ARCHAEOLOGICAL SAMPLING ON UTILA, BAY ISLANDS, HONDURAS

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The Setting

The Island of Utila (Fig. 1) is the smallest and westernmost of the Bay Islands group in the Gulf of Honduras. Utila, the two larger islands of Guanaja and Roatán, three minor islands, sixty-three cays, and two small ancillary cays (Cayos Cochinos) form the Department of the Bay Islands, one of seventeen political districts of the Republic of Honduras.

The three major islands represent peaks of submerged east-west geologic basement and associated coral reefs. They were formed by relatively recent tectonic activity along the southern escarpment of the Bartlett Trough (McBirney and Bass 1969:230). In contrast to Guanaja and Roatán, Utila is comparatively low. The island, which is 8.4 miles long and 2.9 miles wide at its extreme limits, is divisible into two geologic zones. The largest of these, seventy-five per cent of the land mass, consists of alluvium and organic swamp sediments. All of the island west of East Harbor and the area southeast of the Harbor (Fig. 1) is low and swampy. As Lord (1975:47) has noted, the underlying limestone formation in these low areas serves as a catchment for rain, which percolates through sand and gravel. The net result is a shallow water table, usually from ten to twenty feet below surface. This is especially significant, since there is no surface water on the island. Most potable water on Utila comes from shallow, hand-dug wells. As a concomitant, the supply of water is reduced substantially during the dry season. Since tides accelerate the percolation of swamp water, protracted periods of reduced tides also affect the water level. In the low areas mangroves are the dominant form of vegetation. That mangroves have been important in building up marine sediments and cumulose soils is reasonably certain (Davis 1940:383). Red mangroves *(Rhizophora)* fringe the *manglar*, and extend into the interior; black mangroves *(Avicennia)* are common in the interior; white mangroves *(Laguncularia)* occur in small communities throughout the *manglar* though, as Davis (1940:336) has noted for Florida, nowhere are they the dominant species. Bark from the red mangrove sometimes is used to produce dye for staining leather; however, the principal use of mangroves on Utila today is for making charcoal.

The second major geologic zone on Utila consists of alkaline-olivine basalt lavas and tuffs; this zone contains the only known exposed quaternary volcanic rock in this part of the Caribbean (McBirney and Bass 1969:239). This formation is limited to the eastern portion of the island, excluding the *manglar* southeast of East Harbor. Pumpkin Hill on the northeast coast is the highest point on the island (elev. 290 ft.); it is the remnant of a wave-battered pyroclastic cone built on a base of coralline limestone (*ibid.*). Stuart Hill, just northwest of the town of Utila, comprises the only other major natural rise in elevation (169 ft.). According to McBirney and Bass, it is

> an arcuate ridge composed of basaltic tuff breccia and abundant blocks and small fragments of coral, limestone, and metamorphic debris. A series of disconnected hills and smaller ridges on the northeast completes what seems to have been the rim of a central crater from which the fragmented materials erupted. Large, ropy bombs of olivine-augite basalt are common, and in places radially outward-clipping layers of palagonitic tuff breccia contain large blocks of vesicular basalt up to 1 M across (1969:238).

While in general this interpretation is undoubtedly correct, two points need to be made. First, Stuart Hill is located on the perimeter of the area known locally as 'The Bamboo'. The Bamboo contains the 80-Acre Site described by Strong (1935), and preliminary archaeological survey indicates that this site extends well beyond the area Strong surveyed (see Fig. 1). This area is punctuated with rubble-filled mounds dating from the period of aboriginal habitation, although this may be difficult to discern given the dense overgrowth. It is possible that some of the disconnected hills and small ridges to which McBirney refers are man-made. Second, Rose (1904) and Strong (1935:140) suggest that Stuart Hill is the point of convergence of four cobbled causeways, presumably of aboriginal origin. However, these features seem to be consistent with McBirney's description of the geomorphology of the area. Arthur Bronlow (personal communication) believes the 'causeways' to be natural, rather than man-made. Nevertheless, it is clear that the area known as The Bamboo was in fact the primary locus of pre-Columbian habitation on Utila.

The topology of Utila follows a gradual west-to-east incline. Major elevational differences are contained in the volcanic eastern portion. In addition, this area contains three caves, all containing fresh water, and all having evidence of aboriginal utilization (Strong 1935:33-34). Of the 24.36 square miles total landmass, the six that are suitable for agriculture are primarily located in The Bamboo (Lord 1975:57). This savanna area takes its name from the several species of 'bamboo grass' that are prevalent here, including *Asclepias curassavica,* and *Palicourea* sp. It is possible that much of this represents secondary growth due to years of cultivation, although, with the exception of scattered small garden plots, this area is not utilized in agriculture today. Craig (1967:71) suggested a long period of intensive clearings for 'provision ground' type of cultivation on Guanaja. Nevertheless, in historic times Utilan agriculture has focused on such cash crops as coconut and plantain. The former grows in areas adjacent to the coast; the latter is a late introduction as well. Lord (1975:54) is of the opinion that most food plants grown in house gardens on Utila were imported to the island from the 1830's onward. This is clearly the case for breadfruit *(Artocarpus altilis),* banana *(Musa* spp.), and the various citrus fruits. However, some cultigens are undoubtedly of considerable

