

ARCHEOLOGY ON THE ISLAND  
OF MO'OREA, FRENCH  
POLYNESIA

ROGER C. GREEN, KAYE GREEN, ROY A. RAPPAPORT,  
ANN RAPPAPORT, AND JANET DAVIDSON

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## PREFACE

THE FIRST SYSTEMATIC ARCHEOLOGICAL excavations in the Society Islands, undertaken in 1960, from March to August, were supported by the Mangarevan Expedition Fund of the American Museum of Natural History made available through the generosity of Mr. Donald S. McClain. The work was extended from December, 1961, to March, 1962, with the support of additional funds from the same source. As a part of the Museum field project in Polynesian archeology, initiated by Dr. Harry L. Shapiro, work proceeded under his general direction. We are deeply indebted to him for advice, aid, and encouragement throughout all phases of the field work, the laboratory analysis, and the preparation of the present report.

We are indebted to many other individuals for invaluable assistance. Professor Douglas L. Oliver of Harvard University, under whose direction the site surveys of the Papeto'ai District were initiated, gave us much valuable advice during both the field-work and the period of manuscript preparation. Dr. Kenneth P. Emory and Dr. Yoshihiko Sinoto of the Bernice P. Bishop Museum, who conducted a broad-scale archeological survey in the Society Islands in 1960, were also sources of valuable information, ideas, and advice. Ann and Roy A. Rappaport, who were initially members of the Bernice P. Bishop Museum field party, are especially indebted to Dr. Emory for assigning them to the American Museum expedition for a major portion of the archeological season.

In 1960 Dr. Bengt Danielsson of Tahiti graciously performed the initial functions of liaison between the Mangarevan Expedition and the French Administration, saving much time for us and shielding us from that bewilderment so frequently the lot of those who attempt to work within the unfamiliar regulations of a foreign country. Throughout the investigations, our official contact, through Dr. Emile Massal, Director of the Institute of Medical Research, was of paramount assistance in facilitating all aspects of our program. We have also enjoyed the deep interest and support of Monsieur Charles Mouzon, the Administrator of Mo'orea. We are grateful to these individuals and many other members of the French Administration

and the Governor of French Polynesia for making our investigations possible.

As a part of the Harvard University program (Green, 1961a), Roger and Kaye Green made an extensive survey of surface remains in the 'Opunohu Valley. They also made the earlier inland island excavations in the western or Amehiti side of the 'Opunohu Valley (Site ScMo4). The following year they returned with Miss Janet Davidson, then a graduate student from Auckland University, and Mr. Donald S. McClain, to excavate the additional inland sites reported on below. These sites are all in the 'Opunohu Valley, which was the property of Mr. and Mrs. Medford R. Kellum, Jr., to whom we are especially grateful for their extensive assistance, cooperation, and warm hospitality.

Since the field-work was completed and some of the reports written (1963), important additional material which aids in the interpretation of the data recovered has come to light. On the archeological side, a quantity of new information became available late in 1964 and early in 1965—specifically, radiocarbon dates for the remaining inland sites excavated in 1962, the preliminary report on similar work in Tautira, Tahiti, by Garanger (1964), and a recent summary of the program of the Bernice P. Bishop Museum in the Society Islands over the past three years (Emory and Sinoto, 1964, 1965). Equally important from the ethnohistorical point of view are the references to the 'Opunohu population in the journal of Bicknell and Henry for 1805, and the Tobin (MS) manuscript and drawings. The senior author is particularly indebted to Dr. Robert Levy and Dr. D. L. Oliver for bringing this material to his attention.

These materials, the recent history of the Tahitian Mission by Davies (Newbury, 1961), and the more acute evaluation of the historical sources (Gunson, 1963) have made possible further interpretation of historical and traditional references to the 'Opunohu Valley beyond that previously attempted.

Although the manuscripts of the several authors contributing to this report have been amended to some extent to incorporate some of these new data (specifically the report on re-



ligious structures), for the most part their contributions and their interpretative sections remain as they were written in 1963. On the other hand, the Summary and Conclusions (pp. 216-227) which have been entirely rewritten, incorporate some of our earlier statements but add a great deal to the interpretation that was not possible previously.

In rewriting the Summary and Conclusions and in bringing the over-all manuscript to its present state, the senior author is particularly grateful to Miss Janet Davidson for assistance and critical comment. He is profoundly grateful to all individuals involved, for the many stimulating discussions during the last five years concerning the interpretation of these data. The responsibility for the conclusions now drawn in the Summary and Conclusions must lie with the senior author.

Several members of the staff of the American Museum of Natural History have given us valuable assistance. Mr. William E. Old, Jr.,

identified the shell specimens. Mrs. Helen Kenyon has been helpful in many ways. To Miss Bella Weitzner go our especial thanks for editing this manuscript.

We also thank Ivanhoe Teamotuitau, Ta Huvea Mahinepeu, Uramo'ae Tefa'afana, and Yves Teihota'ata, who formed the able nucleus of our excavating crews, and Te Tuanui Ahupu, the pastor of the church at Papeto'ai, who not only permitted us to excavate extensively upon his own lands, but who was instrumental in encouraging the cooperation of all the villagers with whom we had dealings.

Finally, we thank all the villagers of Pape-to'ai for their hospitality, cooperation, and interest.

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## INTRODUCTION

MO'OREA, A HIGH ISLAND, approximately 40 square miles in area, lies about 10 miles west of Tahiti. Volcanic in origin, it is older than its larger neighbor, is consequently more highly eroded, and rises in spectacular, sharp ridges to altitudes exceeding 5000 feet. Because there is no exploitable land above 700 or 800 feet, the habitation zone is, and always was, in the lower altitudes. This low-altitude zone consists of a coastal plain, seldom more than 500 yards wide, frequently narrower, encircling the island, and several large, wide valleys, the floors of which climb rather gently to 700 or 800 feet before meeting the steeper mountain rise. Two long, deep bays, Cook's and 'Opunohu, extend inland from the north coast on either side of the mountain called Rotui.

Of these valleys, 'Opunohu, by far the larger and more important, coincides roughly with the central crater, extending southward from 'Opunohu Bay to the very center of the island where it is surrounded by steep mountain walls. The interior of the valley is divided by a major ridge system into two unequal parts and by other fern-covered ridges into a number of minor sections. Many small streams run through this part of the valley to merge on the alluvial plain into one large stream which flows out into the bay. Ari'i Taimai (Adams, 1947) stated that this valley was very densely populated; indeed, it was well inland behind the alluvial plain that the largest concentrations of stone structures yet known were discovered and mapped (Green, 1961a, 170).

The coast offers less in terms of stone remains. Teuira Henry (1928, 93) mentioned Papeto'ai and its *marae*, Taputapuatea. Other *marae* and stone structures have been located at or near the coast (Emory, 1933, 97-105). Neither in concentration nor in frequency do the coastal remains compare with those in the interior. Surviving coastal structures are, however, often larger.

These purely descriptive statements should not be construed as suggesting that there were contrasting inland versus coastal adaptations, or that specific groups were either exclusively inland or coastal people. There is no indication that inland populations lacked access to the sea or that coastal people had no access to the in-

terior. The distances from farthest inland to the coast are short: the head of the 'Opunohu Valley is no more than 5 kilometers from the sea. The magnitude of the structural concentration on the eastern side of the interior of 'Opunohu suggests a large social and political organization in terms of both size of population and areal extent. On the other hand, the absence of such concentrations on the adjacent coast suggests that the smaller coastal population was probably an integrated part of this large organization. In addition, ecological considerations indicate that a cultigen-oriented people would prefer the interior of the valley for settlement if they could still retain access to the sea.

Eleven sites were excavated, five in the interior and six on the coast (Fig. 1). Three inland sites consisted of round-ended houses: one was situated in the smaller western portion of the 'Opunohu Valley known as Amehiti; the other two were in the larger eastern portion, now known as Vaipohe but once called Tupaururu. The Amehiti round-ended house is designated ScMo 4 (Society Islands-Mo'orea-'Opunohu 4). The sites in the larger inland concentration on the eastern side, some 1½ kilometers from the coast, are designated ScMo 158 and ScMo 103, in each of which Structures D and C, respectively, are the round-ended houses. Two religious structures in Site ScMo 103, I and K, were also tested briefly. More complete investigations of two independent religious structures were also undertaken inland. One (ScMo 163) was an inland *marae* with enclosing wall similar to some at ScMo 103, and the other (ScMo 129) was a "coastal" *marae* situated inland.

Of the coastal sites, one (ScMt 1) was on the eastern side of the mouth of 'Opunohu Bay, on the land traditionally called Mata'iri'i. This is in the ancient district of Te Aharoa. All the remaining sites were in the modern village of Papeto'ai, in the ancient district of Fa'ato'ai. The traditional names and designations of these sites are as follows: Hauiti, ScMf 2; Vaiohu'a, ScMf 3; Ta'auroa, ScMf 4; Te Amaama, ScMf 5; and Mata'i Taria, ScMf 6. An additional site (Te Mao'ae), designated ScMf 1, was not excavated.

