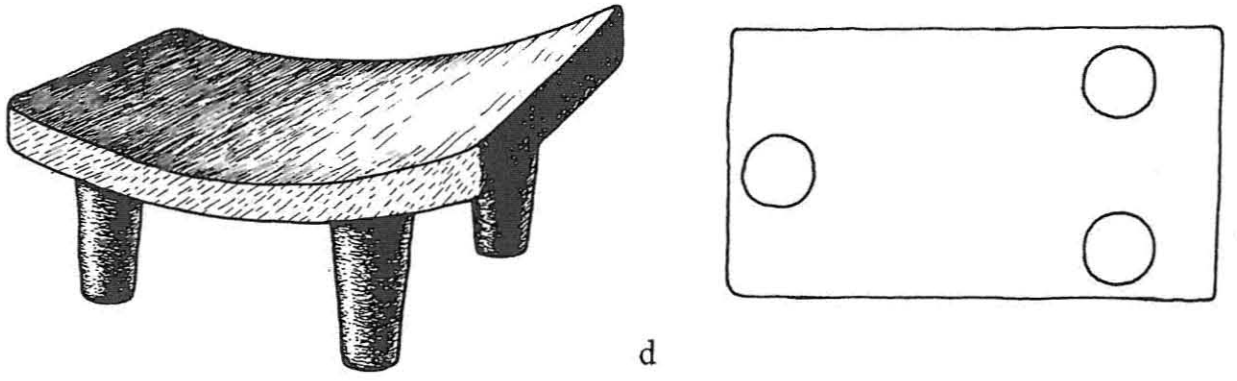
Figure 12-1.
Drawing depicting the probable appearance of the complete tenoned stone platform. Drawing by Mark Chenault.

METATES

We recovered ten whole metates and eighty-six metate fragments during excavation and survey. We also analyzed nine whole metates from the Jiménez collection, all of which were found at site G-150. We devised ten types, based on differences in plan view and leg shape, for this study. Figure 12-2 depicts these types.

Figure 12-2.
The metate types from the Cordillera de Tilarán (drawings by Nick Lang): a, *rectangular decorated tripod metate;* b, *rectangular tripod metate with zoomorphic head;* c, *rectangular tripod metate;* d, *rectangular tripod metate with cylindrical legs;* e, *ovoid tripod metate;* f, *ovoid metate with knob legs;* g, *ovoid nonlegged metate;* h, *oval tripod metate;* i, *basin metate;* j, *unshaped boulder metate.*





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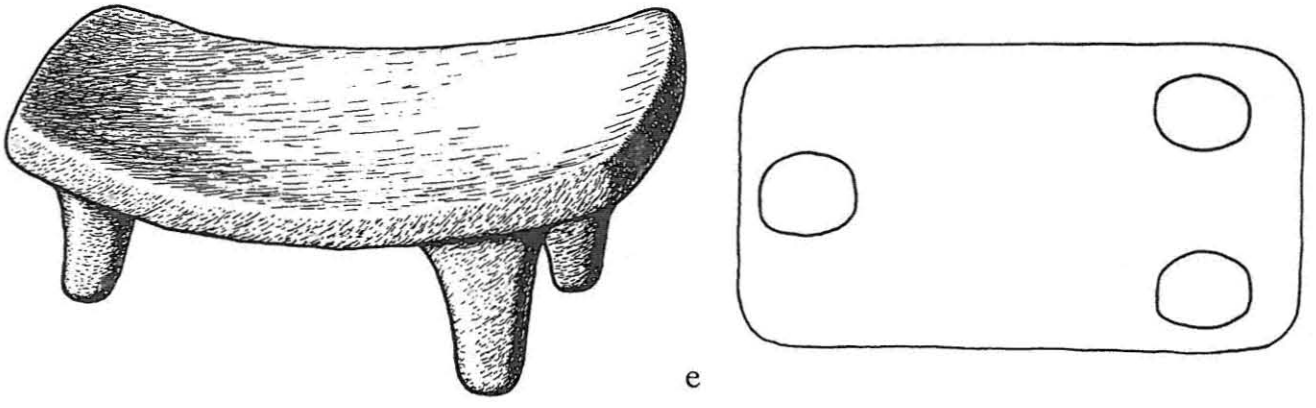

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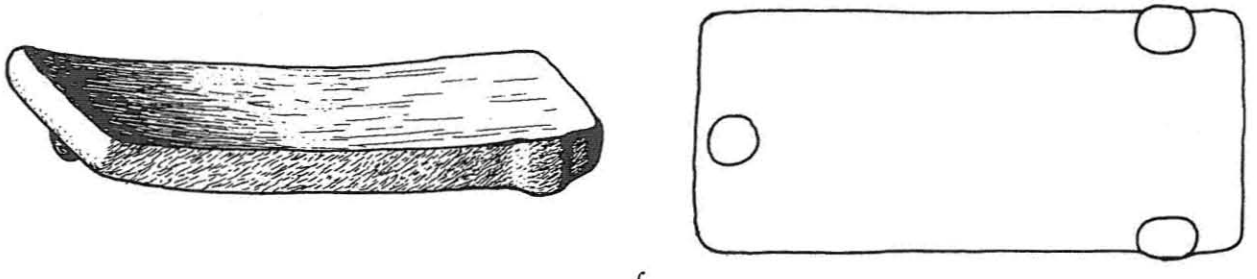

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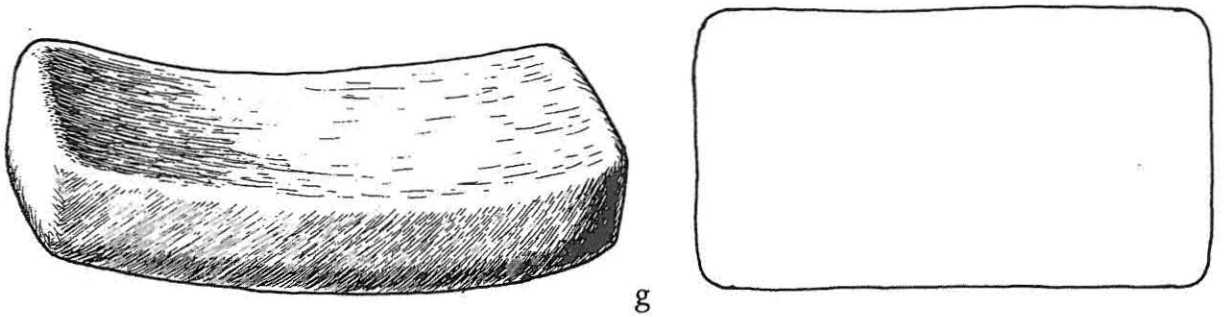

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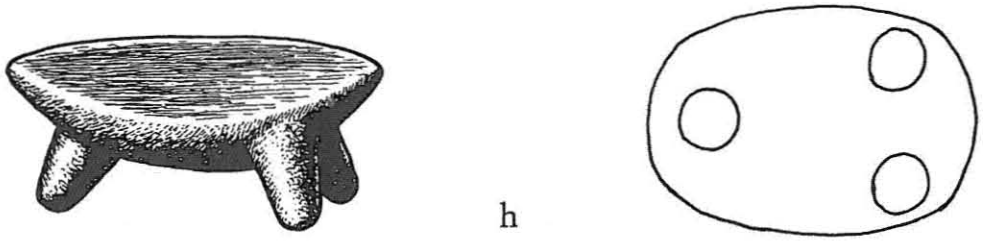

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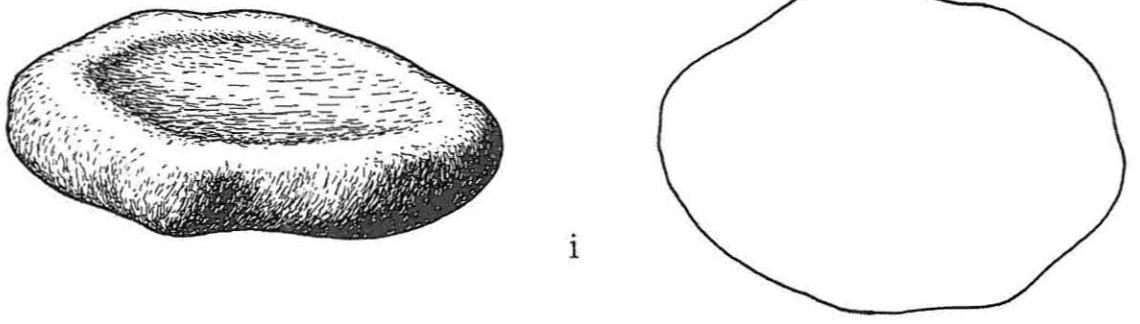

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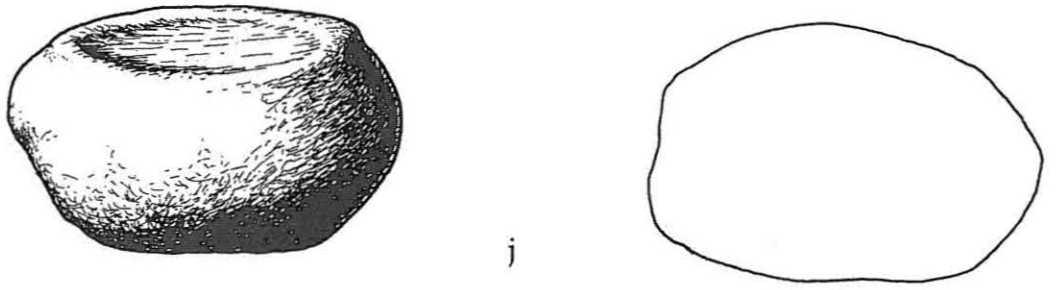

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Rectangular Decorated Metate (1 Complete Specimen)

This category encompasses those metates with pecked or incised surface decorations. We recovered only one specimen of this type (Fig. 12-2*a*). We found it at the Silencio cemetery associated with Silencio Phase ceramics. It is a tripod metate with pecked geometric designs on its edges, on the outside of the back legs, and on both sides of the front leg (Fig. 12-3). Another type of geometric decoration occurs on the underside of the metate. This design was formed with incised lines rather than pecked. The metate exhibits heavy grinding use wear. This is evident in the truncation of grains on the grinding surface and the partial obliteration of the bands of geometric design that occur on the grinding surface. The metate is made of nonvesicular stone. It is bowed in the middle of the grinding surface. Its legs are trapezoidal in cross section, and the bottoms of the legs are smoothed, apparently from movement while grinding. The back legs are flush with the sides of the metate.