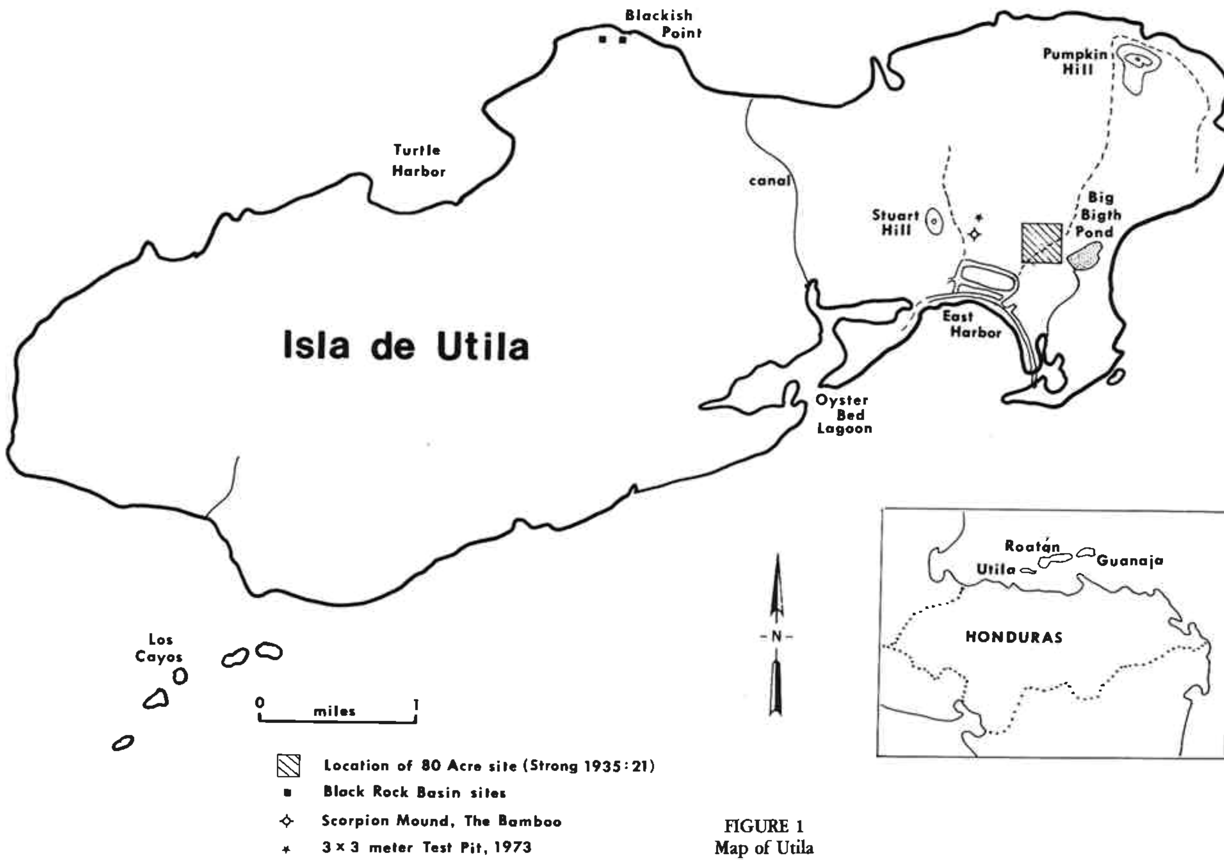

FIGURE 1
Map of Utila

antiquity, including mamey *(Mammea americana)*, guava *(Psidium guajava)*, the curcubits, and manioc *(Manihot esculenta)*. Strong (1935:14), citing an unnamed historical source, states that the Bay Islands supplied Cortez' settlement at Trujillo with both maize and manioc. The other aforementioned food plants have a pan-Caribbean distribution (Howard 1973). Other indirect evidence recovered to date (*e.g.* the number of metates from archaeological contexts) as well as the strategic location of the Bamboo Mounds *vis-à-vis* agricultural lands, suggests that farming was important prehistorically. Lord (1975: *passim*) has argued convincingly that the geologic structure of the island inhibits attempts at mechanized agriculture, thus preadapting the island's modern inhabitants to a system of remittance rather than subsistence economy. There is no reason to suppose that this obtained prehistorically, given the nature of *milpa* agriculture and of *conuco* horticulture. Craig's suggestion (1966:111) that the aboriginal inhabitants of the Bay Islands were non-agricultural appears to be a subjective judgement based on the bias of a fishing geographer, rather than on archaeological data.

Besides food plants, Utila has a component of other useful flora. Lord (in preparation) has documented the use of a variety of medicinal plants by contemporary islanders, *e.g.*, circe *(Monordica charantia)*, ramgoat *(Vinca rosea)*, and stinking toe (*Cassia* sp.) are used as blood builders. The proliferation of medicinal plants among today's islanders is consistent with Columbus' description of Honduras as replete with medicines (Strong 1935:13). One of us (R.C.G.) has been treated somewhat successfully for ciguatera poisoning with a tea brewed from 'fever grass' *(Cymbopagon)* and sap from a wild fig tree *(Ficus* sp.). The latter is particularly interesting in view of Thompson's (1970) suggestion that Maya bark cloth was made from *Ficus* trees, and further, that this tree is limited in distribution to the tropical lowlands. Bark beaters were found in archaeological context on Utila in 1973; they were also found by Strong at the Dixon Site on Roatán (1935: Pl. 16, k-1), and at the H-CN-12 Rio Claro site, Departamento de Colón, by Healy (personal communication), where they date from the Cocal Period. Sea grape *(Coccoloba uvifera)* is present on Utila, especially along the north coast. This is the classic component of strand areas in the Antilles (Howard 1973:7). Wild cotton is also present on Utila *(Gossypium hirsutum)*. Fibrous bark from the mahoe tree *(Paritum elatum)* provides the poor man's rope which is used by contemporary Utilans (Lord 1975:55).

Because of Utila's insular character, Utilans tend to view their weather in terms of prevailing winds. Seasonal patterns of rainfall, temperature, and of destructive storms all correlate with easterlies and nor'westers; both of these can effectively blockade the island. Winter (October through January) is the rainy season; it is the time of the nor'westers that carry the bulk of the year's rainfall. March is a hot, still month, with characteristically low visibility due to fog; towards Easter this weather is called 'Good Friday Weather' (Lord 1975:51).

This signals the beginning of summer, when rainfall averages about five inches per month, and which lasts until the nor'westers resume. Average yearly rainfall on Utila is about 100 inches; the average temperature is 80.06° F, with a range from about 65° to 91°.

Utila's insular character is also reflected in its fauna. Indeed, other than domesticates, terrestrial fauna is limited today to *Iguana* spp. (some of which attain six feet in length—Lord 1975:56), 'Wishiwillies'—an unidentified species of lizard, possibly *Ctenosaura* sp., and 'Waulas'—small boa constrictors. Both crocodiles and caimans were apparently known historically; both are now extinct on the island. Determination of additional fauna that were present prehistorically will have to await future research. Although the avifaunal assemblage includes ground doves and hummingbirds, most Utilan birds exploit the littoral and marine environments. Pelicans, seagulls, herons, and egrets are all plentiful. The only land animal found in sufficient quantity to merit the attention of the 1974 expedition to the island was the scorpion, probably *Centruroides margaritatus* (H.L. Stahnke, personal communication).

Most of Utila's coast is comprised of extensive foreshore flats, with depths up to ten fathoms. In this area *Thalassia* sp. predominates. This is the turtle grass that provides feeding grounds for the green *(Chelonia mydas)* and hawksbill *(Eretnochelys imbricata)* turtles. This is also the habitat of the conchs: *Strombus gigas, Cassis madagascariensis,* and *Fasciolaria gigantea.* Of these, *S. gigas* is most important economically today. Craig (1966:108) believes the conch *Cassis madagascariensis* to have 'no utilitarian value'; however, it is present in archaeological contexts on Utila, and apparently was eaten in prehistoric times throughout the Caribbean (Goodwin and Walker 1975:31). Craig (1966:103) notes that conch is not found to any considerable extent along the north coast of Honduras, due to extensive silting from the various rivers. He suggested later that the presence of conch in the Bay Islands, especially of the 'Bay Islands Broad Leaf' variety of *S. gigas,* was an important inducement for aboriginal settlement (1967:74).

Reefs are present off Turtle Harbor, Blackish Point, and Rock Harbor on Utila's north shore. The largest reef complex lies off the west end of the island, and extends past the cays as much as two miles into the Caribbean. Wing (1974) has demonstrated the sort of inferences that can be made about aboriginal utilization of reef environments, *e.g.,* requisite technology, species lists, etc. Unfortunately, no systematic sampling either of archaeological fauna or of contemporary fish populations has yet been conducted for Utila. More important fishing grounds than the reefs are known for Utila. According to David Lord,

> Fishing banks two to sixteen miles distant are important in providing fish for market and local consumption alike. More than a dozen banks were identified by informants, some only a few yards square in area, others as large as two and a half miles long by a mile wide and ranging in depth from nine to 180 fathoms (1975:45).

Of particular importance are the Pumpkin Hill Bank and a large fishing ground north-northeast of Utila (see Craig 1966: Map 19, p. 76). In the former porgies *(Sparidae),* wahoo *(Acanthocybium),* red snapper *(Lutjanus buccanella),* and hogfish *(Lachnolaimus maximus)* are taken. In the larger fishing ground bonito *(Katsuwonus pelawus)* and albacore *(Thunnus atlanticus)* are plentiful. Craig (1966:84) has observed that these fish, in large schools, follow the circular surface currents, returning repeatedly to an area midway between Utila and Glovers Reef. It will be interesting to determine if these fishing grounds were utilized prehistorically. They have been fished in historic times from small doreys; Craig (1966:31) believes that the structural form of the doreys is 'of certain aboriginal design'.

One final feature of Utila's littoral zone merits attention. The Utilan shoreline is broken by entrances to two large lagoons: the Upper Lagoon and the Lower Lagoon. The former is the larger: it lies just west of East Harbor, and from it runs the man-made canal (Fig. 1) that traverses the island. Especially here large oyster beds are found, though these are not generally exploited by Utilans. However, the examination of archaeological sites on Utila in 1973 and 1974 suggests that oysters were an important resource prehistorically. Richards and Boekelman (1937:167) noted the presence of oysters in association with a burial at Río Hok Skum near Corozal in British Honduras (now Belize), and they even suggested that Utila was the source, albeit they did so on the basis of incomplete distributional data. Oysters have also been recovered from votive caches at San José, Uaxactún, Copán, and Santa Rita. If Richards and Boekelman overstated their case in equating the ceremonial significance of oysters and that of *Spondylus princeps* of the Pacific, it is clear, nevertheless, that oysters had some ceremonial significance in addition to their economic importance. Oysters are also found in the Lower Lagoon.

The History of Bay Islands Archaeology

The presence of a large aboriginal population on the Bay Islands has been known since July 30, 1502, when Columbus encountered an Indian trading canoe near Guanaja. Fourteen years later over 400 Indians were relocated from the Bay Islands to serve as slaves in the Greater Antilles, after Diego Velásquez, the Governor of Cuba, sanctioned slave raids in the Western Caribbean in 1516. According to Strong (1935) the aboriginal islanders supplied Cortez' settlement at Trujillo with fish, maize, and manioc. And yet this region has remained virtually unknown archaeologically.