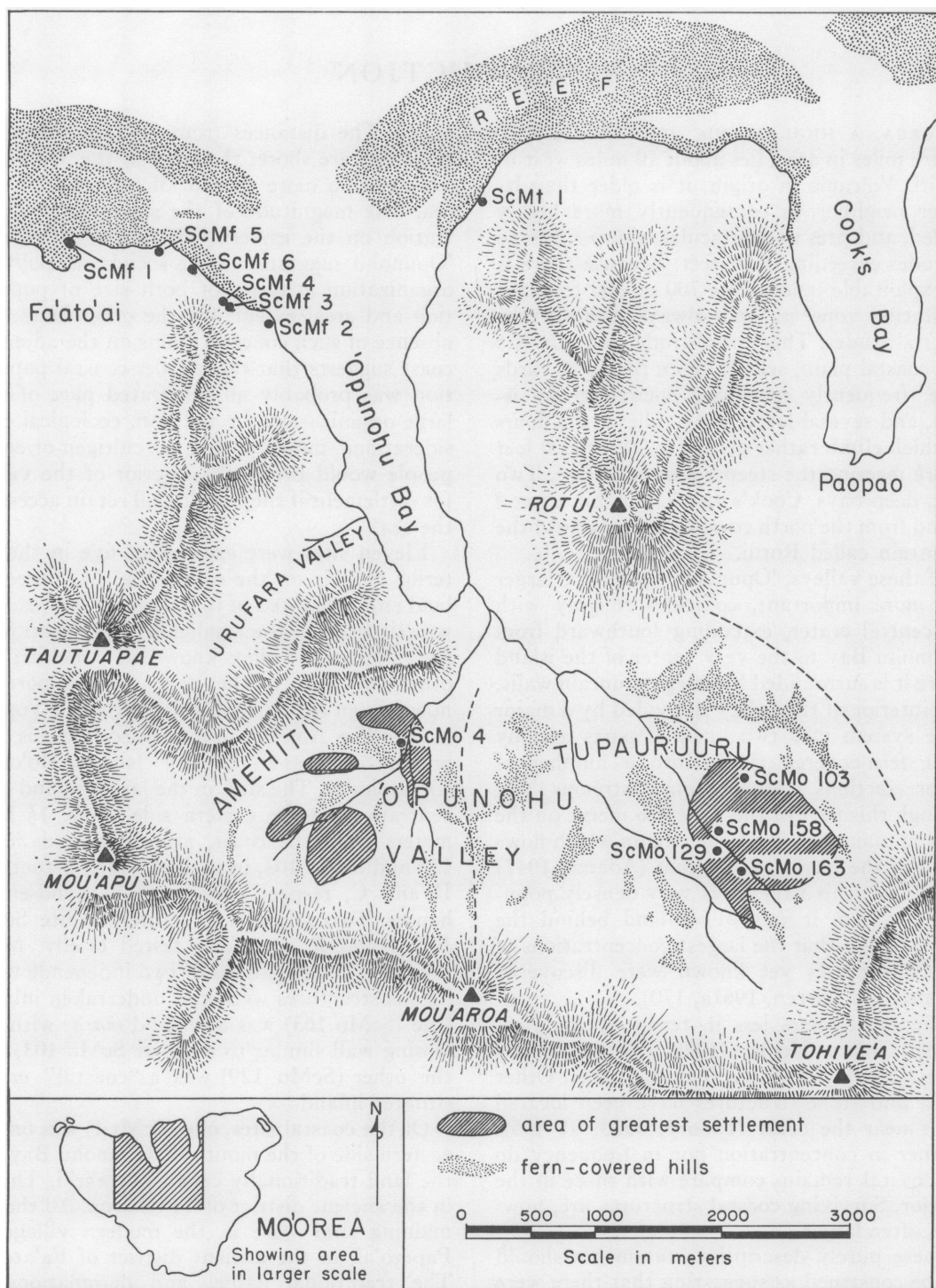


FIG. 1. Map of Fa'ato'ai and 'Opunohu valleys in Mo'orea, French Polynesia, showing location of principal sites and excavations. Coastal sites: ScMf 1, Te Mao'ae. ScMf 2, Hauiti. ScMf 3, Vaiohu'a. ScMf 4, Ta'au'roa. ScMf 5, Te Amaama. ScMf 6, Mata'i Taria. ScMt 1, Mata'iri'i. Inland sites: ScMo 4, community house in Ame'iti half of valley. ScMo 103, community house and *marae* cluster. ScMo 158, community house and *marae*. ScMo 163, *marae* of Type III F. ScMo 129, *marae* of Type IIIB.

# EXCAVATIONS OF TWO ROUND-ENDED HOUSE SITES IN THE EASTERN PORTION OF THE 'OPUNOHU VALLEY

JANET M. DAVIDSON

THE FIRST SITE, ScMo 4 (described below, pp. 164-170), that was excavated in the valley in 1960 was the largest round-ended house recorded in the smaller Amehiti division of the valley. The two sites described below are the two largest round-ended houses recorded in the larger eastern portion, where there is a greater concentration of sites and where every type of stone structure known from the Windward Group of the Society Islands is represented (Green 1961a, 171). The aim of the excavations on these two sites was to obtain additional structural information on round-ended houses, and chronological information about the position that they held in the sequence of occupation in the valley.

## SITE ScMo 158

This site, on the east bank of a stream, 15 to 25 feet above its bed, was in a slight bend of the stream, at a point where there is a break in the slope. Tahitian chestnut trees (*mape*) grew along the stream bed; on the site itself there were several large hibiscus trees (*purau*) and much undergrowth.

The site consisted of six structures on two levels (Fig. 2). Structure A, a small inland *marae*, included a partly paved enclosure with uprights at one end and a backrest stone at the opposite end. The front wall of Structure A was eroding into the stream. Structure A was not excavated. The interior of Structure B, a small stone enclosure attached to the rear wall of Structure A, was excavated. Structure C, a long pavement on the edge of the scarp between the two levels, had probably partly eroded. A line of curbstones extended along the rear of the pavement, and in the center of the line of curbs was an upright stone backrest. A second upright stone backrest (Fig. 2, 1) stood at the western end of the pavement (Fig. 2, 2). A flat clear area with no structures lay between Structures B and C. To the east was a portion of a small square pavement (E). Below Structure C a low scarp separated these upper structures from the lower level on which Structure D

was situated. Structure D, a round-ended house, outlined by undressed curbstones, measured 17.5 meters in length and 8 meters in width. On the north side were a built-up terrace and stone retaining wall, and, at one end of the terrace adjoining the house, a small pavement, (F). Structure D was illustrated by Emory (1933, 105, Fig. 69) as Site 98b.

The entire site was cleared of all vegetation except the large trees. The terrace and the flat area between Structures B and C were laid out in 2-meter squares, some of which were later extended. Structure D was not excavated in squares because a deep deposit was not anticipated. It was therefore merely scraped down to the floor level and carefully examined for features. Excavation was by hand trowel, and natural strata were followed. The excavated areas are shown in Figs. 2 and 3. The squares were plotted, and the entire site was mapped by plane table. Part of a crew of from six to 12 Tahitians in our employ did much of the excavating.

Evidence for four successive periods of occupation was found on this site. These were numbered successively Periods I to IV, Period I being the earliest. The round-ended house was in use during occupation Period III. Evidence for four occupations was also found at Site ScMo 103C, and these periods were also numbered successively I to IV, Period I being the earliest, and Period III marking the time of the round-ended house. This system of numbering does not refer to anything beyond the individual site, nor does it imply that there is any necessary connection, temporal or otherwise, between occupations bearing the same number on these or any other sites. There is not yet sufficient information from the 'Opunohu Valley for the different occupations on separate sites to be related in one numbered sequence.

When the site was cleared of vegetation, a small rectangular house, 5 meters by 3 meters, was discovered within the area of the round-ended house. Both Green and Emory had recorded part of this structure as a possible parti-