Tripod metates with geometric decoration are commonly found in the Guanacaste-Nicoya area from Late Period IV to Early Period V (ca. AD 300–700). The Silencio Phase date of the Arenal Project specimen fits in with these dates. Elaborate decorated metates are illustrated by Snarskis (1981b: catalog numbers 73 and 74) and by Graham (1981:pl. 49 and 50).

Rectangular Tripod Metate with Zoomorphic Heads (3 Complete Specimens)

All of these metates are from G-150 and are in the Jiménez collection (Fig. 12-2*b*). Two have jaguar heads extending from the single-legged end of the metate (Fig. 12-4). Both are made of a stone with small vesicles and exhibit fine workmanship. The grinding plates of these metates are bowed. The single front legs are triangular in cross section with slightly concave sides, and the two back legs are somewhat L-shaped in cross section. The plane of the grinding surface continues across the tops of the zoomorphic heads, some of which display evidence of use grinding. The eyes and other facial features were produced through pecking. These metates are similar to others from lowland Guanacaste, although not as elaborate as that illustrated by Graham (1981:pl. 49). Unlike many of the more elaborate metates, the legs on the metates from the Silencio cemetery are not decorated.

The third metate in this category has a protruding head, which is either highly stylized or unfinished. It appears to be an avian representation with a downturned beak; however, no eyes or other facial features are present. It is made of a nonvesicular volcanic stone, probably a basaltic andesite. This metate also underwent heavy use grinding. A metate of similar shape, also with a stylized projection, from Guanacaste is illustrated by Stone (1977:fig. 131). The heads on all three of the metates in this category extend only 5 cm to 6 cm from the body. Striations on all three indicate unidirectional or, as termed by Hummer (1983), reciprocal use grinding parallel to the long axis.

We found a carved stone head of a bird at the Silencio cemetery (Fig. 12-5). It is probably from a rectangular tripod metate with zoomorphic head. The head is made of a stone with small vesicles. The eyes protrude, as do apparent topknots. There is a geometric pattern in low relief on the back of the neck. The head is probably a continuation of the plane of the metate grinding surface, although grinding is not heavy across the neck or top of the head. It appears to have been reworked and smoothed at the point where it broke away from the metate.

Rectangular Tripod Metates (7 Complete Specimens and 3 Fragments)

These metates are angular, blocky and massive, lack decoration, and have thick, wide legs D-shaped in cross section (Fig. 12-2*c*). The rear legs are flush with the sides of the metates. The metates are made of nonvesicular stone and appear to have been pecked to shape and roughly ground. We found all examples of this type at the Silencio cemetery. Rectangular tripod metates exhibit little use grinding. These metates may have been produced for interment as mortuary offerings.

Rectangular Tripod Metate with Cylindrical Legs (1 Complete Specimen and 3 Fragments)

The Jiménez collection contains one example of this type (Fig. 12-2*d*). It is a fairly small metate (29.5 cm long, 22 cm wide, and 14 cm high) with thick, cylindrical legs. Although the body is

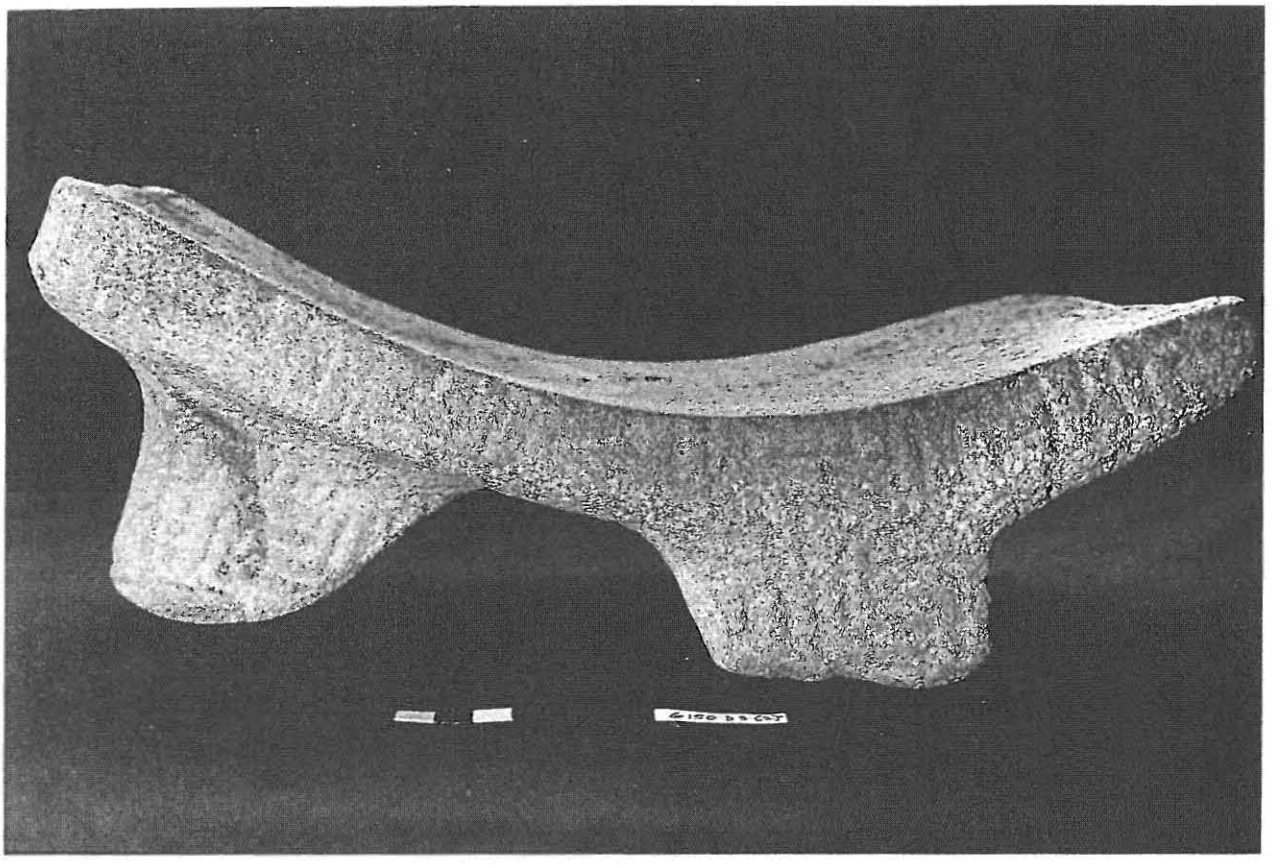


Figure 12-3.
Rectangular decorated metate from site G-150. Photograph by Fran Mandel-Sheets.

thick, the metate is not as blocky as the rectangular tripod metates. This specimen underwent fairly heavy use grinding and has some evidence of pecking to roughen the grinding surface. It is made from nonvesicular stone. The edges are not well defined, and, in general, this metate does not appear to have been produced with great care.

Project personnel recovered a large portion of a rectangular tripod metate with cylindrical legs (approximately the back two-thirds). This metate appears to be better made than the example just described, as are two other fragments from the corners of metates.

Ovoid Tripod Metate (1 Complete Specimen and 1 Fragment)

This type of metate is ovoid in plan view (Fig. 12-2*e*). The edges are rounded, and there is no surface decoration. These metates are made of vesicular volcanic stone, sometimes with large vesicles. The whole example (Fig. 12-6) has legs that are oval or slightly D-shaped in cross section. They are inset from the edges of the metate. It is large (50.5 cm in length), but not as blocky and massive as the