Although the first record of excavation on Utila was in 1897, when treasure hunters recovered a large, decorated ceramic vessel, coral beads, and clay figurines (Rose 1904), anthropological interest in the Bay Islands did not surface until 1928. In that year Conzemius (1928) published his 'On the Aborigines of the Bay Islands', a brief review of the ethnohistoric literature.

This publication marked the beginning of speculation about the cultural affinities of prehistoric Bay Islanders, a question that is still open to some contention. In June and July, 1931, the Boekelman Shell Heap Expedition of the American Museum of Natural History excavated a number of test pits on Utila, primarily on the north shore. Junius Bird was staff archaeologist. Shortly thereafter (April and May, 1933), the Smithsonian Institution sponsored an archaeological reconnaissance of the Bay Islands. Together these two expeditions spent a total of 48 days on the Bay Islands (Strong 1935:1-2). Results from these two expeditions are contained in Strong's monograph (1935), the only major extant publication on the archaeology of the Bay Islands. Writing of Utila, Strong noted that:

> the island is obviously an extremely promising place for extensive archaeological research. Habitation, ceremonial, and burial sites are all present. Only one or two have been seriously sampled. The island as a whole has not been examined—even for surface indications . . . (1935:35).

The same could be said for the other islands of the group. In 1940 Feachem contributed a brief, personalistic account of his visit to the islands. Feachem saw differences in the ceramic components of Utila and Roatán: he reiterated Strong's (1935) contention that Utilan ceramics showed affinities to Central America, rather than with Mexico or Yucatan, and he attributed the greater number of polychrome sherds on Roatán to influences from the Ulúa Valley (1940:187). He noted the prehistoric presence of imports, notably obsidian, which is not naturally occurring on the islands. In 1950 Kidder, Ekholm, and Stromsvik visited the 80-Acre Site on Utila that had been described by Strong (1935). The ceramic collection that they made was utilized by Epstein (1957, 1959) in the establishment of a tentative chronology for the region. This study was the first to attempt a systematic integration of Bay Islands' ceramics with those from the mainland, and the sequence that resulted is clearly the best to date.

Craig (1966, 1967) conducted a brief examination of archaeological sites on Guanaja as a corollary to his study of the fishing geography of the region. His observations on the marine ecology of the area (1966) are useful, although some of his interpretations of archaeological remains are clearly preposterous. He suggests that prehistoric inhabitants of Guanaja had Carib affinities (1967:70), even though the resettlement of the Black Caribs from St. Vincent to British Honduras took place in 1797; furthermore, as Allaire has pointed out (1976), there is little archaeological evidence for prehistoric Carib occupations even in the Lesser Antilles, the supposed homeland of the Island Carib.

More recently Healy, Veliz, and Willey (1975) have attempted a preliminary classification of pottery from Roatán, using the type-variety method. These authors have suggested a population increase during the Post-Classic, and have postulated that the apparent shift in settlement patterns to include hilltop sites may be correlated with a need for defense (1975:8). Utilizing Epstein's chronology, they suggest that while Selín (Late Classic) ceramics from the Bay Islands show affinities with the Maya-influenced Ulúa River Valley, the preponderance of cultural influence during the succeeding Cocal (Post Classic) period was from lower Central America (1975:9-10). This interpretation is consistent with that of Strong (1935) and of Epstein (1957). In addition, Healy *et al.* (1975:10) noted the presence of Tohil Plumbate trade sherds on Roatán in Cocal contexts, evidence that relations with Mesoamerica were not totally estranged during the Post-Classic.

Taken together, then, all of these contributions to the prehistory of the region point to a complex situation during the Late Classic and Post Classic periods. Earlier periods of occupation are unknown for the Bay Islands. Healy has recently characterized the Bay Islands, and Northern Honduras in general, as a major frontier (1974, 1975). A number of sources of cultural influence have been suggested, Maya to the north and west, Chibchan-related tribes to the south (Strong 1935; Epstein 1957, 1959; Healy 1974, 1975). The importance of the area in pre-Columbian trade networks has been suggested (*e.g.*, Thompson 1970; Henderson 1975); certainly this is indicated in historical sources. A tentative ceramic chronology has been advanced (Epstein 1957, Healy *et al.* 1975). Hypotheses have been forwarded about warfare and changes in settlement patterns *(ibid.)*. In short, there are hopeful signs that the archaeology of the region is coming out of its Thermidorian phase. However, in order to elucidate the larger questions of process, what is needed is basic archaeological footwork. The following sections present some tentative results of, and suggest hypotheses derived from, two brief field seasons on the Island of Utila.

Procedures

For one month in each of the summers of 1973 and 1974 preliminary archaeological research was conducted on the island of Utila, under the sponsorship of the Explorers Club, and under the direction of the senior author. The 1973 study was carried out as an adjunct to a larger project on the ecology of the island.

In 1973 one three-meter square test pit was excavated in a large mound adjacent to the 80-Acre Site (Strong 1935), in order to discern the nature of the mound construction and to elucidate the sequence of aboriginal habitation at that locale. It should be noted, however, that the Bamboo Mounds area is considerably more extensive than Strong (1935) reported; one small test will not reveal the sequence of habitation for the whole site, and it is possible, though not probable, that the findings presented here are not representative of the site in general. Nevertheless, the ceramic component encountered during the 1973 excavation closely resembles the Kidder, Ekholm, and Stromsvik collection utilized by Epstein in his pioneer study (1957), and agrees well with results derived from similar test pits on Roatán (Healy, Veliz, and Willey 1975). In addition, profiles cleaned in a number of pot hunters' pits on the site would tend to confirm impressions gained from the test pit with regard to stratigraphy and to the nature of mound construction at the site.

Arbitrary 30 cm. macro-levels were used in the test excavation; the pit was excavated to a depth of 150 cm. Briefly, the mound was of the rubble-filled type described by Stone (1942) as 'usual' for the Sula-Ulúa region. The bulk of the mound fill was composed of potsherds, although fragmentary metates, bark beaters, obsidian blades, and a number of marine gastropods and pelecypods were present. No complete artifacts were recovered. The bulk of the mound fill was separated from the surface by a thin humus zone. A small break in the continuity of the deposit was recognized between levels II and III; also, a number of significant changes in the composition of the fill were noted in level III. Here the percentage of large, comparatively thick everted rims declined; the frequency of slipped and bichrome sherds increased, though not substantially; the number of fish spines decreased, and there was a vast increase in the number of marine shells comprising the fill. Potsherds were the major component throughout. Fragments of serpentine pendants were recovered from level III.

Between 120 and 128 cm. below surface a floor composed of coralline limestone blocks was uncovered; these were placed side by side. Surfaces were characteristically rough, and there was little evidence that these blocks were reshaped for their use in construction. If these blocks indeed constituted a floor, then they were probably covered with a plaster or with mud. The zone beneath the coral floor was sterile, with the exception of decomposed shell seen as specks in the brown-red clay matrix. It is possible that the coral floor was merely part of the mound fill, rather than an earlier living floor. Stone (1942) has documented the use of unworked stone in mounds of the Sula-Ulúa region as a support, protecting the mound from erosion during the rainy season.

The majority of ceramics from the test pit seem to derive from the Cocal Period (Post-Classic) defined by Epstein (1957). Two Bay Islands Polychrome sherds were encountered in the basal portion of Level III. These are probably from the Cocal I phase (Epstein 1959). Incision was the most frequent decorative mode; this characteristically took the form of the incised punctate ware described by Healy *et al.* (1975). However, the combination of incision and punctation occurred most frequently on cazuela-shaped vessels, while simple horizontal incision was limited mainly to outlines on rims of semi-constricted, lipped ollas. On the cazuelas decoration was confined to the area above the keel. While the range of sherd thickness varied from 3-10 mm., thickness averaged between 5 and 7.5 mm. This is thinner than the 7-10 mm. average reported by Healy *et al.* for their ceramic collection from Roatán (1975), but thicker than that they reported for 'Chiriquí Armadillo Ware' and Sandy Plain Ware. It is interesting that Healy *et al.* did not report the presence of the cazuela shape; this form was common in all levels in the test pit on Utila.