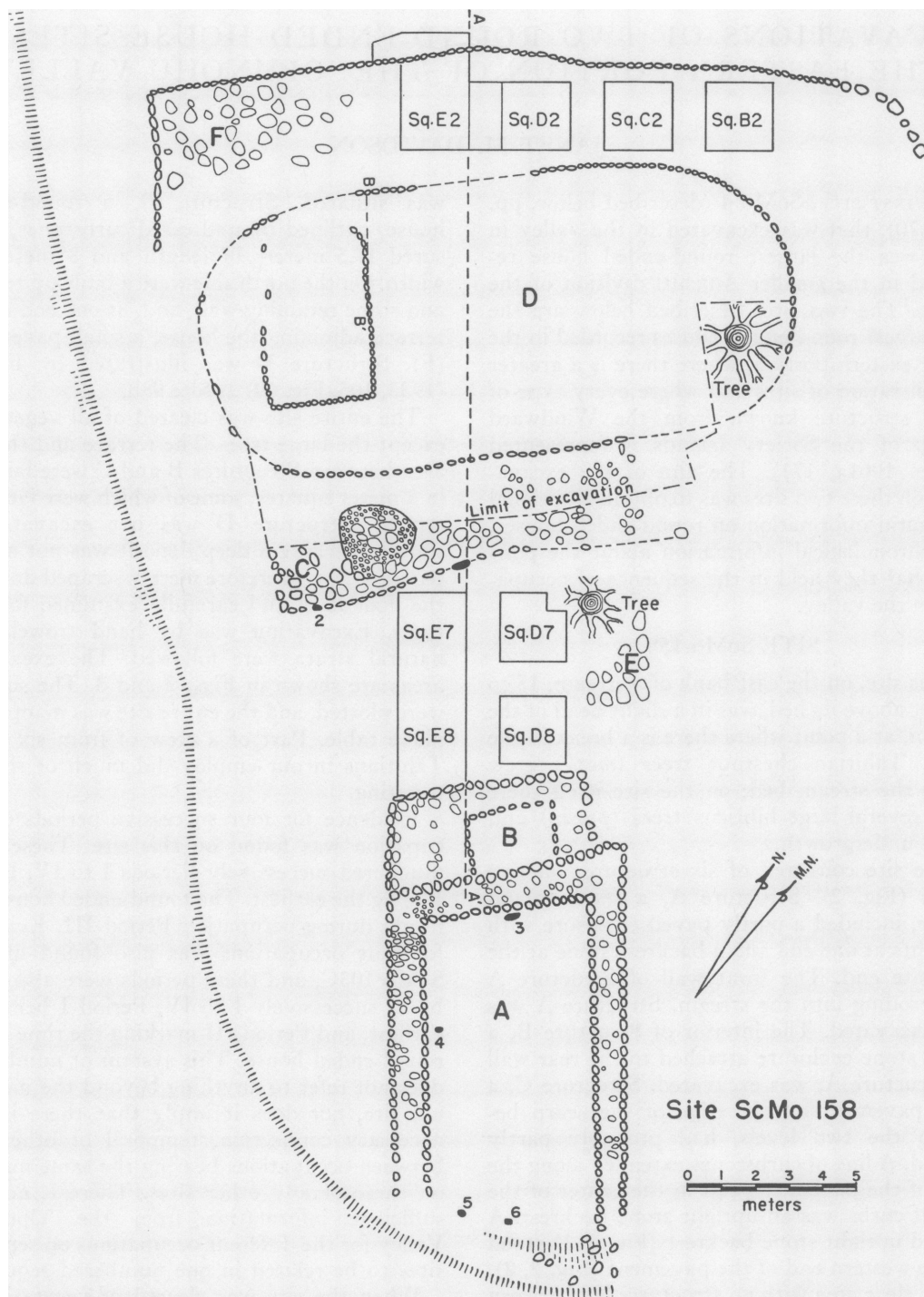


FIG. 2. Groundplan of Site ScMo 158, showing Structures A to F and excavated areas. A. Inland *marae*. B. Enclosure attached to rear of A. C, E, F. Pavements. D. Round-ended house. 1. Backrest stone, height 20 inches, width 21 inches. 2. Backrest stone, height 22 inches, width 12 inches. 3. Backrest stone, height 15 inches, width 34 inches. 4. Upright, height 12 inches. 5. Upright, height 15 inches. 6. Upright, height 12 inches.

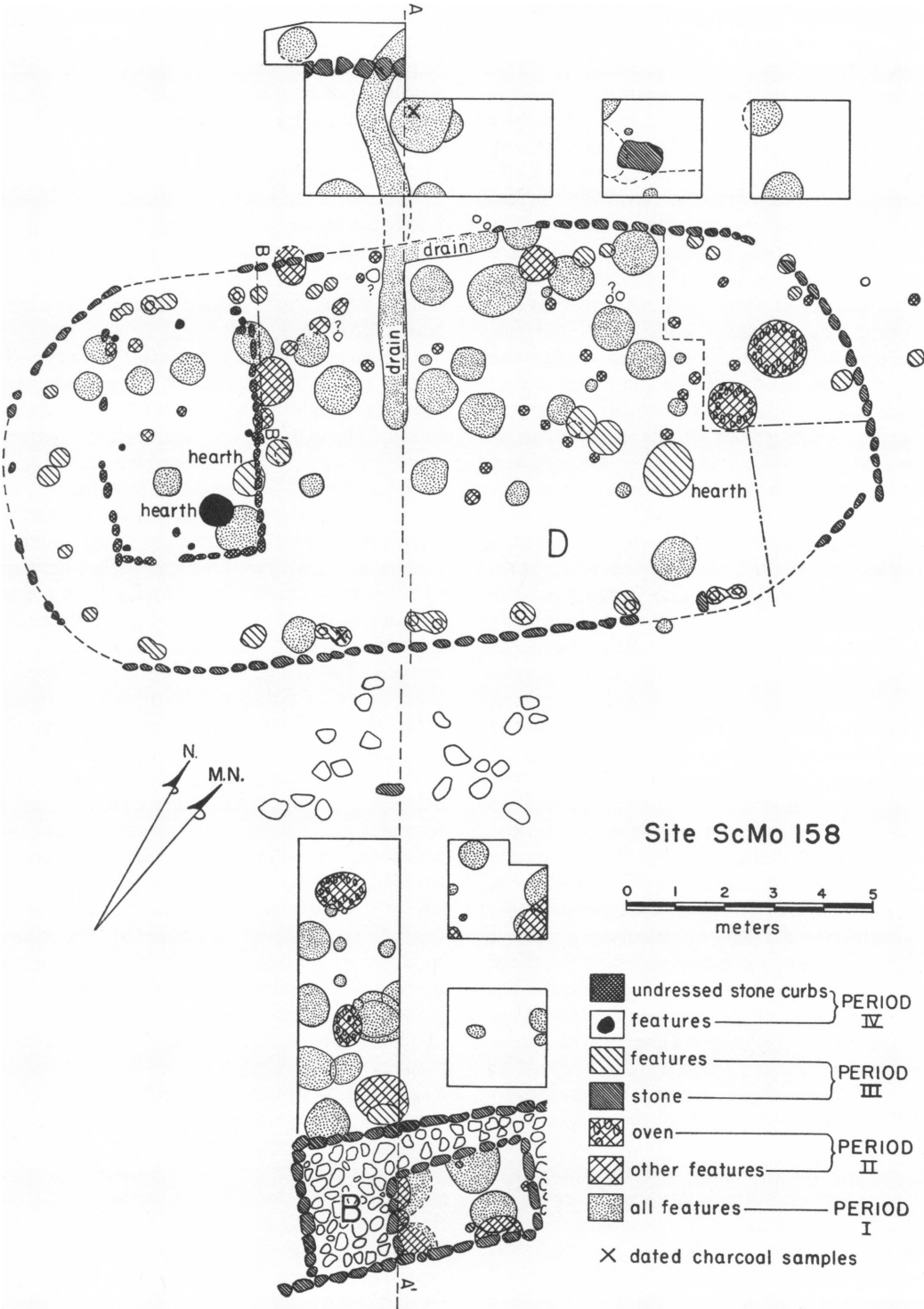


FIG. 3. Detailed plan of excavated areas, Site ScMo 158, showing Structures B and D and features of all periods.

tion of the larger structure, but neither had recognized its complete form. Its position led to the assumption that this house was the latest structure on the site, and its excavation was begun. It proved very difficult to define the floor which was not marked by a firm level of any sort. The same difficulty was experienced in the round-ended house, and this parallels the experience of the previous excavation at Site ScMo 4 (pp. 164–166). In places in the house a thin lens of clay, yellower than the overlying material and corresponding to the base of the curbstones, was found. A similar layer a few centimeters lower, which extended under the curbstones, was assumed to be the floor level of the larger house, whereas the upper layer was presumed to be the floor of the square house. Neither layer could be traced over a very large area. The square house and the features belonging to it were assigned to Period IV.

Excavations in the round-ended house proceeded simultaneously. Except for the northeast corner, where there was a large tree, the entire interior was excavated, together with the scarp and a small area at the north end outside the house (Fig. 2). The soil inside the house was carefully scraped down until the presumed floor level was reached. This was then searched for post-holes and other features. It was at once apparent that on the southeast side of the house such post-holes, cut as they were into sterile clay, would be easy to isolate, but on the north and west sides, closer to the terrace wall, a considerable artificial fill made post-holes more difficult to define. Moreover, in this area a number of features uncovered caused some confusion, until it became clear that there had been considerable activity on the site before the round-ended house was built. These earlier features appeared wherever the excavators penetrated the thin floor level. After the initial confusion, the features assignable to Period III were isolated from those of earlier periods.

The four squares between the house and the edge of the terrace were excavated in order to obtain information about the construction of the terrace. In each square, below the thin layer of surface soil, a layer of granular brown clay with large quantities of charcoal was encountered (Fig. 4, Layer 3). There was considerable variation within this layer; in places it was almost black, with pockets of charcoal and

pockets of clay which seemed to be redeposited natural material. At one place a number of large stones, several of which were flat, like paving stones, were found. Beneath the clay a layer of much harder, compacted gray clay, containing little charcoal, was at first mistaken for undisturbed natural material (Fig. 4, Layer 4). This compacted gray clay covered, and in places filled, a number of circular pits cut into sterile clay. These pits were the earliest features on the site. The terrace retaining wall was built on top of this layer, and Layer 3 provided the infilling behind it (Fig. 4).