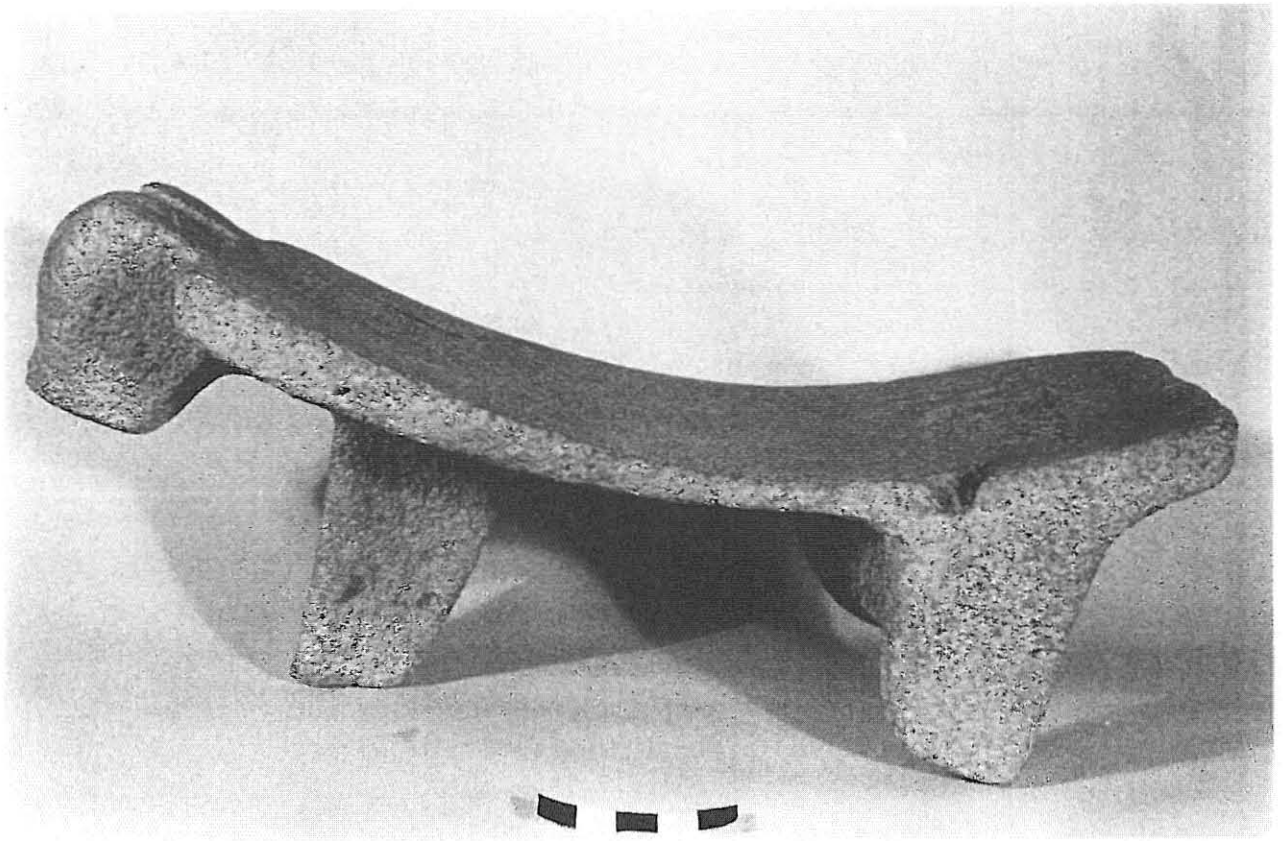


Figure 12-4.
Rectangular tripod metate with zoomorphic head (jaguar) from G-150. Photograph by Fran Mandel-Sheets.

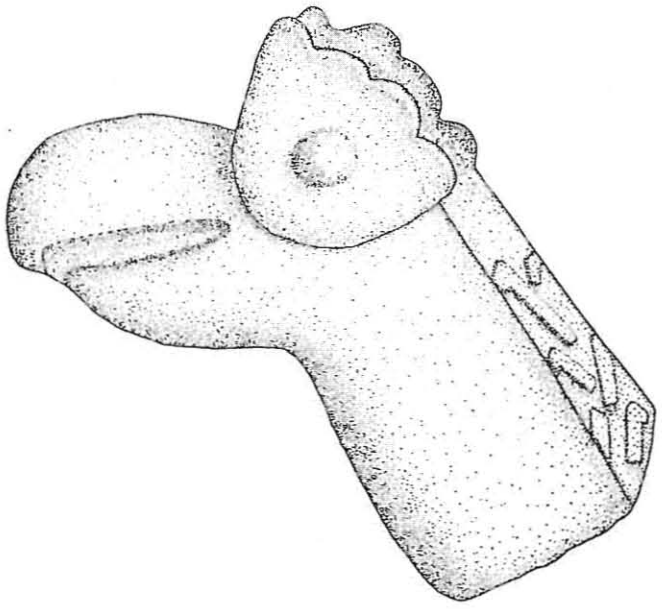


Figure 12-5.
Drawing of a carved stone bird head from a rectangular tripod metate with zoomorphic head, from G-150. Drawing by Mark Chenault.

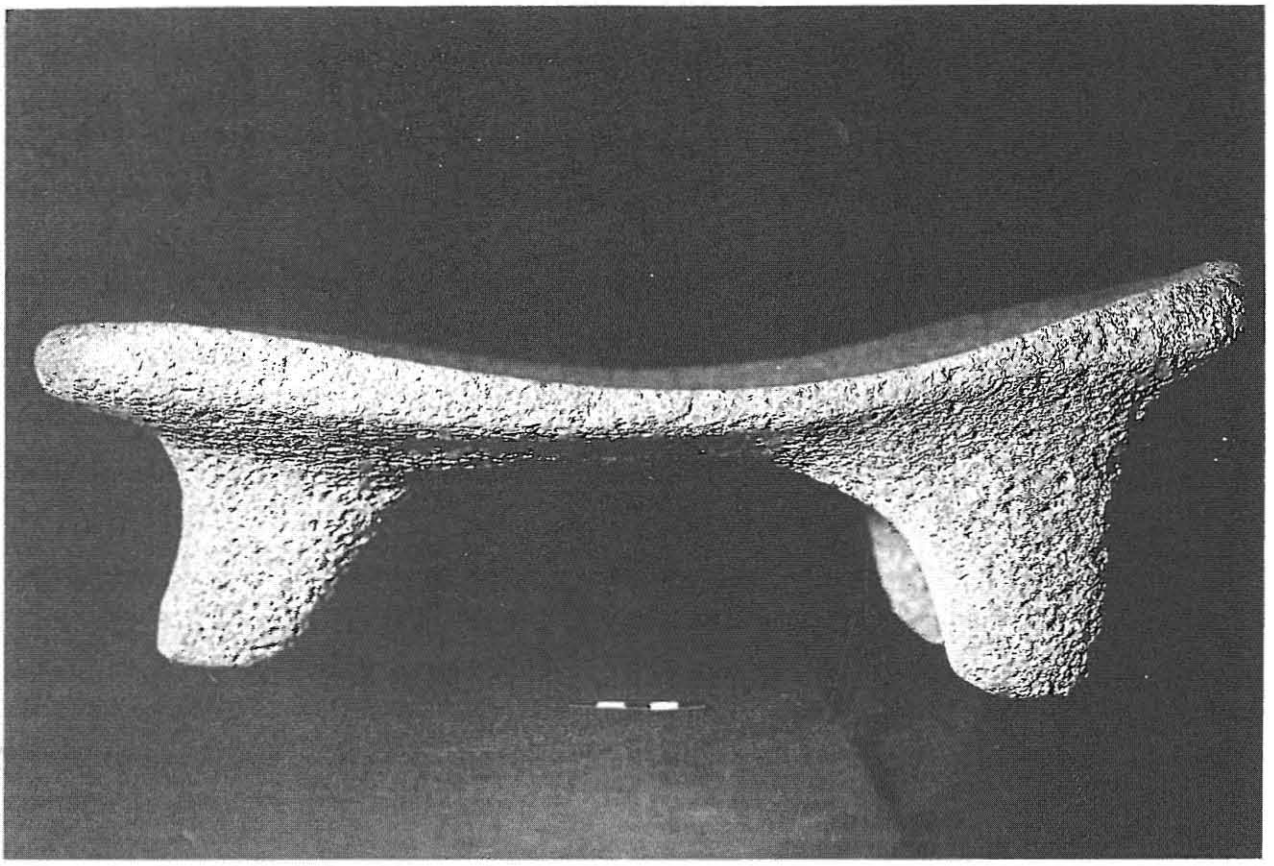


Figure 12-6.
Ovoid tripod metate, from site G-150. Photograph by Fran Mandel-Sheets.

rectangular tripod metates described earlier. The complete specimen exhibits heavy use grinding. It shows truncation of grains and polish on the grinding surface. Striations running parallel to the long axis indicate a back-and-forth grinding motion. The bases of the legs are also ground smooth from movement of the metate during grinding and have striations parallel to the long axis of the metate. The fragment was not as heavily used.

Ovoid Metate with Knob Legs (1 Complete Specimen)

One specimen from the Jiménez collection is representative of this type (Fig. 12-2*f*). The metate is long (45.5 cm), but has short knoblike legs. The front leg is square in cross section, and the back legs are circular. The grinding surface is flat and covers the entire top of the metate. The artifact, though squat and heavy, is well shaped on both its rounded edges and underside. It was heavily used, although no striations are evident. The stone from which the artifact was made is markedly vesicular.

Ovoid Nonlegged Metate (1 Complete Specimen and 1 Fragment)

Metates in this category are shaped, but lack legs and decoration (Fig. 12-2*g*). They are plano-convex in cross section, with flat grinding surfaces and round undersides. They are made from moderately vesicular stone and exhibit fairly heavy use grinding with truncation of particles and parallel use striations.

Oval Tripod Metate (1 Complete Specimen and 3 Fragments)

This type is small with a rounded underside (Fig. 12-2*h*). The three legs are small, inset, and knoblike. These metates are made from volcanic stone ranging from non-vesicular to moderately vesicular and are undecorated. The whole metate shows moderate use grinding, with striations running parallel to the long axis of the grinding surface; the fragments exhibit lesser amounts of use. Small, oval tripod metates are also found in the Atlantic Watershed (Snarskis 1978) and Diquis (Drolet, personal communication, 1984).

Basin Metate (2 Nearly Complete Specimens)

This type of metate is made from large, minimally shaped pieces of volcanic stone (Fig. 12-2*i*). They were used with a circular rather than a back-and-forth grinding motion, in contrast to most other metates produced by the prehistoric Costa Ricans. This motion, probably with a one-handed mano, formed a basin in the center of the metate rather than a flat or troughed grinding surface. Evidence of battering at the bottom of the basin indicates that crushing or pounding was also performed with these stone tools. Both metates are surface finds and are extensively weathered. That weathering may account for the lack of visible striations in the grinding basins.