In general temper size tended to vary proportionately with sherd thickness. Rolled quartz and crushed shell and possibly coral were utilized as tempering agents; a few sherds contained angular quartz and mica temper, suggesting that these vessels were trade goods. The coarsest temper was contained in large, thick sherds with segmented, wormlike appliqué bands (Healy's Grooved Appliqué Ware). This mode of decoration was not common. As Epstein has noted (1959:126), the monochrome appliqué tradition is thought to have its source in Nicaragua and Costa Rica (Strong's North Coast Appliqué Style). Epstein dates it as Post-Classic but pre-plumbate.

The conformity of pot shapes from throughout the test unit suggests that utilization of the mound was confined to the Cocal Period. The exception is that the frequency of ollas declined in the lower two levels, although this class was present throughout. Epstein (1957) reported that *all* ollas from the 80-Acre Site were contained within the Cocal Horizon; the trend towards increasing usage of this form suggests that construction of the mound began in early Cocal times (Cocal I), and continued through the later phase (Cocal II) which is assumed to have ended just prior to the Conquest. Similarly, flare-walled bowls are thought to have been more popular in Cocal times (Epstein 1957; Healy *et al.* 1975); a variety of these forms were recovered from the various levels.

In general, then, the foregoing discussion is necessarily sketchy. One salient point of limited test excavation is that it raises more questions than it solves. While it is interesting to speculate on broader issues on the basis of minor testing, in reality the utility of these speculations is only that they provide a framework for future testing. In this regard a number of hypotheses can be advanced. First, Healy, Veliz, and Willey (1975) have already suggested a dramatic population increase for the Bay Islands during the Post-Classic. An explicit sampling program to test the number and size of sites, as well as their composition, for each of the succeeding phases is now needed to determine if the apparent population increase is real. Another critical area for future testing is trade. A number of authors have characterized the region containing the Bay Islands as a frontier. Relationships both north and south are becoming evident. Historical sources indicate the presence of a trade network that connected coastal Honduras and the Yucatan at contact. The presence of a large trade center at nearby Naco has been documented (Henderson 1975). And, on Utila a number of goods not indigenous to the island can be discerned. These include the angular quartz and mica tempered pottery, and certain types of rocks (*e.g.*, mica schists, qui-granular granitics). Obsidian is present in tool form, but no exhausted cores or debittage were found. Some basalt, legged metates are made from an alien rock; one striking example has a grotesque zoömorphic head (Fig. 2).

Conversely, trees of the genus *Ficus,* from which bark cloth was made, are

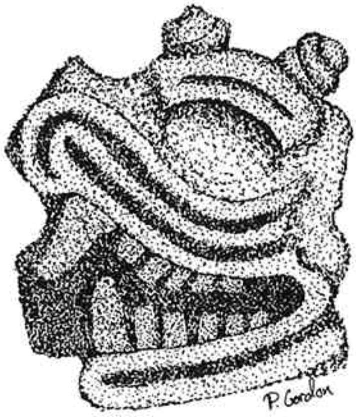

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FIGURE 2

present on the island, as are bark beaters from archaeological contexts that appear to have been made from indigenous limestone. The *S. gigas* conch is common in *Thalassia* beds off the islands, while it is not particularly common in mainland coastal waters due to the discharge of alluvial effluents from the various rivers. And, the Bay Islands Broad Leaf variety of conch is distinguishable. Clearly there are ample avenues for the study of trade. Again, what is needed is systematic testing programs.

The Surface Collection

In 1974 an attenuated walking survey of the island was conducted. A number of sites, primarily bordering the mangrove thicket along the south shore, were located that have not been noted in the literature. During this brief field season an intensive examination of the surface of a small mound fifty meters south of the mound that had been tested previously was conducted. This involved the mapping of artifact classes from a fifty per cent sample of the mound surface. Because previous testing indicated the presence of a distinct humus zone separating the bulk of the mound fill from the surface in one case, and because of the documented use of rubble for mound fill in the area, it was postulated that an intensive examination of a horizontal surface of one of the mounds might provide an associational record of human behavior not otherwise available. Research objectives were to (1) isolate areas of specific behaviors where possible, and (2) to compile a profile (synchronic) of the utilization of the mound by its inhabitants. It should be stressed that while the possibility of encountering primary refuse (that discarded or abandoned at its location of use, after Schiffer 1972) was recognized, it was not assumed *a priori* that this was the case. Indeed, while certain patterns in the spatial arrangement have become evident, the date on the nature of the deposition are still inconclusive. The following discussion suggests hypotheses about mound utilization as if the patterns discerned for classes of artifacts represent primary refuse. In order to demonstrate that this is in fact the case, it will be necessary to correlate these findings with those from other, as yet unstudied mounds.

For the surface collection, an eighty foot grid was established over the mound surface. This grid also encompassed the southeast portion of an adjacent mound. Grid units were ten feet square. Students working on this project designated the mound 'Scorpion Mound' because of the pervasive presence of the small scorpion *Centruroides margaritatus* (Marinkelle and Stahnke 1965). Six teams of two individuals, selected so that capabilities were matched, conducted the survey. The typological scheme utilized was tailored to permit the inference of specific activity areas. Artifacts were grouped into eleven classes. These are: plain body sherds, rim sherds, decorated sherds, obsidian blades, fire-cracked rocks, other stone tools, pumice balls, coral, faunal remains (excluding shellfish), shells, and metates. These will be referred to as V2-V12 sequentially in the discussion that follows (*e.g.*, plain body sherds = V2, etc.). Although a probability sampling strategy would have been statistically valid (Redman and Watson 1970), it was reasoned that a fifty per cent sample would yield valuable distributional data that otherwise would be lacking. A checkerboard sampling procedure was used to provide optimal recovery of over 50% sample over the mound surface (Fig. 15). It was thought that such a procedure would permit better control over elevational differentials that would a nonaligned sample. Proveniences for all artifact classes in each grid unit were recorded on a scale map in the field from reference points established at two foot intervals along the perimeters of the grid units. These segmental charts were transferred to a master map in the field laboratory (Fig. 15). Speed was sacrificed to efficiency: given the density of artifactual materials, it took almost a full day for a two person team to complete one square.

Analytical Procedures

Besides the overall density map that was prepared in the laboratory to permit the inductive examination of artifact clusters, a number of other analytical devices have been applied to the data. However, one assumption permitting these types of analysis needs to be made explicit: that is, the assumption of contemporaneity. Two factors suggest that this was in fact the case. First, extrapolating from the test unit the presence of a humus zone separating the mound fill from the surface deposits suggests that surface materials were deposited later than the secondary refuse (after Schiffer 1972) in the mound fill. Second the examination of the ceramic artifacts after the fact would place the deposition of surface materials within the Cocal II phase (Epstein 1957; Healy *et al.* 1975). No artifacts of an earlier period were discerned.

TABLE 1

Correlation Coefficients for Ceramic Artifacts

Variable	Pearson's r	$(r^2)100$
V2/V3	.68879	47%
V2/V4	.62569	39%
V3/V4	.74188	55%

Raw counts for each of the artifact groups per grid unit were utilized in the computation of Pearson's Product-Moment Correlation Coefficient (r), in order to test the covariance of the eleven variables over the entire mound surface. As Redman and Watson (1970:290) have noted, the strength of association displayed by the coefficient should be regarded as a relative measure only, rather than as a precise one with exact levels of significance. The Pearson's Correlation Coefficient statistic, unlike the method devised by Whallon (1974), measures artifactual association rather than areal association. As one of us (Hanson 1975) has noted, this statistic provides an assessment of the strength of relationships among different pairwise comparisons, thus enabling statement of the relative strength of association for all pairs of tool types. While none of these scores approached perfect positive correlations, a number of results are significant.

First, as seen in Table 1, the various ceramic artifacts tend to covary. Among these classes the strongest correlation was between rim sherds (V3) and decorated sherds (V4). The discrepancy between this figure and that for rim sherds and plain body sherds (V2) might suggest that decorated vessels tend to be smaller; this seems reasonable in view of the fact that sherds from large ollas tended to be undecorated. Plain body sherds (V2) and coral (V9) yield a coefficient of .78984 (62%); as will be seen, this was due to overlapping primary clusters atop the mound. It is possible that this association indicates the use of coral in food preparation, *e.g.*, in shredding manioc, etc. It is also possible that coral was used in cooking, perhaps for its heat retaining qualities (analogous to boiling stones or to the probative function attributed to Poverty Point objects). Decorated sherds and coral (V4/V9) had a slightly lower correlation coefficient of .77113 (59.5%); this was similar to the coefficient expressed by decorated sherds and shell (.76633, or 58%). Rim sherds and faunal remains (V3/V10) had a correlation coefficient of .67233 (45%). Again, this seems to be due to the overlap of primary clusters, and it may well suggest a functional relationship. While none of the aforementioned correlations is particularly striking, the pattern of negative correlations is more so. In fact, the coefficients for all of the variables (V2-V11) with metates (V12) were negative. As will be seen, metates formed a significant spatial isolate on the mound surface.