It was possible to correlate the sequence obtained from the squares with the more complex sequence within the area of the round-ended house. Here the pits and other features of Period I were very numerous. All were filled with Layer 4. The Period-II features that were cut into this layer consisted of a number of post-holes and three more pits, all filled with black material containing much charcoal. A thin layer of this fill overlay Layer 4 along the northern side of the house and corresponded to the thicker and more varied Layer 3 of the terrace. Two large ovens were associated with this layer. Occasional truncated post-holes with black fill, found to the southeast of the site, suggested that the black layer had once been more widespread but had been scraped down and redeposited behind the terrace wall, together with some sterile material. The early pits constitute Period I; the features filled with the black layer, Period IIa; and the black layer itself with its associated ovens constitutes Period IIb. After Period IIb, the site was modified to accommodate the structures of Period III, the round-ended house, the Pavement F, and the terrace wall.

The area so far discussed formed a unit throughout which the same layers were identifiable. Unfortunately, because there was no stratigraphy on the scarp, it was not possible to correlate the upper level of the site with this area directly by following the stratigraphy right through the site. Consequently, correlation must be inferred.

A black layer (Fig. 4, Layer 3), with which two ovens were associated, lay immediately beneath the surface soil in the area between Structures B and C. This black layer filled a large pit immediately behind Structure B, as well as a number of shallow depressions. A

Site ScMo 158: North-South Section near middle portion of the site connecting Structures A through D

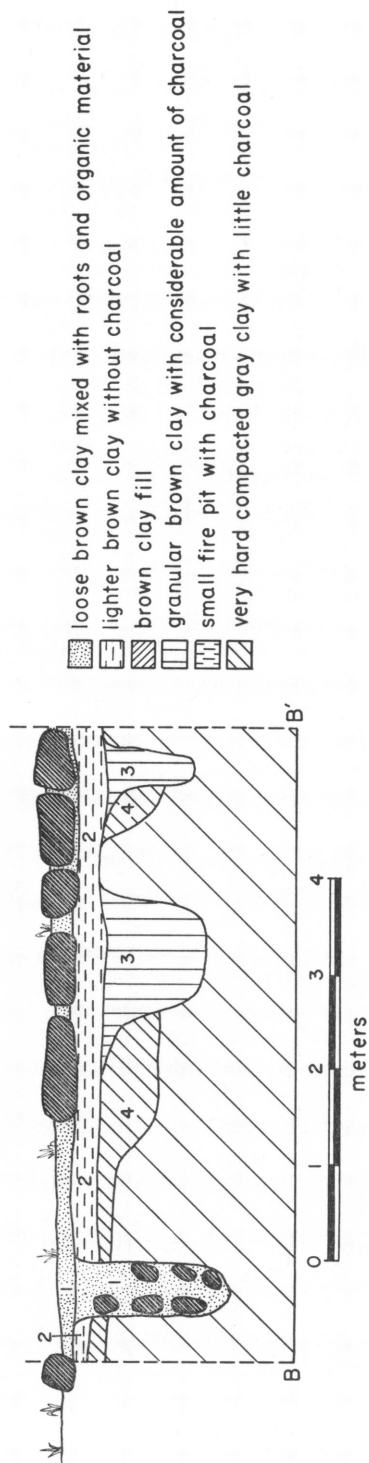
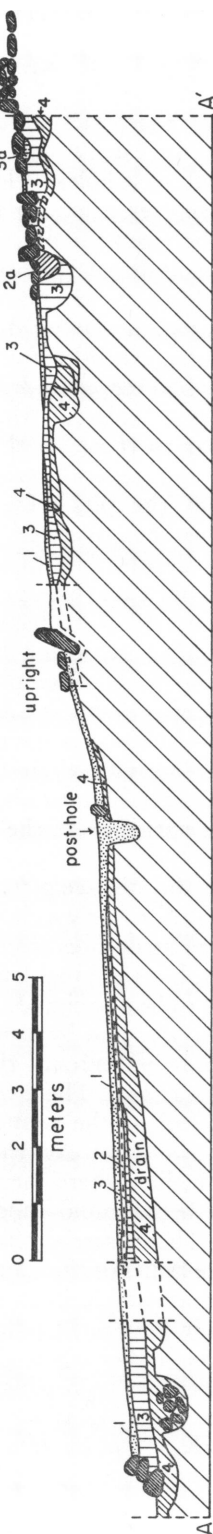


FIG. 4. Sections, Site ScMo 158. A-A', through entire excavated area. B-B', detail of section inside Structure D.



smaller pit which contained the remains of a human burial was cut into the fill of the pit. The burial thus lay just underneath the wall of Structure B. The black layer continued under the wall of Structure B, which was built directly on top of it, filled some shallow pits in the interior of Structure B, and passed under the wall of Structure A (Fig. 4).

Both in Structure B and in the area between Structures B and C, the black layer sealed a number of pits containing an earlier fill and some post-holes. These pits resembled very closely the Period-I pits described on the lower part of the site; they are probably, in fact, contemporary. The black layer also was very similar to Layer 3 on the lower part of the site. The features which it filled have therefore been assigned to Period IIa, and the two ovens to Period IIb. The pavement (Structure C) built directly on top of the black layer obviously belongs to Period III. The *marae* (Structure A) and its extension (Structure B) were also built directly on top of the black layer. Therefore they probably also belong to Period III, although it is possible that they are more recent and belong rather to Period IV. The excavations inside Structure B revealed only two small post-holes.

The position of the fragmentary Pavement E, which was outside the excavated area, is not clear.

A large, roughly circular pit encountered on the scarp, partly underneath Structure C, was filled with large burnt stones and apparently had been the base of a very large oven. It could not be connected stratigraphically with the rest of the site, except insofar as it was earlier than the Period-III pavement. Its large size suggests that it was associated with the round-ended house, rather than with the smaller ovens of Period IIb. It has therefore been assigned to Period IIIa, and the pavement is assigned to Period IIIb (see discussion below, p. 127).

All features of all periods are shown in Fig. 3 except the large Period-IIIa oven which is shown in Fig. 2.

#### PERIOD I

More than 30 roughly circular pits belonging to Period I were excavated on the lower level of the site. They ranged in diameter from 50 cm.

to 1.25 meters and in depth from 25 cm. to 40 cm. The fill of most of these pits contained large stones; there was charcoal in some, but no evidence of fire except on the upper level in one pit. Several post-holes belonging to Period I were also scattered among the pits. A shallow ditch ran between the pits and down the slope beyond the limits of the site. Its total excavated length was 8.25 meters, but only one end of it was located. A smaller ditch, approximately 2 meters long, ran into it at right angles. Both apparently had served as drains.

The Period-I pits on the upper level were very similar to those on the lower level. Thirteen pits and several post-holes were found here. Again the pits were circular, approximately 1 meter in diameter and from 50 cm. to 60 cm. in depth. The fill in each pit varied slightly; in one case three pits had been cut into one another. All were basically similar, however, and all were sealed by the black layer. The edges of two other pits adjoined, and a large stone was firmly wedged in the gap thus created. As these pits were less disturbed by subsequent activity than those on the lower level, it was possible to observe that many of them were narrower at the mouth than at the base.

The pits did not seem to be arranged in any particular order, nor was it possible to infer the form of any structures from the post-holes. In some cases, but not in all, one post-hole and one pit seemed to be associated.

The area occupied by these pits was very extensive, and the limits of the Period-I occupation are not known. There were more pits at the northeast end of the round-ended house site. These pits were not excavated because of lack of time. The line where the Period-I excavation ceased inside the round-ended house is indicated in Fig. 3. There were probably additional pits beyond the limits of the excavations.

A charcoal sample from the Layer-4 fill of a Period-I pit between Squares D2 and E3 was selected for radiocarbon dating. It recorded modern activity, indicating an age within two minus standard deviation of less than 180 years (GaK-367<sup>1</sup>). Possible interpretations of this result are discussed below (p. 139).

<sup>1</sup> Gakushuin University radiocarbon code number for this date. Other code numbers for radiocarbon dates are similarly cited after the first mention of a date.

### PERIOD IIA

The Period-IIa occupation was in some respects the opposite of that of Period I in that it comprised a large number of post-holes and a few pits. Three pits on the lower level and one clearly defined on the upper level differed in no way from the Period-I pits. However, their distinctive fill makes them contemporaneous with the post-holes. The post-holes were clearly related to house structures. Several houses appear to be involved, but no complete pattern relating to a single structure was discerned. The stones deposited in the fill behind the terrace wall suggest that curbstones and paving stones may have been associated with these Period-II structures.

### PERIOD IIB

The four ovens were the only features associated with this period. The larger of the two ovens on the lower level, which was more than 1 meter in diameter, consisted of two superimposed ovens as did the larger of the two on the upper level. The other two were smaller, single ovens.

The ovens and the black layer may possibly date to the time immediately prior to the construction of the Period-III features, and may never have been associated with house structures. However, it seems more likely that they belong to the time when the structures of Period Iia had been built and were occupied.

### PERIOD III

The entire post-hole pattern was recovered on the southeast side of the house. A number of "double post-holes" were found where an earlier post-hole had been dug and deliberately filled and another post-hole had been dug immediately adjacent to the first. The more recent post-holes were usually deeper than the earlier ones. The two post-holes in the east corner of the house were found to be associated with two different floor levels. The second and later of the two floor levels, from which the later post-hole was cut, sealed over the earlier post-hole which was cut from a slightly lower level. Unfortunately, these two floors could not be traced for any great distance, nor could they be related to the two floors identified in the Period-IV house. A similar situation probably obtained with respect to the other double post-holes, but this was not recognized at the

time because of the great difficulty experienced in identifying any floor level.