We do not know the prehistoric use of these metates. They may have been used for grinding a substance other than maize, or represent a different method of preparing corn. I am unaware of metates of this type from elsewhere in Costa Rica. Sheets, Rosenthal, and Ranere (1980) report similar grinding implements from western Panama.

Unshaped Boulder Metate (1 Whole Specimen)

We recovered the one example of this type (Fig. 12-2*j*) during surface collection of Site G-175. Production of this type of metate would consist merely of taking a boulder—in this case, of nonvesicular stone—and pecking a flat surface on one side for use as a grinding platform. However, even this might have been unnecessary; use grinding alone may have formed the flat surface. No striations are evident on this specimen. The function of this metate is unknown.

Metate Fragments (74 Specimens)

Seventy-four metate fragments are too incomplete to be placed into the formal categories described earlier. One is from a circular or oval decorated metate of unknown type. Another small fragment may be from a rectangular tripod metate with zoomorphic head. There is the remainder of a broken projection on the edge of the metate, which may be an animal head protruding from the front of the metate. We found three metate fragments with cylindrical legs and five corner fragments from rectangular metates without evidence of legs. We also recovered three cylindrical metate legs, three conical legs, one D-shaped leg, and one knob leg. Two fragments from the grinding plates of metates are very thin and appear to have been well made. One fragment retains a D-shaped leg, the other has a leg that is L-shaped in cross section. Though the legs differ, the thinness and fine artisanship of the fragments suggest that they are from similar metate types.

We could specify fifty-four metate fragments as to type. Most of these fragments appear to be from shaped metates, and most exhibit some degree of use grinding. Six have striations, all of which are parallel and unidirectional.

MANOS

The Proyecto Prehistórico Arenal recovered thirty-nine manos and mano fragments. We also analyzed four whole manos from the Jiménez collection, found at the Silencio cemetery. We devised seven categories to classify the manos. Figure 12-7 depicts these types.

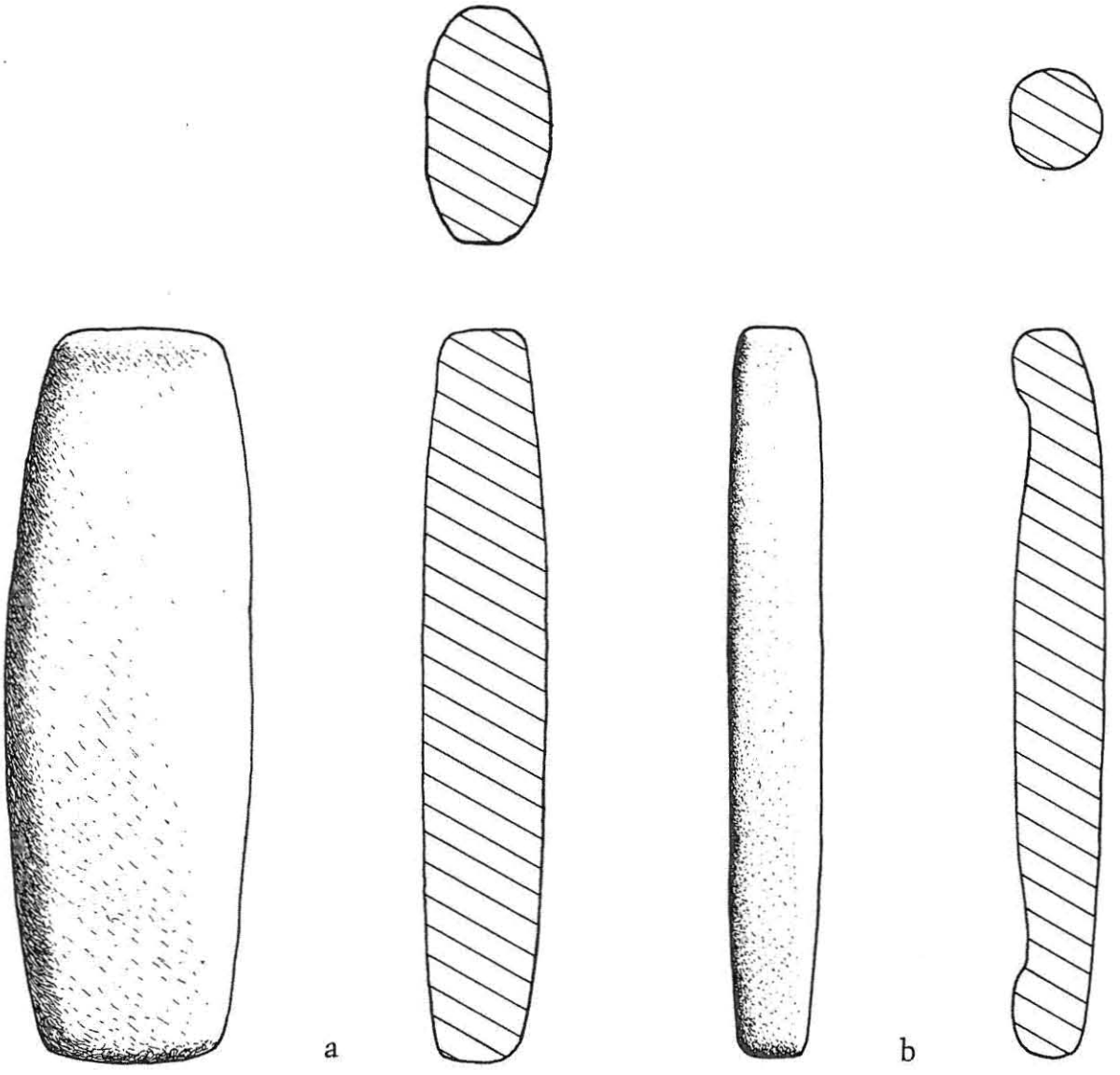
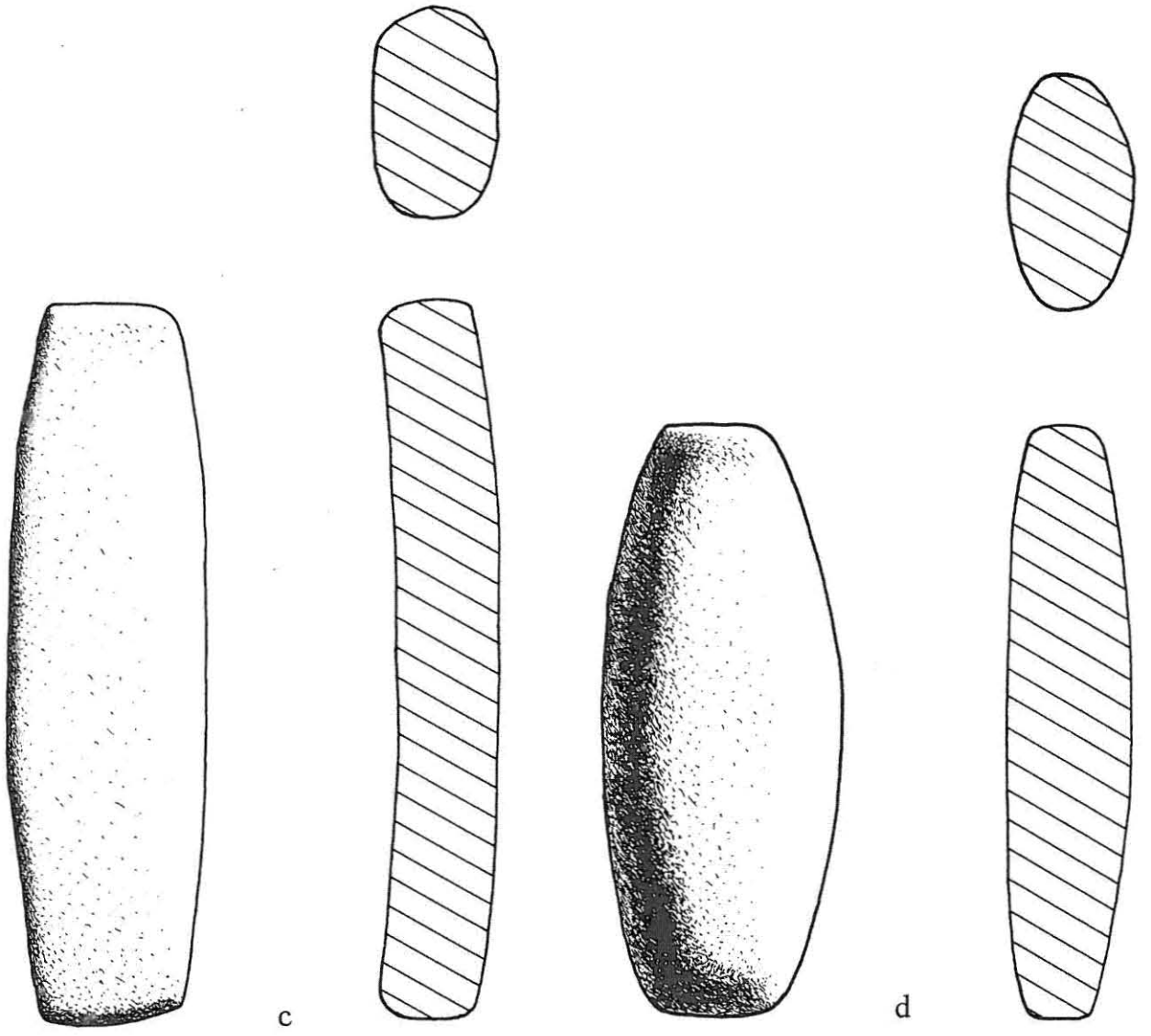


Figure 12-7.
Mano types from the Cordillera de Tilarán (drawings by Nick Lang): a, *bar mano;* b, *overhanging bar mano;* c, *concave bar mano;* d, *ovoid mano;* e, *oval mano;* f, *loaf-shaped mano;* g, *rectangular mano.*

Bar Manos (20 Fragments)

Bar manos are long and were meant for use with two hands (Fig. 12-7*a*). They vary from oval to nearly circular in cross section. All specimens of this type are fragmentary, so we do not know their average lengths. The manos are made of stone ranging from nonvesicular to moderately vesicular. The ends of the manos are pecked flat, as are, to a lesser extent, the edges. The majority of the bar manos exhibit use grinding on two sides and several have use striations. One has striations running diagonal to the long axis, rather than perpendicular, as is the case with other project manos. Einhaus (1980:fig. 15/9) discusses bar manos from La Pitahaya, Panama.