While correlation coefficients have provided a useful relative measure of association, they did not elucidate patterns that were recognized after an inductive examination of the density map. This is probably due to a number of factors. First, this statistic is influenced by sample size. Second, clusters of the indicative artifacts frequently crosscut the arbitrary grid units. Finally, the gross nature of the classes utilized precludes perfect positive correlations. For example, the plain body sherds category (V2) contains griddle sherds, those from ollas, sherds from flare-walled bowls, etc. In short, the artifact typology has necessarily influenced the results.

For this reason it was determined to utilize computer graphics in mapping the densities of artifact classes, in order to facilitate the delineation of patterns not readily discernible either in the density map or in the statistical analysis. For this the SYMAP program was selected. SYMAP prints a darker symbol for higher values, thus producing contour maps based on the assumption of a continuous distribution of the value of a variable between two data points (Redman and Watson 1970:289; *cf.,* Cerny 1972). By selecting Option 11 in this package, raw frequency scores are printed within the various contours on the maps. Five shading gradients were used, each with an absolute total value range of twenty per cent.

The first map created by the SYMAP program shows the elevation of Scorpion Mound (Fig. 3). In general this map seems accurate, although some distortion is present in the northeast quadrant where continuity is spuriously expressed between the highest elevation of the mound surface and that of the adjoining mound. Also, gradients are standardized in the map, obviating the examination of minor elevational differentials. This map, then, can be used as a key for interpreting the artifact density SYMAPs; it represents the trend surface of the mound, rather than an exact picture.

In addition to clarifying the nature of the statistical relationship expressed in the Pearson's Correlation Coefficient between pairs of artifact classes, SYMAP has permitted the delineation of secondary and tertiary artifact clusters that may indicate functionally specific areas of the mound. In a number of cases the associations already expressed between pairs of artifact classes appears to be due to dense (primary) clusters of the pairs on the top of the mound surface, the area of greatest overall artifact density. This appears to be true for the pairs V2/V4, V4/V9, and V4/V11, as seen in Figs. 4-6. Because of the dense concentration of a variety of materials atop the mound, it is difficult to know what functional relationships are present. However, through an examination of distributions of artifact classes over the entire mound surface some hypotheses can be developed.

First, as previously noted, correlation coefficients for all eleven variables with metates were negative. While this is in fact due to the frequency of metates (n = 3), SYMAP has delineated the areal distribution of these metates in a portion of the grid that is devoid of primary, secondary, and tertiary clusters of all other artifact classes (Fig. 7). Note that because of the small number of metates, every grid unit containing one was scored at the highest gradient. All three metates were clustered within a fairly small radius in the northeast portion of the grid; this section of the mound is relatively flat. They are close enough together so that all metates might have been used by a single person, sequentially, in food processing. If this is so, then it would be expected that wear patterns on the metates would be different. This has yet to be tested. Again it should be stressed that this cluster is in an area without evidence of other activities; the only significant frequency of other artifact classes is that of plain body sherds, though this frequency is comparatively low. Of course, the presence of pottery is not incompatible with the processing of grains.

A similar cluster is contained in the northwest portion of the grid, an area referenced in the field notes as a possible hearth. Within this section primary clusters of fire-cracked rocks, undifferentiated stone tools, and of pumice balls were located. Indeed, the only primary clusters of these three classes were located in this area. Again, this is particularly significant in view of the absence of primary clusters of these classes in the area of greatest overall density atop the mound. If these distributions are functionally related, as they appear to be, then it can be hypothesized that this cluster represents, for example, an area for the recycling or manufacture of stone tools. Pumice could have been used for sharpening; the fire-cracked rocks might suggest a testable probative inference that some stone tools were heat-treated. The distributions of these three artifact classes is charted in Figs. 8-10.

Rathje (1972) has suggested that obsidian, though not generally available in the lowlands, was viewed as a necessity by lowland peoples, requiring the existence of complex trade networks. As previously noted, all obsidian recovered on Utila was in the form of finished artifacts, especially prismatic blades. The distribution of obsidian on the surface of Scorpion Mound is interesting, in that the largest primary cluster (Fig. 11) is located adjacent to the densest distribution of faunal remains. These clusters, located on low-lying ground in the southeast quadrant, would seem to indicate a functional relationship. It seems reasonable that obsidian blades were used in butchering; the difference in the distribution suggests the probative inference that butchering was conducted in a single area, and that refuse was redeposited simply by throwing it out of reach. As an alternative, a butchering area might have been just removed from the area of food preparation; the presence of secondary distributions of plain body sherds and of rim sherds with faunal remains argues for this latter interpretation, as does the overlap with a secondary cluster of shells. The distributions of these classes is charted in Figs. 11-12. In addition, a secondary cluster of faunal remains overlaps almost perfectly with a tertiary cluster of coral. The abrasive nature of some corals would make it a useful tool in scaling fish (Goodwin and Walker 1975); indeed, field notes demarcate this particular faunal cluster as comprised almost entirely of fish spines. These data, then, suggest the probative inference that coral was used to scale fish, and, further, that this activity was at least in part localized in the east central portion of the mound (Fig. 13).

With few exceptions primary clusters of the various artifact classes tended to be localized on the mound surface. While undoubtedly some redeposition of the individual artifacts has occurred due to natural factors, *e.g.*, wind and rain, it is unlikely that the patterns that have been described resulted from this redeposition. If it is assumed that lateral displacement of primary refuse ensued from non-cultural causes, then it would be expected that a relatively more diffuse distributional pattern would be present, especially along the slopes of the mound. In fact, this does not appear to have been the case.

When the overlapping, adjacent, and in some cases mutually exclusive clusters of indicative artifacts are combined, it is tempting to relate the pattern that results to a structure that presumably topped the mound. This, too, is in fact a hypothesis that needs independent verification. But, the data would seem to indicate an isolated work area for the grinding of corn in the flat below the corner of the mound; it can be supposed that this area was used by a single person, presumably female. Conversely, the flat on the northwest perimeter of the mound would seem to have been utilized in the manufacture and/or recycling of stone tools, a task attributable to a male(s). Coral may have been utilized for scaling fish along the east-central portion of the mound surface. Similarly, obsidian appears to have been used in butchering; this was done adjacent to the area where the food was subjected to secondary preparation on the flat southeast of the mound. It is interesting that a dense secondary concentration of rim sherds (V3) also was found in this area (Fig. 14). The correlation coefficients for rim sherds and faunal remains (V3/V10) and for rim sherds and plain body sherds (V3/V2) are approximately equal. This might suggest the possibility that processed animal foods were placed in relatively small containers, such as flare-walled bowls.

That an equal number of rim sherds was found both in the cluster atop the mound and in the probative food preparation area is particularly noteworthy given the much greater density of plain body sherds in the former area. It may be postulated that a house structure topped the mound; because of the lack of surface water on the island, water was stored in large ollas in the house, hence the differential ratios. It is also likely that butchering and the preparation of smelly food animals were not carried out in the house; this could account for the location of these probative work areas adjacent to the higher elevations of the mound surface. Finally, the dense concentration of a number of artifact classes atop the mound would be consistent with the practice of storing goods either within or just adjacent to the house structure. A secondary concentration of fire-cracked rocks (Fig. 8) on this highest surface suggests the probative inference that there was a small cooking fire in or by the house structure.

Although the preceding discussion has been both simplistic and highly speculative, the patterns described are certainly provocative. And, the potential of these data is not exhausted. Clearly a number of other interpretations are conceivable. For example, debris located below the mound may represent secondary refuse (after Schiffer 1972), due to the practice of discarding garbage down the sides of the hill atop of which was a residence. This is an aboriginal pattern that persists in much of Latin America (Goodwin and Walker 1975:22). Resolution of this issue will have to await future research. Again, the point is that a framework has been provided from which the archaeological record can be tested. Traditionally the archaeology of the Southern frontier of Mesoamerica has been concerned with comparative, diachronic issues. Virtually no attention has been given to the reconstruction of the way of life of the pre-Columbian inhabitants. Before many questions of process can be answered satisfactorily, it will be necessary to obtain a better grasp of the synchronic aspects of aboriginal cultures in the Bay Islands. It is hoped that the foregoing discussion will contribute in this regard.