It was apparent, however, that the round-ended house had been at least partly rebuilt. Those features that clearly belonged to the earlier stage were assigned to Period IIIa, and those of the later house were assigned to Period IIIb. The two houses are shown in Fig. 5.

### PERIOD IIIA

Eleven post-holes were found which certainly belonged to the earlier house. Three additional post-holes proved to have been in use during both periods. A complete series of post-holes was recovered for the east wall and, except for a 6-meter gap where no post-hole of either house was located, for the west wall. Only one double post-hole was found at the southwest end of the house. If a post-hole of unknown period in this area is assigned to Period IIIa, and the two Period IIIb post-holes can be assumed also to have been in use in Period IIIa, and the Period IIIb post-holes are assumed to have been in use also in Period IIIa, the possible pattern for Period IIIa at this end of the house is also complete. At the northeast end of the house one post-hole was found under the curbstones, and one outside of them. The remainder of this end of the house was not fully excavated. These post-holes, however, suggest that the earlier house may have been as much as 1 meter longer than the more recent house. One of the two central post-holes of Period IIIb was found to have an earlier counterpart. The second was probably used throughout both periods. Two hearths found belonged to the round-ended house, but it was not clear whether or not one belonged to the earlier house and one to the later house.

### PERIOD IIIB

Eighteen post-holes clearly belonging to the later house were found. They ranged in depth from 45 cm. to 60 cm. Most of them still contained the stones that had been packed around the post. Two additional post-holes could be expected to be located in the unexcavated area. Otherwise, the pattern was complete, except for the gap in the west wall. This was the area where the greatest concentration of earlier structures was found; possibly the Period-III post-holes were not identified here because they had been cut into the fill of earlier pits.

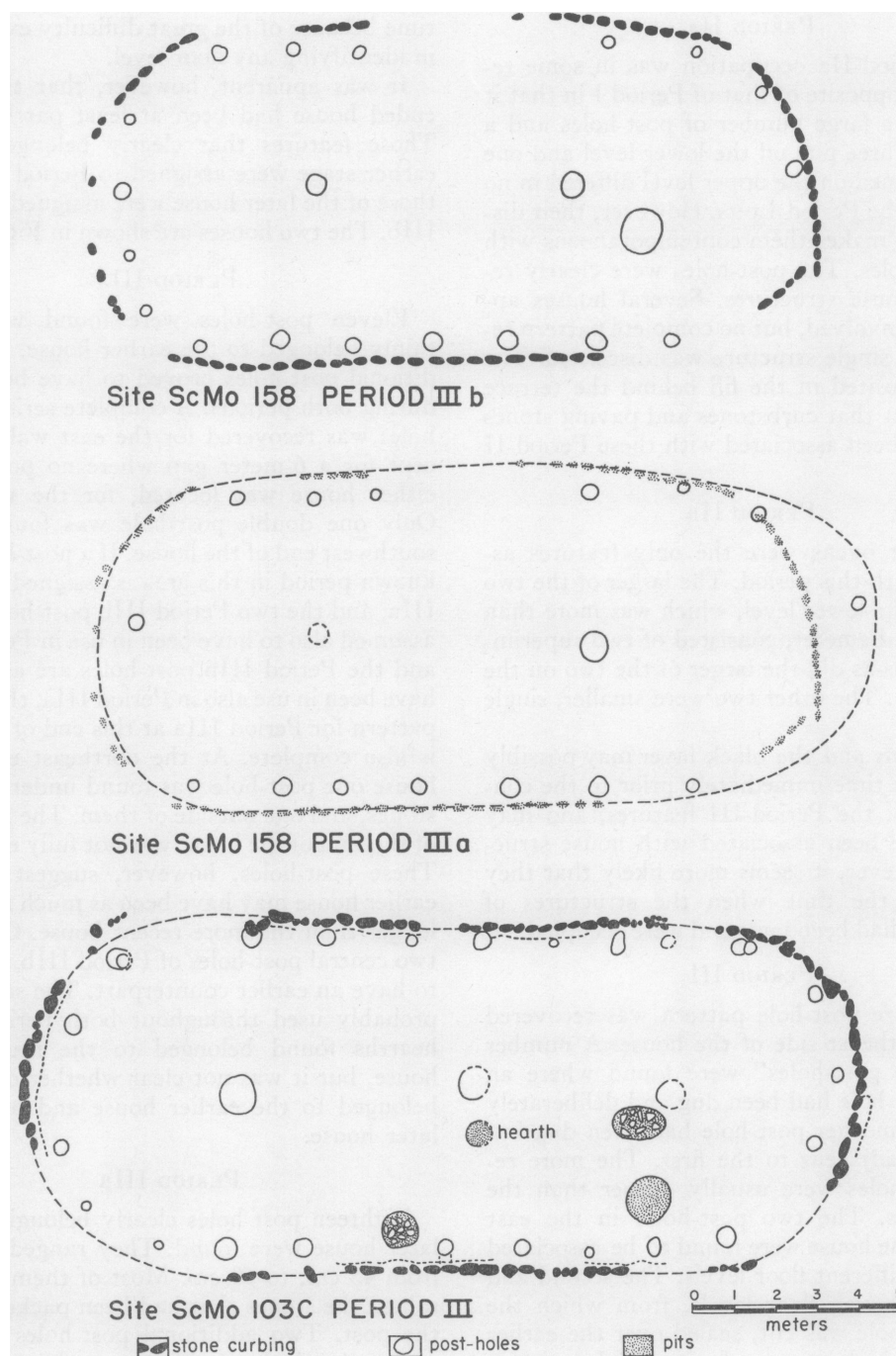


FIG. 5. Three round-ended houses, Site ScMo 158, Periods IIIa and IIIb, and Site ScMo 103C, Period III.

Two large round-ended houses, Site ScMo 158, Periods IIIa and IIIb, and Site ScMo 103C, Period III. Two large central post-holes must have held the posts that supported the ridgepole of the house. The two post-holes were 90 cm. and 95 cm. deep

and more than 50 cm. in diameter.

From the double post-hole just to the west of the main section through the site and on the

south side of the round-ended house, a carbon sample was obtained which has been radio-carbon-dated as modern, and within the limits of two minus standard deviation as less than 180 years before 1950 (GaK-366).

The evidence quite clearly suggests that the round-ended house was at some stage rebuilt in similar but probably slightly shorter form. The modification of the site and the building of the terrace must have occurred prior to the construction of the first house. However, it is impossible to determine the order in which the other Period-III structures were built and which of them belong with Period IIIa and which with Period IIIb. If the large oven described above does in fact belong to Period IIIa, then the pavement must belong to Period IIIb. The stones used in this pavement were possibly in use elsewhere on the site during Period IIIa, but there is no evidence to support such an assumption. Similarly, it is not possible to determine when the *marae* (Structure A) and its extension (Structure B) were built. Excavations failed to reveal the function of Structure B. The human burial beneath its wall was evidently placed there immediately prior to the building of the wall.

#### PERIOD IV

Seven post-holes belonging to this house were found (Fig. 3), one in each of three corners and one in the center of each wall. A Period-I pit with a soft fill in the fourth corner probably accounts for the fact that no post-hole was identified there. The post-holes of this house were shallow; the two in the center of the end walls were deeper than the rest. A hearth, 70 cm. in diameter and 6 cm. to 8 cm. deep, in the east corner of the house was the only other feature uncovered that belonged to the house.

#### PORTABLE ARTIFACTS

A number of stone artifacts were recovered. One complete *penu*, or pounder, six adzes, complete enough to be classified, three small adze chips, two fragments of pounders or sling stones, and two complete sling stones were found on the site. The pounder and the six adzes warrant description, but the fragments are too small to be diagnostic.

The pounder was recovered from the fill of a Period-I pit (Pl. 19). It is simple, with straight

sides, and measures 73 mm. across the base, 28 mm. at the narrowest part of the neck, and 45 mm. at the widest part of the head. Its total length is 105 mm. There is a central groove across the head. The pounder is not polished. It is rather different from the typical Tahitian pounder known from museum collections, and more resembles one recovered from an early context in the coastal excavations (p. 199).

An adze (Fig. 9a) was recovered from the same pit. It is triangular in cross-section, with the apex of the triangle at the back, and has a long bevel which reaches almost to the shoulder. The sides and front of the butt are reduced but not ground, but the front and sides of the blade, the bevel, and the entire back are ground. The upper part of the butt and the tip of the blade are missing. The adze is 43 mm. wide and 38 mm. thick at the shoulder.

A complete adze (Fig. 9e) and a chip were recovered from the fill of a Period-I pit on the upper level of the site. The adze has a rectangular cross-section. The butt and the blade are of almost equal length, the butt being somewhat longer. The sides and front of the butt are slightly reduced and are not ground, but the front, the bevel, and the sides of the blade are ground. Its total length is 105 mm.; its greatest width in the middle of the blade is 45 mm.

The fragments all came from the fill of the Period-I pits.