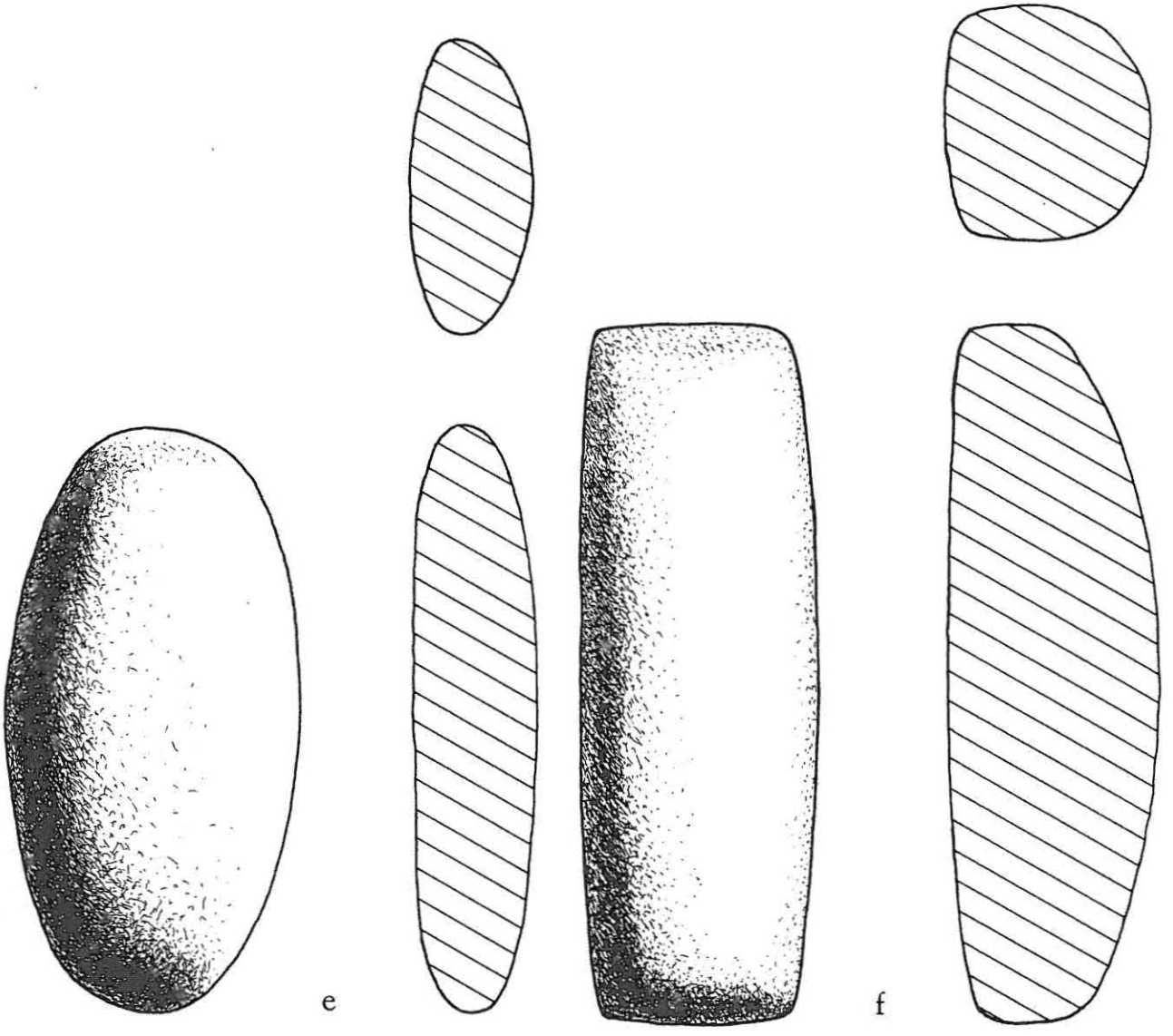


Overhanging Bar Mano (1 Whole Specimen and 1 Fragment)

One complete, overhanging bar mano is included from the Jiménez collection (Fig. 12-7*b*). The specimen is very long (38 cm) and was certainly used with two hands. The ends of the mano overhang the sides of the metate, which caused facets to form near the ends. A side view of the mano reveals that the middle section is convex, while the end sections are slightly concave. This shape would match a metate on which the entire surface was used, resulting in a shallow trough. The mano is biconvex in cross section. Both sides exhibit heavy use, one side more than the other. Numerous use striations are evident perpendicular to the long axis. The striations indicate a unidirectional or reciprocal grinding motion. Some rocking is indicated by the rounded grinding surfaces. If the mano was not rocked, a biplano, or plano-convex cross section would have resulted. Project personnel recovered one additional fragment of this type of mano. Graham (1981) illustrates elaborate, overhanging bar manos. This type of mano is characteristic of the Guanacaste-Nicoya area (ibid.).

Concave Bar Mano (2 Fragments)

We recovered two fragments of bar manos with concave grinding surfaces (long axis) (Fig. 12-7*c*). These apparently were used on metates with



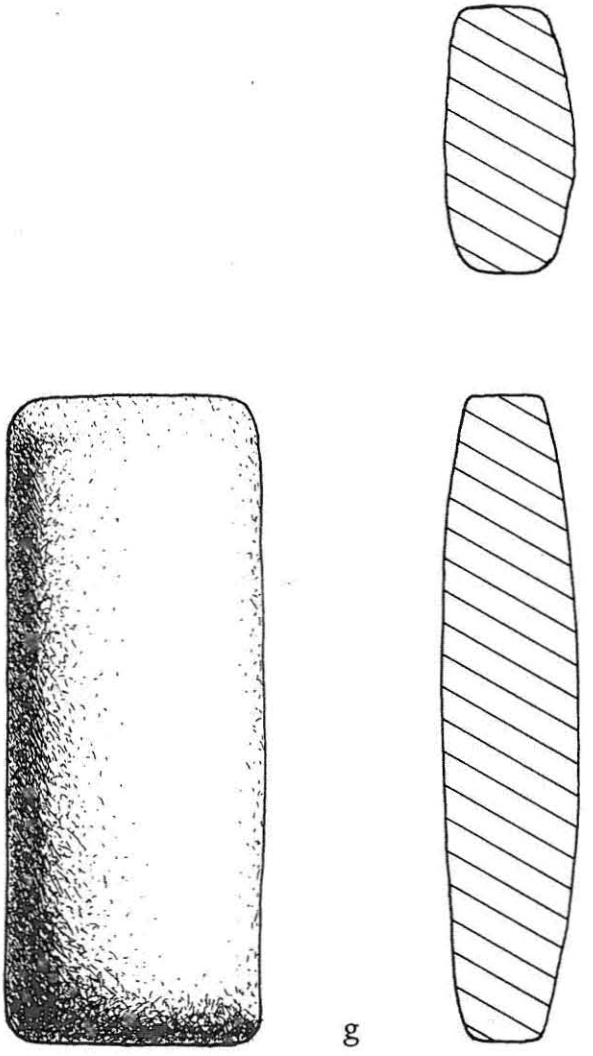
slightly convex grinding surfaces. We also found two edge fragments from metates that may have had that characteristic. These manos are biconvex in cross section and are made from nonvesicular to moderately vesicular volcanic stone. The two fragments show evidence of use grinding.

Ovoid Mano (2 Whole Specimens and 2 Fragments)

These manos are ovoid in plan view and biconvex in cross section (Fig. 12-7*d*). Both sides were used for grinding, and striations are perpendicular to the long axis. The ends of the manos are pecked flat and smoothed. The manos are made of nonvesicular stone. The Jiménez family found one ovoid mano at the Silencio cemetery. It is similar to the other manos in this category in plan view, but is biconvex in cross section rather than oval. Einhaus (1980:455) illustrates what she terms ovoid handstones, which actually range from ovoid to oval in plan view.

Oval Mano (4 Fragments)

This type is oval in both plan view and cross section (Fig. 12-7*e*). They are made from volcanic stone, which varies from nonvesicular to slightly vesicular, and are not extensively shaped. They can have one or two grinding surfaces. The four mano fragments show evidence of grinding, but do not have use striations. One mano fragment has extensive battering on one end. The grinding surfaces and battering suggest the use of these manos for both milling and crushing. It is likely that this type was used with basin metates.



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Rectangular Mano (1 Fragment)

This mano fragment is rectangular in plan view and slightly biconvex in cross section (Fig. 12-7*g*). The mano is well shaped and is made of nonvesicular volcanic stone. It is highly weathered and shows little sign of use and no striations.

Mano Fragments (3 Specimens)

The Arenal Project recovered three mano fragments, which are too fragmentary to allow further classification.

GRINDING STONES

Grinding stones are pebbles or stones too small to be considered manos. These objects may have been used to grind pigment or other substances, or to burnish or polish other ground stone artifacts or ceramics.