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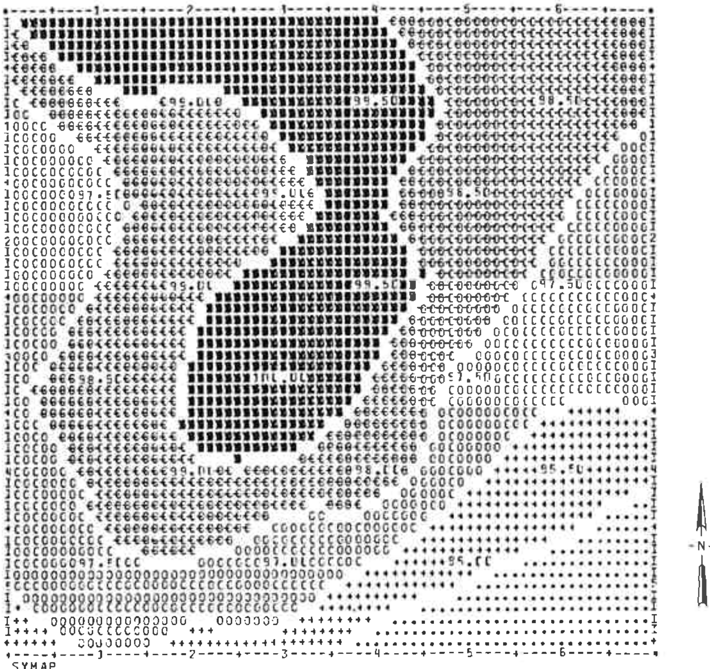


FIGURE 3

Trend-surface elevation of Scorpion Mound.

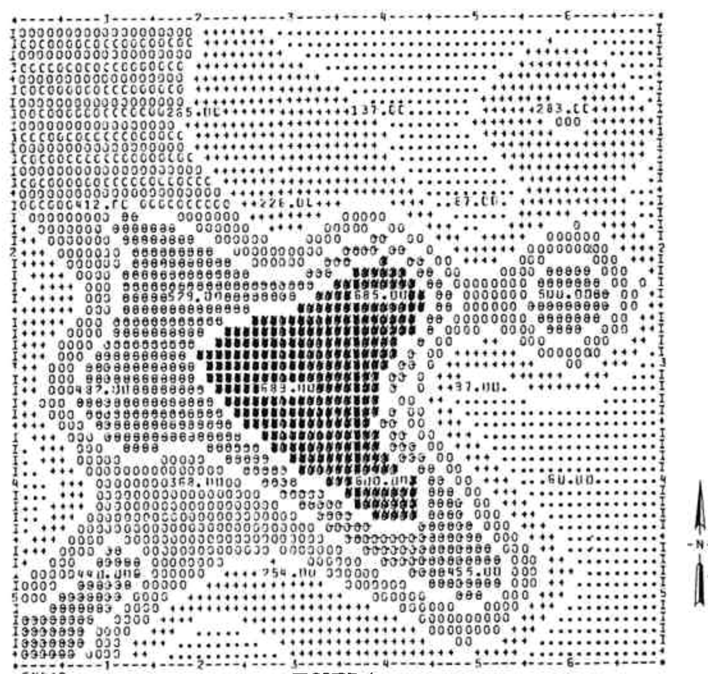


FIGURE 4

Distribution of plain body sherds (V2).

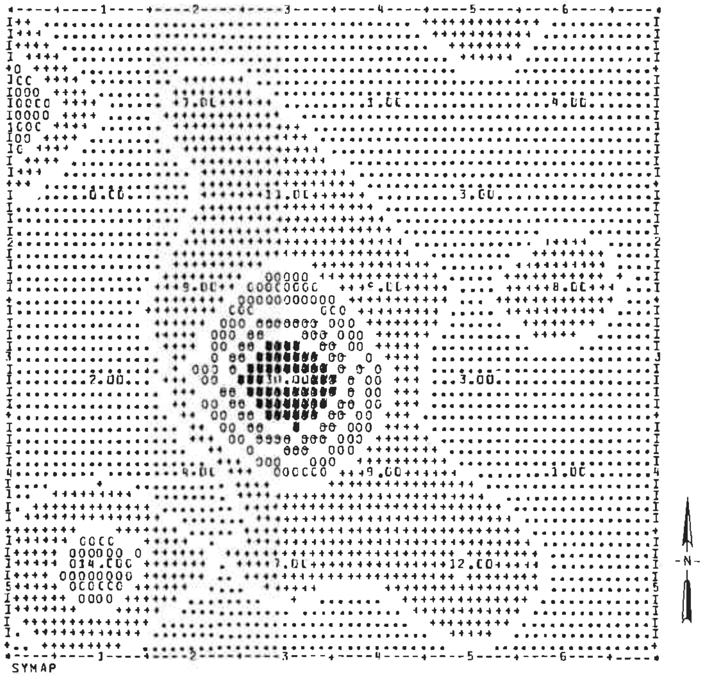


FIGURE 5
Distribution of decorated sherds (V4).

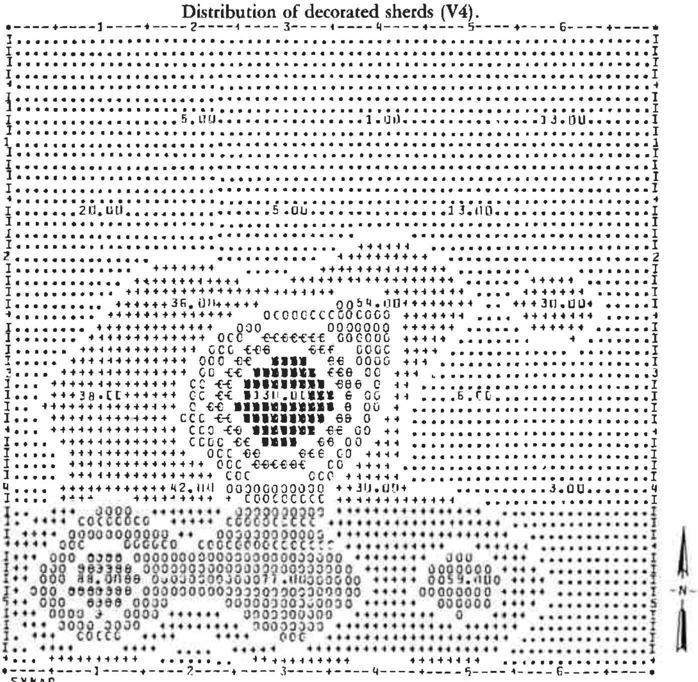


FIGURE 6
Distribution of shells (V11).

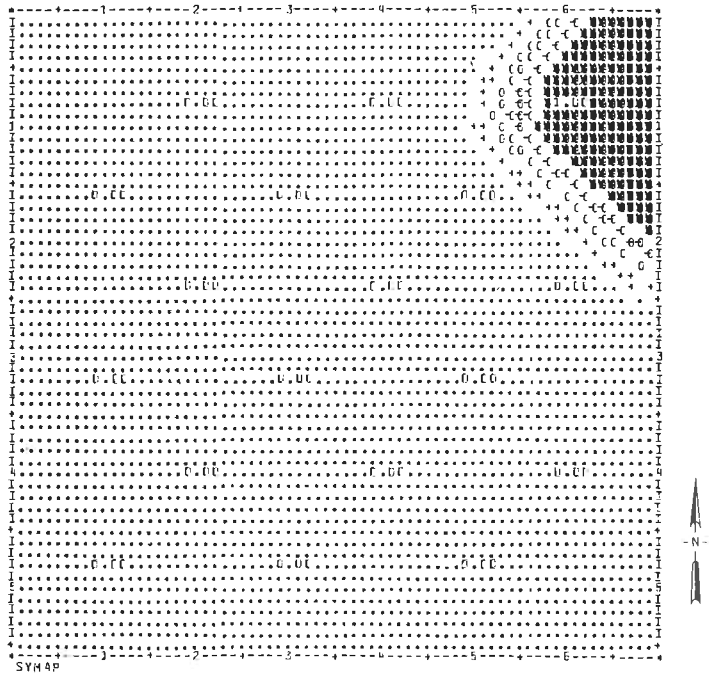


FIGURE 7
Distribution of metates.