The adze shown in Fig. 9f came from Layer 4 in one of the squares in the terrace and is therefore earlier than Period II. It is triangular in cross-section, with the apex to the front. The butt is set at an angle to the blade, and the front of the butt is reduced. One side is convex; the other is concave in the region of the shoulder, giving the adze a lopsided appearance. The bevel is short and steep, and the cutting edge is broken. The adze is not fully ground. Its total length is 135 mm.; greatest width, 37 mm.; and greatest thickness (at shoulder), 40 mm.

A broken adze (A 9/15)<sup>1</sup> was recovered from one of the Period-IIb ovens, where it had apparently been used as an oven stone. This fragment, the upper part of the blade and a small portion of the butt, is triangular in cross-section, with the apex at the front. The butt seems to be set at an angle to the blade, and its front

<sup>1</sup> Field numbers; artifacts will ultimately be deposited in the Museum in Pape'ete, Tahiti.

reduced. It is 37 mm. wide and 43 mm. thick at the shoulder.

Two adzes found in the loose soil at the foot of the scarp probably belong to Period III. The adze illustrated in Fig. 9b is subtriangular in section, with the back considerably narrower than the front. It is widest at the shoulder (28 mm.) and narrowest at the cutting edge (17 mm.). The front of the butt is unground and set at an angle to the blade, but the back of the adze is convex. Its total length is 90 mm.; the greatest thickness (at the shoulder) is 22 mm. The other is the butt portion and shoulder only of a triangular adze (Fig. 9g) with apex to the front, similar to A 9/15.

The two sling stones found just beneath the surface of the Period-IV house were the only artifacts recovered from it. They are very smooth, somewhat egg-shaped stones.

The period and Duff (1959, 127-141) type of adzes from both sites are shown in Table 1.

#### MIDDEN

The midden material found was disappointingly meager. There was just sufficient to show that it did exist. Several pig teeth and some fragmentary bones, probably pig, were recovered from Layer 3 on the upper level. Two pig teeth were found near the Period-IIb ovens in the area of the round-ended house, but it was not clear whether they were on or below the house floor. Some badly decomposed pieces of shell, probably *Turbo* (*maoa*), were found on the site, one in a Period-III post-hole, and one in a Period-IIb oven. A few other fragments of shell were found, but their exact location was not recorded. Some fragments of bone of a cetacean were found in the fill of one of the Period-I pits.

#### SITE ScMo 103C

The site is situated on gently sloping ground which drops steeply toward a stream bed on the south and west. There are a number of large Tahitian chestnut trees (*mape*) between the site and the stream; the site itself supported a number of hibiscus trees (*purau*) and thick undergrowth, predominantly ginger.

The site when recorded consisted of a terrace retaining wall, immediately behind which was a large stone pavement, 14 meters long and from 5 meters to 7 meters wide, and a small rectangu-

lar house. This combination of features was believed to be typical of a round-ended-house site, and it was suspected that there was also a round-ended house which had not been visible (p. 175). The site was excavated initially to test this hypothesis. A series of seven large inland *marae* had been recorded by Green a short distance above this site. Any or all of these could be associated with the site.

The vegetation was cleared from the site, except for the large trees, and a grid of 2-meter squares with 1-meter balks was laid out (Fig. 6 and Pl. 17). As the work progressed, intervening balks were removed, and some squares were extended. The excavation by hand trowel followed natural layers.

Almost immediately, curbstones outlining a very large round-ended house were revealed. Excavations were planned to learn as much as possible about this structure. It was soon apparent that here, as at Site ScMo 158, the round-ended house was not the most recent structure on the site. A rectangular house was partly outlined within the area of the round-ended house, so that one of its walls was actually part of the west wall of the round-ended house. A second wall at right angles to it consisted of curbstones laid down with long sides adjoining, rather than end to end. The other two walls, neither of which was complete, consisted of curbstones laid end to end. There was also an isolated line of curbstones adjoining the east wall of the round-ended house at right angles to it. These are grouped together and discussed as Period IV.

Excavations were mainly in the round-ended house and its associated features (Period III), although the possibility of earlier occupation of this site, as on Site ScMo 158, was kept in mind. As before, the surface soil within the house was carefully removed, until its probable floor level was reached, and this was carefully searched for post-holes and other features. The same procedure was followed in the rectangular house to the south, which was shown to be stratigraphically contemporaneous with the round-ended house. To the north, an extensive cooking area assigned to Period III was uncovered. Broken oven stones, mixed with the thin surface soil, littered the surface. Beneath these was a series of large ovens cut into one another.

Although not so extensive as at Site ScMo 158, evidence of earlier occupation was found



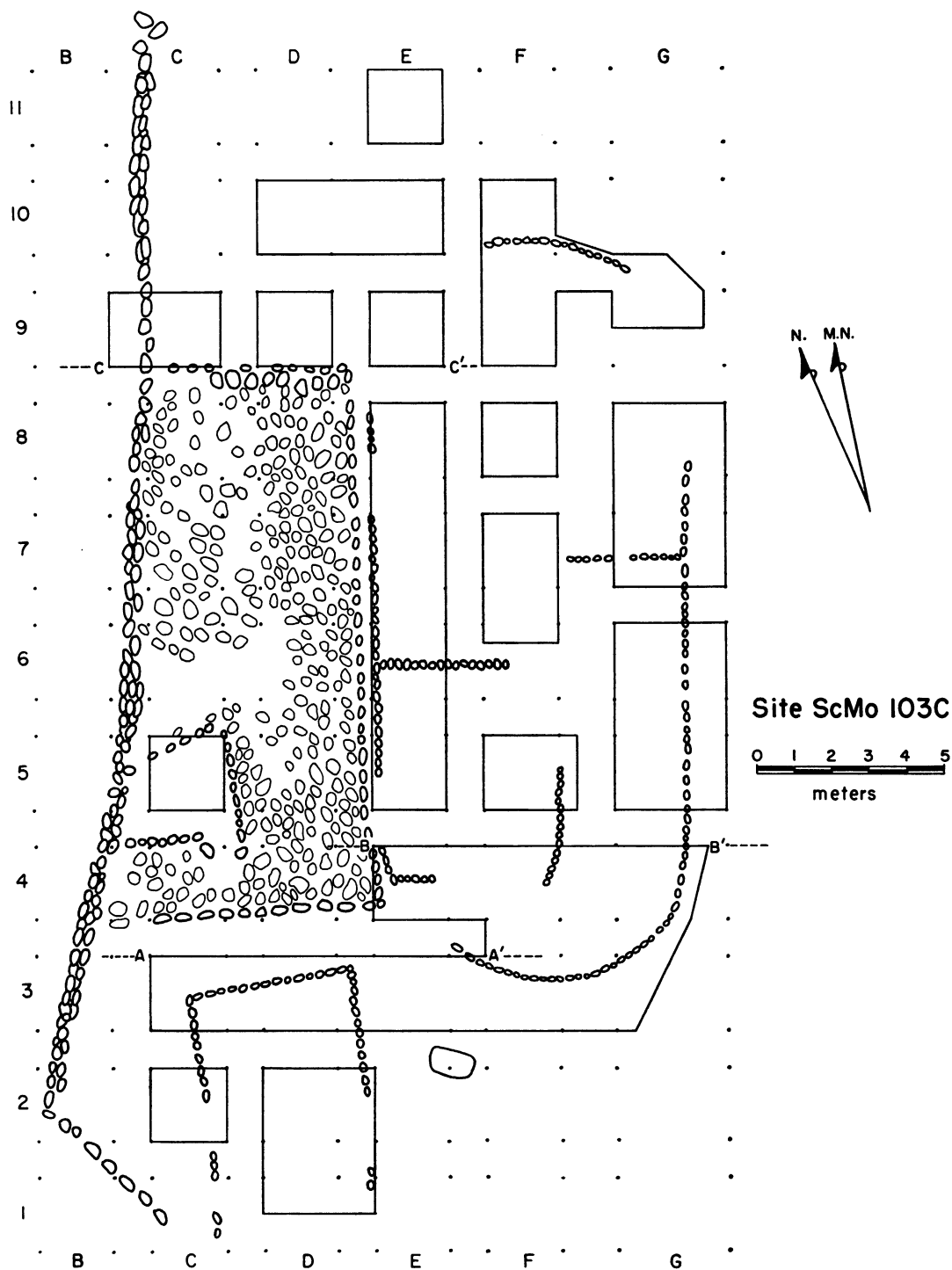


FIG. 6. General groundplan, Site ScMo 103C, showing excavated areas.

here. Except in the cooking area, two layers were found over the entire site (Layers 1 and 6, Fig. 8). These two layers were very similar in composition and were hard to separate. Layer 1, the most recent on the site, was a loosely compacted, dark brown clay containing charcoal and small stones. Layer 6 consisted of more compacted, gray-to-brown clay, with less charcoal. These were the only two layers on the upper part of the site. However, on the lower part of the site other layers were found between them. These layers were most clearly defined in the area immediately adjoining the long pavement. The majority of the early features are probably under the pavement in an area where only one square was excavated.