Cobble Grinding Stones (4 Whole Specimens)

These are unshaped river cobbles with one faceted surface. They were used with one hand and possibly in a circular grinding motion, although we observed no striations indicating direction of grinding. According to Snarskis (personal communication, 1984), stones similar to these may have been used to grind paint pigments. Artifacts of this type have been found associated with such pigments.

Loaf-shaped Mano (2 Whole Specimens and 6 Fragments)

Loaf-shaped manos have plano-convex cross sections and, as their name suggests, are shaped like a short loaf of French bread (Fig. 12-7*f*). Two whole manos of this type, one small (9.2 cm long) and one larger (23 cm long), come from the Jiménez collection. The smaller is of nonvesicular stone; the larger is of a stone with small vesicles. The small mano shows little use wear, while the large mano shows heavy use on two sides. Striations running perpendicular to the long axis occur on both sides. Those loaf-shaped manos that display use on both sides may have been dual-function grinding tools. A rocking motion was used with the convex side and a flat, back-and-forth motion was used on the other side.

Discoidal Grinding Stone (2 Complete Specimens)

These grinding stones are small (less than 4 cm in diameter). They are circular in plan view and slightly biconcave in cross section. Both have two slightly used grinding surfaces. Their function is unknown.

Burnishing Stones (1 Complete Specimen and 1 Fragment)

The one burnishing stone and fragment of a burnishing stone we found were probably utilized in smoothing or polishing ceramics. These stones are small (the complete item is 3.3 cm long), unshaped pebbles. Each has a faceted grinding surface, with no striations evident.

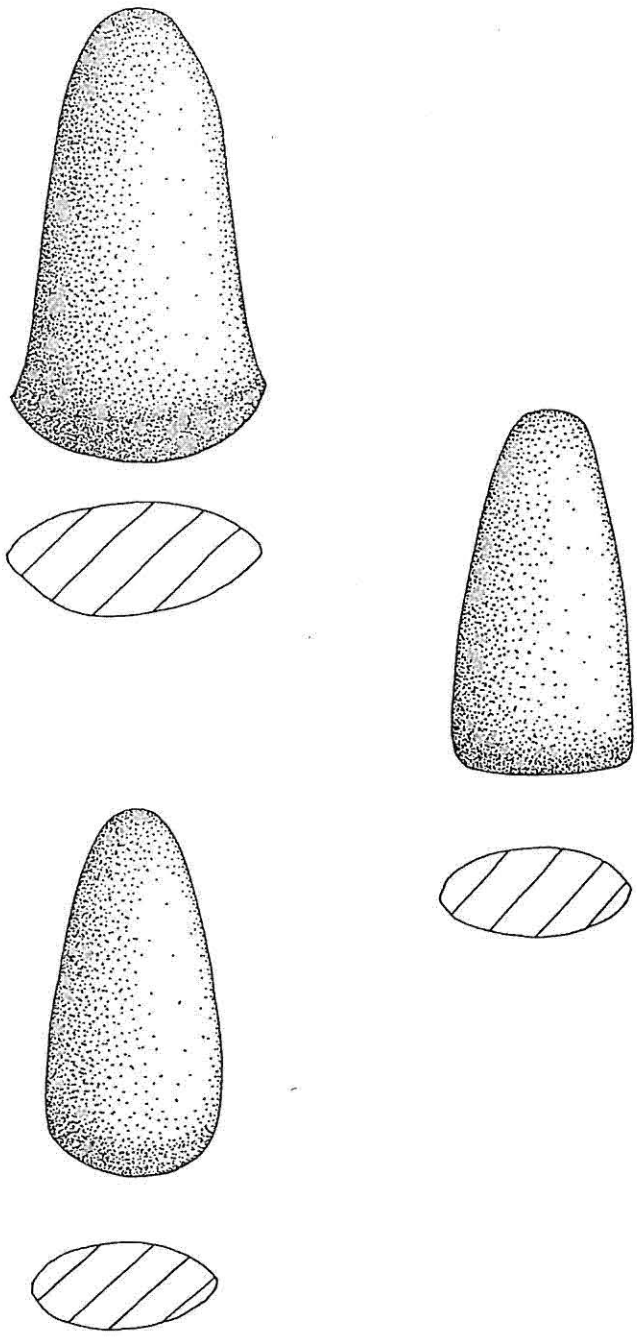

Figure 12-8.
Celt types for the Cordillera de Tilarán. Clockwise from upper left: flaring-bit celt, straight-bit celt, and rounded bit celt. Drawing by Mark Chenault.

NUTTING STONE

This rectangular "brick-shaped" stone with small circular pecked depressions was probably used for cracking nuts. It has two circular depressions on each of three sides. On the fourth side there is only one depression and what appears to be the start of a second. If this item is a nutting stone, we do not know why depressions would be needed on all sides, as only one side could be used at a given time. A very slight amount of grinding is evident on one side of the stone. The stone is nonvesicular andesite. Nutting stones are illustrated by Lange (1980a:fig. 4, B and C). Similar artifacts, though of a softer stone (siltstone), have been found in Panama (Einhaus 1980). An andesite boulder with five small, shallow depressions is described as a nutting stone by Sheets, Rosenthal, and Ranere (1980).

MISCELLANEOUS FRAGMENTS

There are four ground stone fragments that, due to their small size, we could not categorize. One piece appears to be from a carved artifact and has a small groove running across it. The remaining three fragments have ground surfaces, but no other diagnostic features.

POLISHED STONE

CELTS

We analyzed seven stone celts and twenty-seven celt fragments collected by the Arenal Project. We also studied two whole celts and three celt fragments from the Silencio cemetery and now in the Jiménez collection. Melson (personal communication, 1984) has identified the raw material of most of the tools as slightly hydrothermally altered plagioclase-phyric andesite. This is a dense and hard nonvesicular volcanic rock. Figure 12-8 is a drawing of the three celt types from the Arenal basin.

Flaring-Bit Celt (5 Fragments)

These celts have bits that flare outward at the edges. None of the fragments has an intact poll. Use striations are not evident on any of the specimens. Two of the celts have small flakes removed from the bit, apparently during use. On several of the celts, production or sharpening striations are

present. These are short parallel lines that occur across the bit of the celt, perpendicular to the long axis of the tool. These striations occur only at the bit end.

Straight-Bit Celts (5 Whole and 6 Fragments)

The Proyecto Prehistórico Arenal found three complete specimens and studied two from the Jiménez collection. This type of celt has edges that do not flare or become round at the edge of the bit. Instead, the edges and the bits almost form right angles. In some specimens the edges are ground, forming a flat, faceted surface. A straight bit celt from the Guanacaste region is illustrated by Bernstein (1980:fig. 5).

One of the project celts of this type is small (7.7 cm long) and well made, with a poll section that is not as well smoothed as the bit section. The poll is pointed and shows some signs of battering. No use striations are evident on the bit. Another celt is rough, with flake scars over most of its surface; only the bit section is well ground. The poll is pointed and battered. A third celt is short (8.1 cm), but wide and thick (5.1 cm wide, 4.2 cm thick). Its shortened form suggests that it may have been broken and reworked. The poll appears to be very battered. The edges and most of the surface of the celt are rough. Only the bit is ground smooth.

Two small celts (5.2 cm long and 5.8 cm long) come from the Jiménez collection. These celts are well polished over most of their surfaces and exhibit fine production striations. On one, the production striations run in all directions; however, short use striations occur on the bit, parallel to the long axis of the celt. On the other, the production striations occur perpendicular to the long axis. No use striations are evident.

Rounded-Bit Celts (2 Whole and 4 Fragments)

A fragment of a rounded-bit celt is illustrated by Bernstein (1980:fig. 7, item on the right). This type of celt has a bit with rounded edges (Fig. 12-9). One of the whole specimens has a somewhat rounded poll, the other has a pointed poll. The polls on both of these celts are battered. The celt with the pointed poll is polished on only about one-fourth of its surface (the bit portion). The remainder was left rough, perhaps to facilitate in hafting the tool, or perhaps to decrease time spent in manufacture. A small (7.2 cm long), rounded-bit celt is part of the Jiménez collection. It has a pointed poll that shows signs of battering. The celt is rough over most of its surface, and is ground smooth on only a portion of one side.

Celt Fragments

Two celts lacking bits are part of the Jiménez collection. The bit on one celt appears to have broken off, probably a result of use damage. The other celt displays evidence of resharpening. It appears that most of the surface of the celt was roughened by pecking, with only the bit section on one side retaining a portion of the former polished surface. The bit was then apparently flaked to prepare a platform for further flake removal. A flake was successfully removed from the polished side of the celt. The other side, however, appears to have been damaged during the resharpening process. We also recovered the midsection and two highly weathered fragments of celts. One of the weathered fragments appears to have been reused as a hammerstone after breakage.

CHISEL

We recovered a small ground and polished chisel fragment from site G-169. We found the fragment in Stratigraphic Unit 30, indicating that it probably dates to the Silencio Phase, although we found some Tilarán Phase materials in Unit 30 at this site as well. The chisel fragment measures 2.9 cm long, 2.0 cm wide, and 1.8 cm thick. It weighs 15 g. The bit end appears to have been heavily used. Chisels are not as wide as celts, but, like celts, are biconvex in cross section (Einhaus 1980).

SLATE MIRROR BACK

We found a small fragment of what is probably a slate mirror back (Snarskis, personal communication, 1985) at Site G-164. The fragment is 4.9 cm long, 2.1 cm wide and 0.4 cm thick. By projecting the curved edge, however, we have determined that the complete artifact would have been a disk 14 cm in diameter. It probably dates to the Arenal Phase. One side of the fragment is ground flat and polished. The edge of the disk is ground and beveled. The edge is also smoothed to a polished surface. The other side, which would have supported the mirror pieces, is ground, but not polished. Grinding striations are visible running diagonal to the long axis.