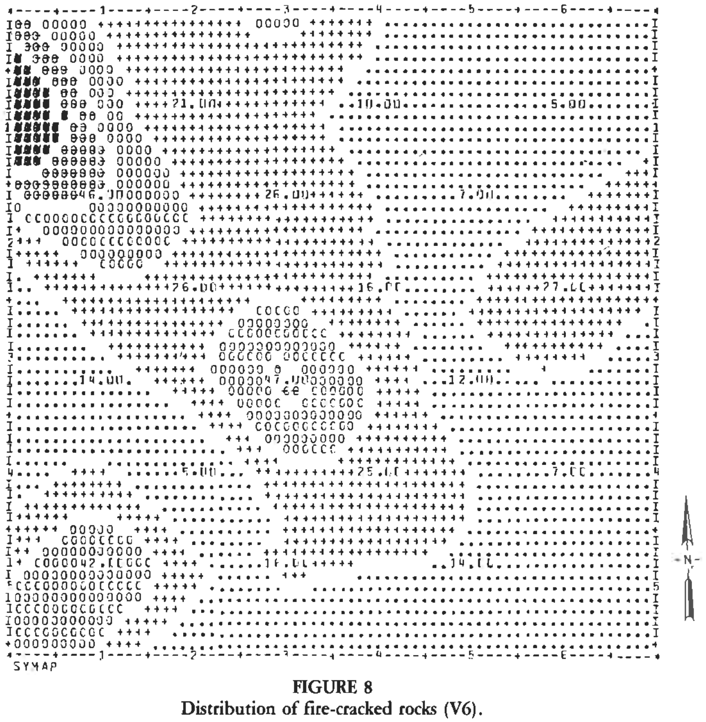


FIGURE 8
Distribution of fire-cracked rocks (V6).

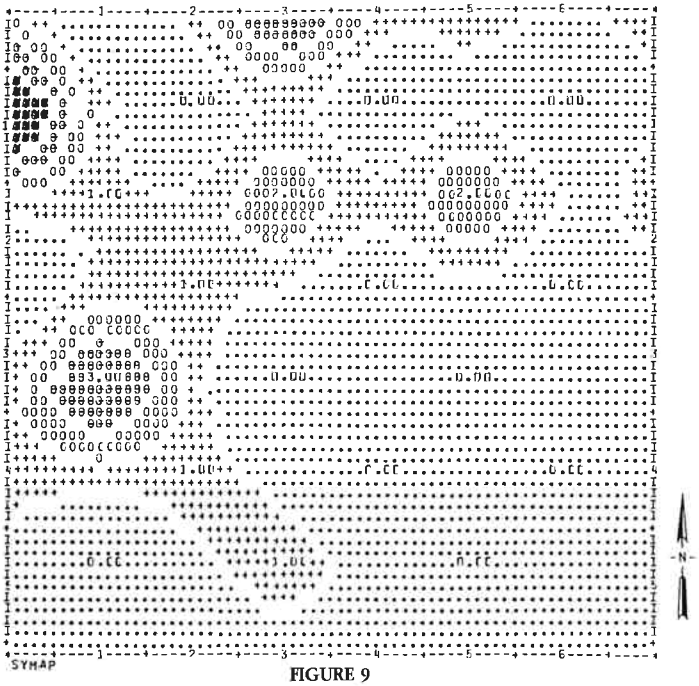


FIGURE 9

Distribution of stone tools (V7). Note the small n, and the absence of stone tools over most of the mound surface.

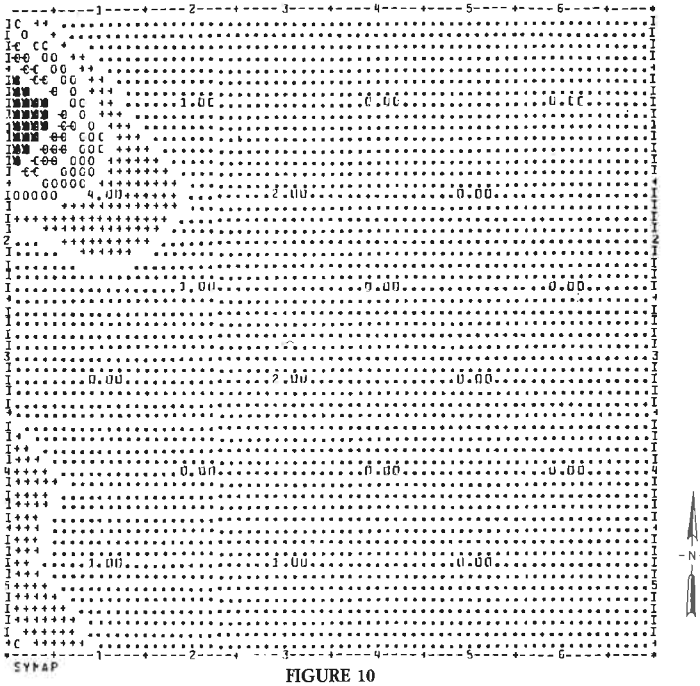


FIGURE 10

Distribution of pumice (V8). Note the small n, and the absence of pumice over most of the mound surface.

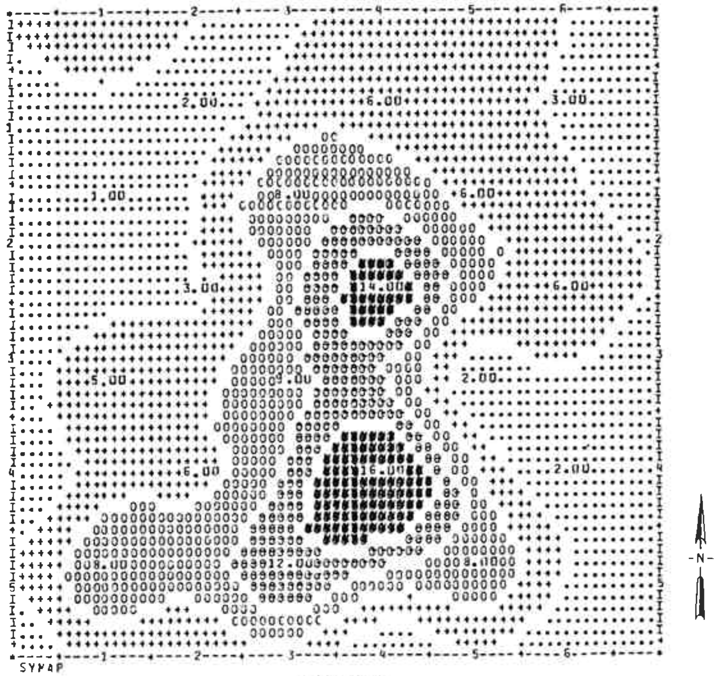


FIGURE 11
Distribution of obsidian (V5).

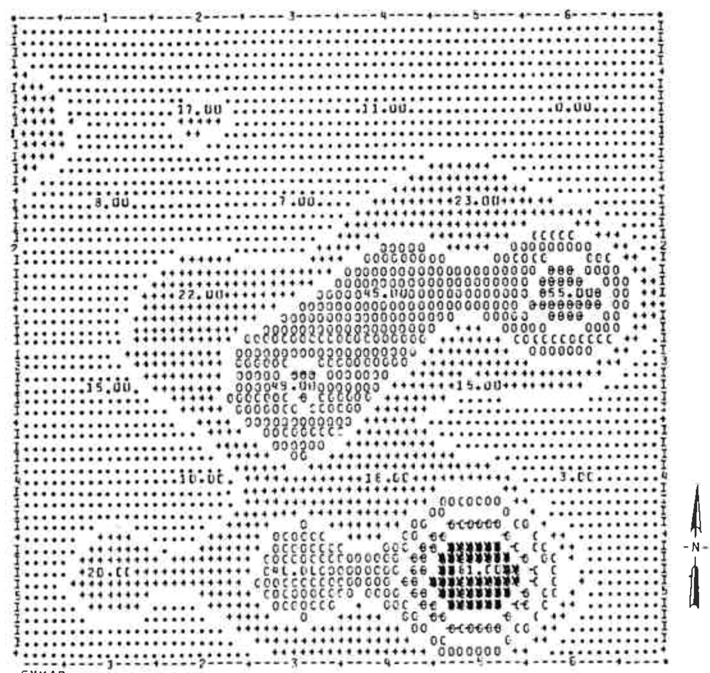


FIGURE 12
Distribution of faunal remains (V10).