Once again, the earliest features on the site consisted of shallow circular pits and post-holes. These were cut into sterile clay and filled with Layer 6. A black layer with ovens in it was found above Layer 6 in the area of the long pavement. This was encountered at each end and in the square in the middle of the pavement. Traces of this layer were also found on the west side of the round-ended house associated with a large oven which was clearly earlier than the house. These black-layer ovens are shown in Fig. 7 as belonging to Period II, whereas the earlier pits and post-holes are Period I. A line of curbstones found resting on Layer 6, below the terrace wall, probably belonged to a Period-II structure.

Above Layer 5, on the south side of the pavement, was a lighter layer (Layer 4), which, however, seemed to be closely related to Layer 5. Layer 4 thickened toward the edge of the terrace where it filled a depression. Layer 4 is probably a redeposited black layer from the upper part of the site. Above this, a layer of sterile yellow clay (Layer 3) was also redeposited behind the terrace wall. Layers 3 and 4 on the lower part of the site probably represent a case of reverse stratigraphy. Layer 1 was above Layer 3. This same sequence of layers was found in the square beneath the terrace.

On the north side of the pavement, Layer 4 was much thicker and extended farther upslope on the site, although it quickly thinned out to the north. In Square D9 a portion of the burned trunk of a coconut palm was recovered from Layer 4. Above Layer 4 was a layer of brown clay fill, Layer 3a, on top of which the pave-

ment and the round-ended house were built (Fig. 8, C-C').

The terrace wall was built directly on top of Layer 5. Layers 3 and 4 seem to have been layers of fill deposited behind the wall to build up the site for the round-ended house.

Three pits found in the area of the round-ended house were clearly earlier than Period III, but could not be assigned with certainty to either Period I or Period II, as the stratigraphy was insufficient to link them to the layers on the lower part of the site. One pit, the largest feature on the site, was more than 1 meter in diameter. It was filled with large stones and material similar to that of Layer 6. It has been tentatively assigned to Period I. The other two pits, one of which was partly under the long pavement, were filled with a mixture of charcoal and clay and have been tentatively assigned to Period II, although there is no evidence to relate them directly to the ovens.

#### PERIOD I

Five pits clearly belonged to the earliest occupation of the site (Fig. 7). These were from 70 cm. to 1 meter in diameter. They were associated with a number of post-holes which probably represent house structures, but the limited area in which these early features were found made it impossible to identify any particular structures. None of the pits was more than 40 cm. deep.

#### PERIOD II

The only evidence of a house belonging to this Period is the line of curbstones close to a Period-II oven in Square C9 (Fig. 7). Time did not permit further excavations in this area. Probably the other ovens and the two pits were also associated with houses beyond the limits of the excavated area. Two of the ovens were shallow, approximately 1 meter in diameter. The third, somewhat larger, was about 40 cm. deep. It was not, however, so large as the Period-III ovens. The two pits were similar to the Period-I pits and differed only in their fill.

A portion of the outer skin of the burned coconut log recovered from Layer 4 in Square D9 yielded a radiocarbon date of  $350 \pm 110$  years before 1950 for the Period-II occupation (GaK-365).

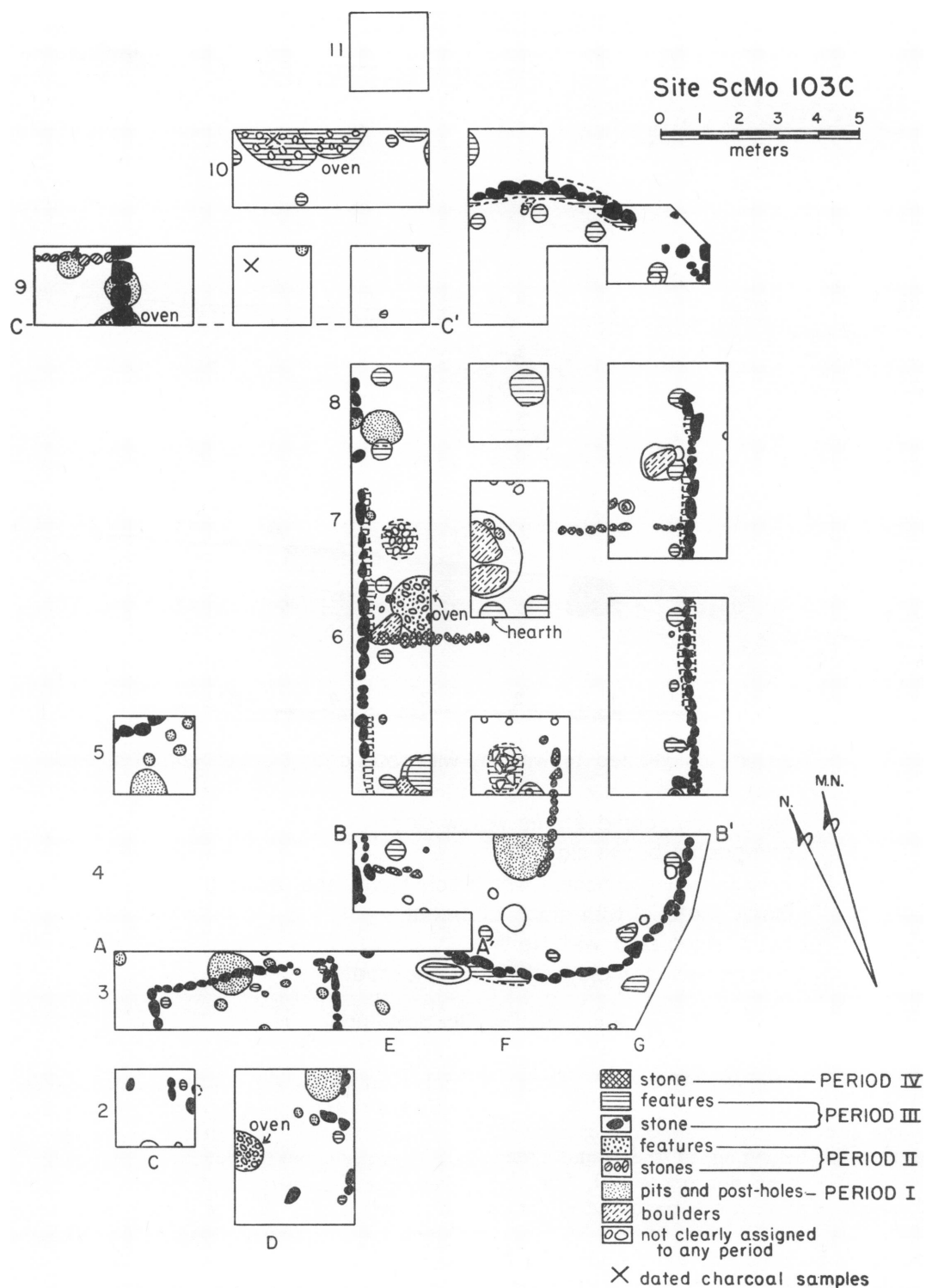


FIG. 7. Detailed plan of excavated area, Site ScMo 103C, showing features of all periods.