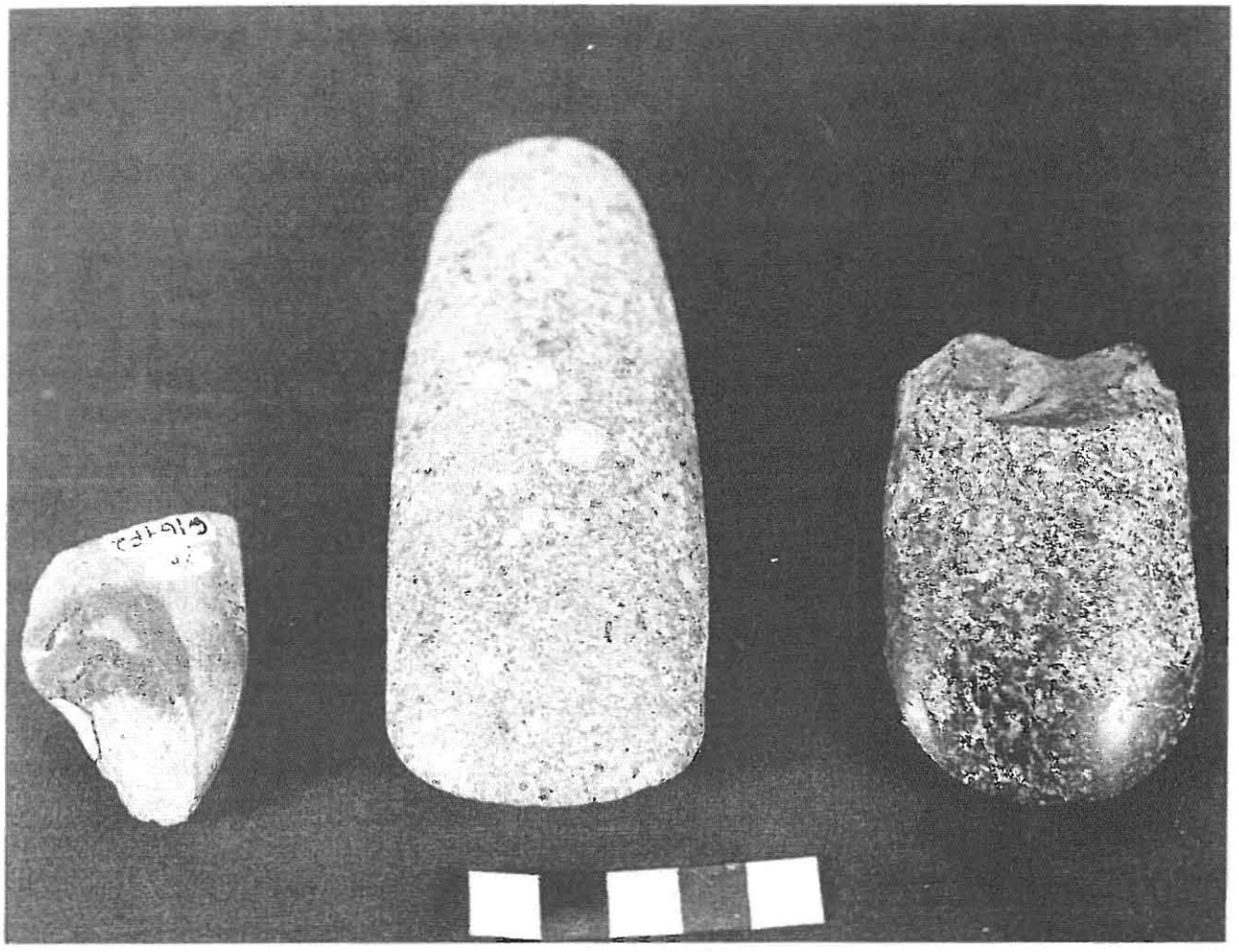

Figure 12-9.
Rounded bit celts from G-169, G-174, and IF-17. Photograph by Fran Mandel-Sheets.

Slate mirror backs occur in many areas of the New World, ranging from the southwestern United States to Peru (Stone and Balser 1965), with numerous slate-backed pyrite mirrors having been found in Mesoamerica (Adams 1977) and in lower Central America (Stone 1977). Prehistoric mirrors in the New World have been described by several authors including Nordenskiöld (1926), Mason (1927); Kidder et al. (1946), and Strauss (n.d.). Slate-backed pyrite mirrors consist of disks of slate, although other forms such as rectangles can occur (Mason 1927), with mosaics of pyrite glued to them using some type of organic glue. The cut and polished pieces of pyrite form a highly reflective surface. Some of the mirror backs are polished but lack carved designs, as is the case for the Arenal mirror back fragment, whereas others are highly decorated. Other types of mirrors also occur in Mesoamerica, such as the concave pyrite mirrors of the Olmec (Carlson 1981; Heizer and Gullberg 1981), and Aztec obsidian mirrors (Pasztory 1983).

Stone and Balser (1965) discovered twelve slate disks at the site of La Fortuna and seven slate disks at Guácimo in Costa Rica. These disks are all believed to have been mirror backs, many retaining traces of the gum used to glue the mirror pieces in place. Three of the disks are highly decorated, one with human figures, including a ball player, another with an abstract design, and the third with incised Maya hieroglyphs (ibid.: figs. 15, 21, and 22). The hieroglyphs were apparently used for decoration only, as they do not make grammatical sense. The disks are believed to have been manufactured in the Mesoamerican region, possibly in the Petén, around AD 500. The slate disks were all found in mortuary contexts with associated grave goods of reworked jades, gold objects, and incised pottery (ibid.).

INCISED STONE

We recovered six large volcanic stones with incised lines from several sites in the Arenal basin. We found these stones in cemeteries, although we found none in completely undisturbed stratigraphic context. Because of this, and because the incised lines usually do not extend deeper than the weathered outer portion of the stone, we at first doubted their antiquity (Chenault 1984a). However, several of these objects have more recently been recovered from additional sites. One of these stones—a very large piece (more than a meter in length and 30 cm to 50 cm in width and thickness)—was found in a large looters' pit at site G-151 with one end extending into the undisturbed stratigraphy. Because of this evidence, we now believe that these objects are prehistoric.

The stones are incised with shallow lines forming geometric patterns (Fig. 12-10). Their function is unknown, but they may have served as markers to define site boundaries or areas within a site. In addition to the large incised stone from Site G-151, we recovered three smaller stones and one large piece from Site G-150, and one at Site G-181.

TEMPORAL DISTRIBUTION OF GROUND, POLISHED, AND INCISED STONE

Based on stratigraphic context and association with ceramic materials, we postulated the following temporal distribution for the ground, polished, and incised stone artifacts from the Arenal basin. We do not include materials found on the modern ground surface in the temporal analysis.

TRONADORA PHASE

Very few ground stone or polished stone artifacts were recovered from deposits that date to the Tronadora Phase. Six of the eleven ground and polished stone artifacts from Site G-163 were surface finds. Ceramic analysis indicates a major Tronadora Phase and significant Arenal Phase occupation of the site. We found a small amount of Silencio and Tilarán Phase ceramics in the upper levels at the site. We found one metate fragment, with a knob leg, associated with Tronadora and Arenal Phase ceramics. We discovered one small knob leg from a metate in Unit 60 and associated with Tronadora Phase ceramics. It is impossible to tell, due to the fragmentary nature of the pieces, if they are from the same metate type. The remaining pieces from G-163, with stratigraphic context, are too fragmentary to allow placement in the typology and, therefore, provide little interpretive data.

ARENAL PHASE

The ground and polished stone collection is much more substantial for the Arenal Phase. We recovered no whole metates during excavation of Arenal Phase sites; however, we found numerous fragments of deliberately broken items at Site G-164. The predominant metate type found in association with Arenal Phase ceramics is the ovoid tripod type. Metates dating to the Arenal Phase are thin with rounded edges and cylindrical or conical legs. Vesicular to moderately vesicular stone is the predominant raw material. Many of the metate fragments exhibit heavy use grinding. None are decorated.

The majority of manos in use during the Arenal Phase were bar manos, including the overhanging and concave varieties. Most are made of stone with small vesicles, and many show extensive use wear. All of the manos recovered are fragmentary. The breakage of these stone artifacts may be a result of postinterment practices during the Arenal Phase. Nearly all of the ground stone recovered in Arenal context was found at Site G-164 (Chap. 5), where human burial practices appear to have involved the breakage of artifacts on top of rock mound tombs.

We found numerous celts associated with Arenal Phase ceramics at G-164. We recovered both straight-bit and flaring-bit celts. Most of the celts found at G-164 are complete and were found in graves, not on top of the stone mounds. We found the slate mirror back near the top of the stone mound at G-164.

SILENCIO PHASE

The majority of the ground stone artifacts collected by the Arenal Project were found during excavation of Site G-150. Occupation of the site dates primarily to the Silencio Phase, with only very minor amounts of earlier and later phase ceramics (Chap. 6). The large, tenoned stone platform found at Site G-181 also apparently dates to the Silencio Phase. Although both Arenal and Silencio Phase ceramics are found at G-181, the blocky nature of the object and its relative elaborateness indicate that it most likely dates to the Silencio Phase. It appears that Costa Rican ground stone had a tendency to become more angular and blocky later in time (Snarskis, personal communication, 1985). The other tenoned stone item recovered by the project was found at the Silencio cemetery (G-150), but was a surface find.