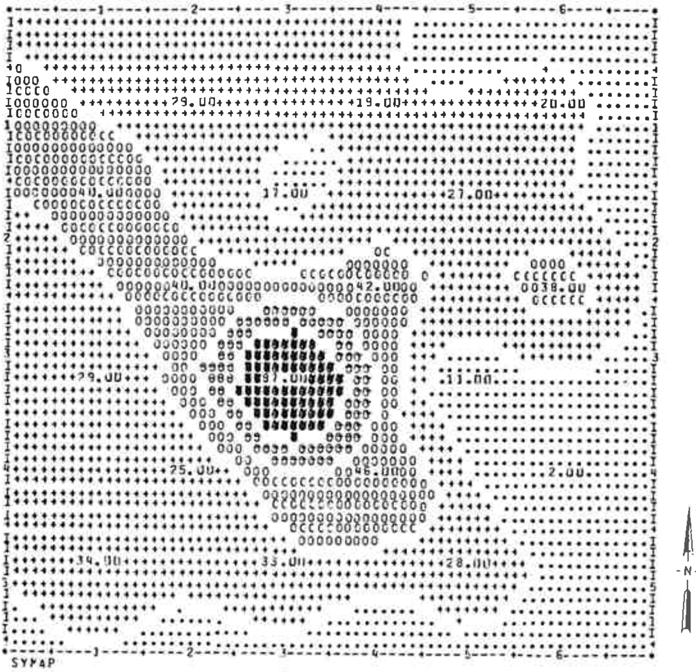


FIGURE 13
Distribution of coral (V9).

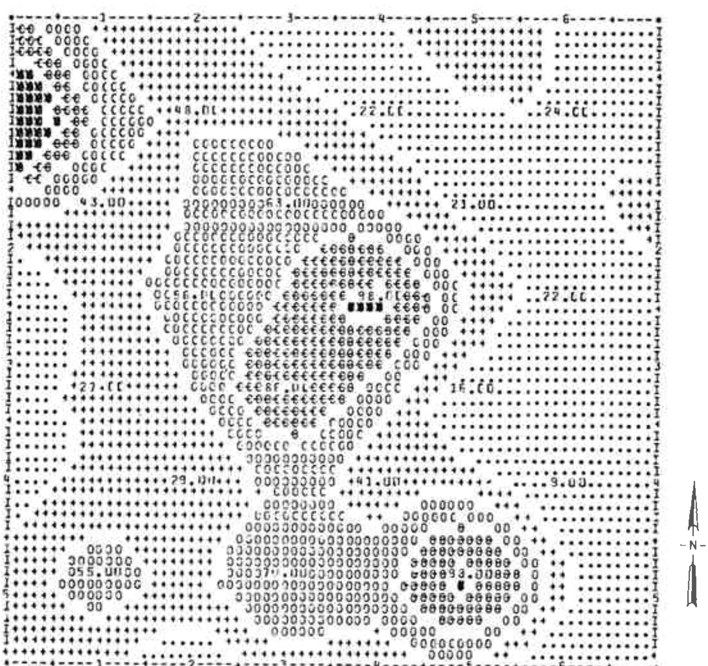


FIGURE 14
Distribution of rim sherds (V3).

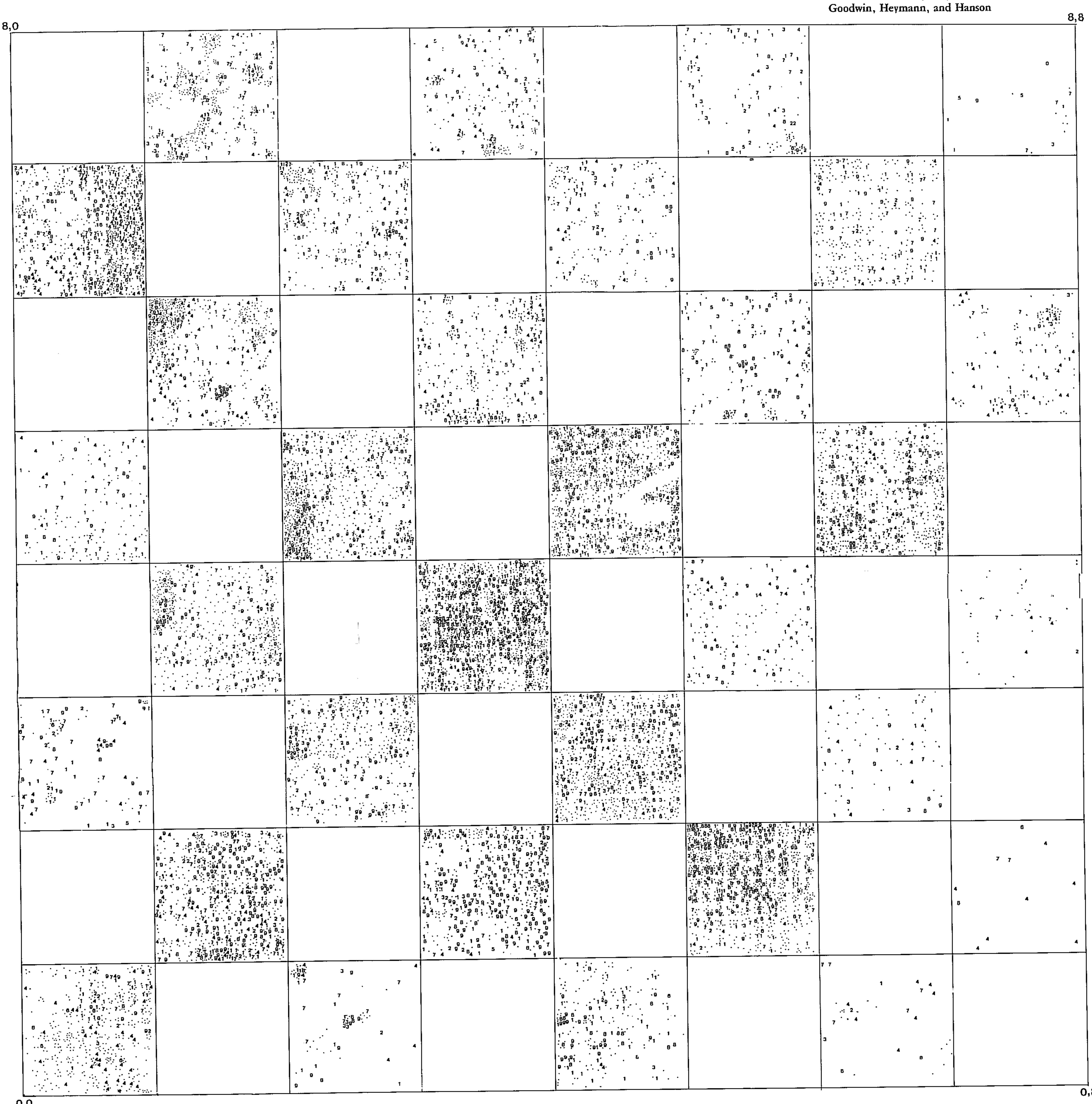
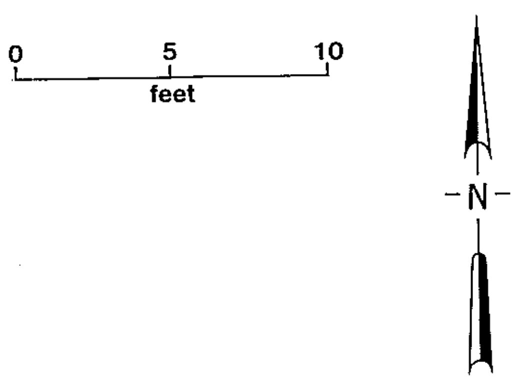


FIGURE 15



DISTRIBUTION OF SURFACE MATERIALS

SCORPION MOUND, UTILA ISLAND, HONDURAS, C. A.

- ⁘ - plain body sherds
- 1 - rim sherds
- 2 - decorated sherds
- 3 - obsidian blade
- 4 - rock -- unmodified
- 5 - stone tool
- 6 - pumice ball
- 7 - coral
- 8 - animal bone
- 9 - shell
- 0 - metate