Metates made during the Silencio Phase take many forms, including the following types: rectangular decorated, rectangular tripod with zoomorphic heads, rectangular tripod, rectangular tripod with cylindrical legs, ovoid tripod, ovoid with knob legs, and oval tripod metates. Although oval tripod metates appear to occur in all areas of Costa Rica during several time periods, the only whole item project personnel recovered is clearly associated with Silencio Phase ceramics. One whole ovoid tripod metate was found in a Silencio Phase burial at Site G-150. It appears to be somewhat anachronistic in that context, since ovoid tripod metates are the predominant type during the earlier Arenal Phase. The legs of the metate do show some tendency toward angularity, however; in fact, the front leg is roughly D-shaped, a trait found on rectangular tripod metates. The blocky, angular, and heavy rectangular tripod metates are definitely dated to the Silencio Phase. The D-shaped front leg of the ovoid tripod metate found at the Silencio site suggests that this type may be transitional between the Arenal and Silencio phases. It may also have been curated for some time before it became a grave offering.

Manos made in the Silencio Phase are very similar to those in use during the preceding phase, and are mostly bar manos. This interpretation, however, could be biased because of the small sample size.

Rounded-bit and flaring-bit celts are found with Silencio Phase occupation. We have not unearthed rounded-bit celts at earlier sites, and straight-bit celts do not seem to occur at Silencio Phase sites.

TILARÁN PHASE

The Arenal project found no identifiable ground, polished, or incised stone artifacts dating to the Tilarán Phase.

SUBSISTENCE

It is difficult to determine the function of many of the prehistoric stone artifacts found in the Arenal basin. The stone tools have lain buried in the acidic rain forest soil for centuries, or were eroded out onto the surface and weathered by the elements. Most traces of the vegetal materials the tools were used to process have long since disappeared. Yet, through ethnographic analogy, we can suggest uses for many of the ground, polished, and incised stone artifacts.

Most of the ethnographic data are concerned with subsistence. These data show that tripod, volcanic-stone metates are ubiquitous in Mexico and much of Central America. Modern Indian groups throughout the region use metates and manos to grind many substances.

While the Arenal Project found some remains of corn (*Zea mays*), the amount was quite small (Chaps. 13, 14, and 15). This is partly a result of poor preservation. Evidence from bone collagen tests indicates that the percentage of maize in the aboriginal diet was under 12 (Friedman and Gleason 1984; Chap. 6).

In addition to maize, we discovered several other types of seeds, which might have been ground with manos and metates, at sites in the Arenal area (Chap. 16). These include one bean (*Phaseolus vulgaris*) found at Site G-150, and a fragment of a bean recovered from G-169. There is ethnographic evidence that indicates that beans are sometimes ground, usually after being cooked. We recovered palm nuts, both of pejibaye (*Bactris gasipaes*) and of unidentified species, from Sites G-154, G-163, and G-164 (Chap. 16). Nutting stones are believed to have been used, with a hand-held stone, to crack open the hard shells of the nuts.

Figure 12-10.
An example of an incised laja from site G-150. Photograph by Fran Mandel-Sheets.

One of the most important stone tool types to the ancient Costa Ricans must have been the celt. In the tropical environment of the Arenal area, celts would have been used extensively in clearing away the thick vegetation for agriculture and habitation. They were also used in cutting wood for fuel, housing, implements, and other uses.

CEREMONY

The location of many of the ground and polished stone artifacts in human burials indicates their possible function as ceremonial objects. We recovered the majority of whole metates and celts from cemetery sites. This may be due to sampling error, but the inclusion of these tools as burial offerings removes them from a purely subsistence context.

We also recovered the tenoned stone objects and the incised stones from cemetery sites. Their nature as highly decorated objects with little use wear, together with their provenience, indicates their nonsubsistence role.

It is not clear whether many of the artifacts were used in both subsistence and in ceremony. Many of the metates are highly decorated, but some also exhibit a high degree of use wear. Simpler metates are also often found with burials, and sometimes show heavy use.

Manos and grinding stones do not appear to have been used as burial offerings. Most of the manos are surface finds, and we recovered metates from burials without finding corresponding, or indeed any, manos. We found some manos, however, in the deposit of broken cultural materials overlying the stone burial mound at Site G-164 (Chap. 5).

Mirrors and slate mirror backs were almost certainly high-status objects in Precolumbian society. Carlson (1981), in discussing Olmec mirrors, suggests that they may have functioned as symbols to "capture" the power and light of the sun, to create fire and smoke, or they may have been used in shamanistic healing practices (as indicated by Mesoamerican ethnographic analogy) and functioned as symbols of elite status. A similar function can be suggested for the Costa Rican mirror backs, as stated by Stone and Balser (1965: 321): "There is little doubt that iron-pyrite mirrors backed by slate plaques were coveted articles of trade even in a land so remote from their point of manufacture as lower Central America. It is possible that at one time they might have been used as heirlooms. It seems clear that they were highly esteemed and perhaps served as ceremonial objects or as symbols of rank."

The slate mirror-back fragment from Site G-164 probably also served a ceremonial function. Its inclusion with the assemblage of broken objects covering the stone burial mound indicates that it was part of the ceremony associated with the interment of the dead. Prior to its inclusion as a grave offering, the complete slate disk was probably a high-status item, as were similar objects occurring throughout Mexico and Central America.

SUMMARY AND CONCLUSIONS

The sample of ground and polished stone tools from the Arenal Project is relatively small, yet it provides some information concerning subsistence, ritual, and chronology. The majority of artifacts recovered are metates or metate fragments. This is probably due to sampling error. Most of our excavations occurred at cemetery sites, where metates were common burial furniture, especially during the Silencio Phase. Their inclusion in burials indicates that they were considered important, even perhaps in the afterlife.

Metates were no doubt used by the ancient Costa Ricans to grind many different materials in addition to maize. Recent studies have examined ethnographically some of the variety of products that are processed using manos and metates (e.g., Southward 1982). Replicating ground stone tools and using them to process a variety of materials can help to determine the causes of use wear on archaeological, ground stone specimens (Cater n.d.); however, no experimental work has been done to replicate the use wear on the Arenal metates.

The metates recovered from the Arenal area vary a great deal in appearance, from unmodified boulders and plain tripod metates, to those with carved decoration and animal heads. It is clear from the artistic treatment of many of the metates that they were not thought of as purely utilitarian objects. Instead, many were used as a medium of artistic expression and may have had ritual or ceremonial significance. In any case, they were valued enough to have been placed in the graves of the deceased.

The Arenal metates have some use as relative chronological markers. Metates with smoother, more delicate lines and rounded edges preceded the blockier, heavier pieces with sharper edges. Along with the evolutionary trend toward blockiness, however, went a tendency toward more extensive and finer surface decoration. Also, some of the heaviness and squareness of the later pieces seem to have, at times, been alleviated by creating openwork in areas such as legs.

The majority of manos found by the Arenal Project are bar-shaped. During the excavation of the Arenal Phase, we found manos in ritual context in their placement, often in broken form, over the stone burial mound at Site G-164. They were not interred with human remains in this phase or in the later Silencio Phase, when metates without manos were commonly placed in graves. Whatever the ritual importance of metates, it did not apparently require the presence of manos in the Silencio Phase. The Arenal manos, though often well shaped, are not decorated.

There appears to be little chronological change evident in the manos from the Arenal basin. This, as stated earlier, is perhaps a result of the small and uneven sample; we recovered very few manos from contexts dating to other than the Arenal Phase.

We suppose that the manos, especially the two-handed bar types, were used in conjunction with metates. Again, experimental work has not been done to try to replicate the use wear found on the Arenal manos. The wear evident on the vast majority of those manos, however, indicates that they were used in grinding against another stone. This stone-against-stone grinding is indicated by the truncation of grains found on the grinding surfaces of most of the manos. Striations, when present, usually indicate a reciprocal grinding motion.

Other ground stone artifacts include small grinding stones and one apparent nutting stone. Data are too incomplete to tell if these items changed significantly through time; therefore, little can be said about their role in subsistence. They appear to have had utilitarian functions as, for example, ceramic smoothing stones and anvils for the cracking of hard substances.

Nonutilitarian uses can be suggested for the large tenoned stone objects and for the incised laja. While their uses are unknown, their provenience in cemetery sites, their high degree of surface decoration, and their lack of use wear indicate that their function was ritual. The complete tenoned piece may have been an altar or chair/throne, and the incised stones may have been markers of some kind.

Polished stone recovered from the Arenal basin consists of a number of celts, one apparent chisel fragment, and one fragment of a slate mirror back. In a tropical environment, celts would have been important tools in clearing land and for obtaining wood for building materials. The celt must have been so important in subsistence that it also took on some ritual importance, as indicated by the occurrence of many celts in the context of human burials. This ritual significance may have also resulted from the difficulty in manufacturing celts, many of them being of hard and dense greenstone, and because the greenstone had to be obtained from the distant Santa Elena Peninsula. Celts exhibit a change in form through time, with the straight-bit and flaring-bit celts associated with Arenal Phase ceramics and the rounded-bit celts with the Silencio Phase materials.

As a collection, the ground and polished stone artifacts from the Arenal basin show a general trend through time toward blockier and heavier pieces with, however, an increasing emphasis on finer surface decoration and perhaps increased use of the zoomorphic head motif. The sample of artifacts from stratigraphic contexts and the data on use wear analysis are too incomplete to allow for determination of changes in subsistence practices through time based on ground stone analysis. What is apparent, however, is that the prehistoric Costa Ricans were not satisfied with purely functional objects, but instead imbued many of their ground and polished stone tools with artistic grace.

ACKNOWLEDGMENTS

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