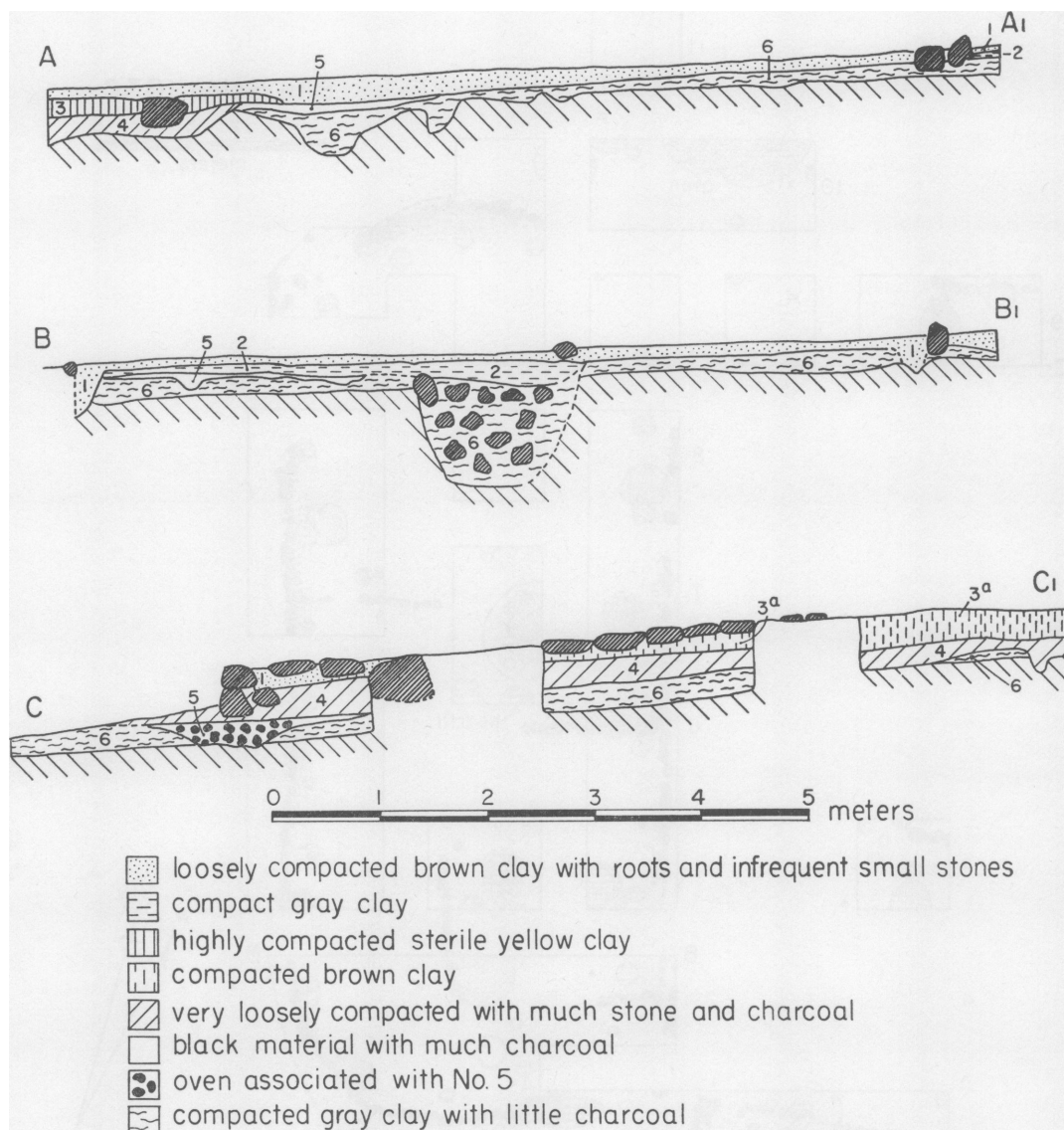


FIG. 8. Sections, Site ScMo 103C.

## PERIOD III

As the site was not completely excavated, some features belonging to the round-ended house possibly were not uncovered, but the main post-hole pattern was recovered in detail (Fig. 7).

The round-ended house was found to be 20 meters long and 8.8 meters wide at its widest point. The ridgepole was supported by two large central posts and probably a third. Frag-

ments of a post with charred exterior were recovered from two of the central post-holes. One of the workmen stated that, to make a post last, it was the custom to char the outside of the base before setting the post in the ground, and that his grandfather had followed this practice when constructing a large house. These two post-holes were situated 4.5 meters and 5 meters from the ends of the house. Each had contained a post about 25 cm. in diameter placed in a larger hole, one 70 cm. in diameter,

the other, 90 cm., each tightly wedged in with stones. One of these post-holes was 70 cm. deep, and the other, more than 1 meter. The third central post-hole was between these two, not quite in line with them and closer to one than to the other. It was 70 cm. in diameter and only 55 cm. deep and was filled with a mixture of clay, charcoal, and small stones. It seemed to belong to Period III. Its shape was more like that of a large post-hole than a pit. Despite a diligent search, no other remains interpretable as a central post-hole were found.

Twenty-four post-holes were found around the perimeter of the house, spaced fairly regularly between 1 meter and 2.5 meters apart. One perimeter area where a post-hole would be expected was not excavated, and in another no post-hole was found where one was expected. The area where no post-hole was found was in roughly the same position in the house as the gap between post-holes at Site ScMo 158. Post-holes situated on opposite sides of the house do not correspond exactly in their spacing. In one place the builder had apparently encountered a large boulder beneath the surface and had dug all around it before finally deciding on the position of the post-hole. Usually, however, only one hole was dug. The depths of the post-holes varied considerably, between 45 cm. and 85 cm. below what was presumed to be approximately the floor level of the house. Most of the post-holes were filled with material very similar to the surface soil, and some still contained the stones that had been packed around the posts. Two had different fills apparently derived from the natural clay.

An interesting feature of the site was a shallow ditch around the perimeter of the house between the curbstones and the post-holes. As this ditch was filled with material very similar to that into which it was cut, it was possible at times to locate only the part that had been in the underlying clay. However, the ditch followed the wall of the house exactly. Close examination of sections always revealed that they had been cut from the same level as the post-holes. In one place in the center of the east wall of the house, where the curb wall was slightly concave, the stones were directly above the ditch instead of on the edge of it. The topsoil and stones appear to have slipped a few centimeters down the slope, while the bottom of the ditch, cut into hard clay, retained its

original position. The ditch was not traced around the entire house. It was V-shaped and varied from 30 cm. to 40 cm. in depth.

No hearth that was definitely associated with this house was found. However, some shallow depressions filled with charcoal near the center of the house could have served as hearths. They could also have been isolated pockets of the Period-II black layer. The absence of a clearly defined floor and the shallowness of the deposits make it difficult to be certain.

Three shallow, roughly circular pits with large stones in their fill, found inside the area of the round-ended house, could not be demonstrated to be stratigraphically earlier than the house. These pits, approximately 1 meter in diameter and 45 cm. deep, closely resembled Period-I pits. However, because they appeared to have been cut from the floor level of the round-ended house, they have been tentatively assigned to Period III.

One large pit, slightly more than 2 meters in diameter, in the center of the house, was partly excavated. It was found to be almost completely filled by two large boulders surrounded by a mixed fill of clay and flecks of charcoal. Whether this pit was built to accommodate the boulders or whether they presented the most convenient way of filling a large unwanted pit is not clear, but the filling in of this pit was probably associated with the preparation of the site for the building of the round-ended house.

All features belonging to this house, with the exception of the pit containing the boulders, are shown in Fig. 5. The pit is shown in Fig. 7.

The cooking area was associated with the round-ended house. Three large ovens, the largest and earliest of which measured 1.75 meters in diameter and 60 cm. in depth, were cut into one another, and several smaller ovens were found nearby. A general layer of ash and oven stones was scattered around them. It was not always possible to define smaller ovens fully within this layer. It was obvious that a considerable amount of cooking had been done in the area over a period of time. Two post-holes, possibly indicating some sort of shelter, were found near the large ovens, but the area was not fully excavated, and further evidence for the shelter was not found. Another post-hole, sealed by a small, more recent oven,

could also be contemporaneous with the large oven. There was no evidence of any prior occupation on this part of the site. To the north the cooking debris thinned out and disappeared, leaving only sterile soil, with no traces of occupation.

A charcoal sample from the base of the earliest layer of the largest oven was radiocarbon-dated as modern and within two minus standard deviation less than 200 years before 1950 (GaK-364).

The other feature on the site that was contemporaneous with the round-ended house was the small rectangular house (Pl. 18). One wall of this house was completely outlined by curbstones, and the two walls adjoining it were partly so, but there was no trace of a fourth wall. Excavations were begun in that area of the structure that was clearly defined, and then extended in the hope of recovering the post-hole pattern and exact dimensions of the house.

The six post-holes found that belonged to this house are shown on Fig. 7 as Period-III features. Unfortunately, although the excavation was extended to include what was believed to be the southwest corner of the house, no post-holes were found there. Lack of time prevented a further extension of the excavation. Because this corner of the house, and therefore the south wall, were not located, its dimensions and exact structure were not clear. The most likely reconstruction seems to be a structure approximately 6 meters by 4.5 meters with four corner posts, one post in the center of each short wall, and two along each long wall. No other features were found in this house.

One other feature on the site that may belong to Period III was a large flat boulder resting on the surface just beyond the south end of the round-ended house. A similar boulder was situated in an exactly similar position in Site ScMo 4, the round-ended-house site that was excavated on the Amehiti or western portion of the valley (p. 164).

#### PERIOD IV

The evidence for this period is so slight as to make its very existence as a separate occupation doubtful. The curbstones which were believed to outline a separate house are described above and are shown on Fig. 7. The dimensions of this house would be approximately 6 meters

by 5 meters. A sufficient area was excavated to locate any features associated with the house. However, only one post-hole that appeared to belong to it was found in the center of its east wall. Several small, irregular holes in the center of the house could well have resulted from root disturbances. No other post-holes or any other features belonging to the house were found. The post-holes could have been missed if they were very shallow, but it is unlikely, particularly since the post-holes of the Period-IV house on Site ScMo 158 were found. There is some slight stratigraphic evidence for separating the square house from the round-ended house in time. In one of the sections a thin lens of clay, believed to be the floor of the round-ended house, was clearly several centimeters below the curbstones of the square house. One must conclude either that this was an unfinished house or that it made use of the posts of the Period-III house. In the latter case it would have had four posts along each long wall and probably one central post at each end, although no evidence was found. It would thus be very similar to the suggested reconstruction of the rectangular house of Period III.

The isolated line of curbstones which constituted the other structure assigned above to Period IV provided even less satisfactory evidence. No further curbstones belonging to the structure were visible. Only one post-hole that could relate to it was found. Traces of a shallow ditch similar to that surrounding the round-ended house were found on one side of the curbstones. Further excavation which might have provided a solution to the problem was not possible because of the presence of a large tree in the adjacent balk. It seems unlikely that the structure could be a partition of the Period-III house, although there is no stratigraphic evidence to prove that it was not. On the other hand, the evidence to justify its being given the position of a separate structure is insufficient.

#### ARTIFACTS

Three complete adzes, one blade of an adze, two small adze fragments, and several sling stones were recovered from this site.

No artifacts were found in association with Period I. One adze (Fig. 9d) was recovered from Layer 5 at the south end of the site near a Period-II oven, where it was resting partly under a large stone. It is rectangular in cross-



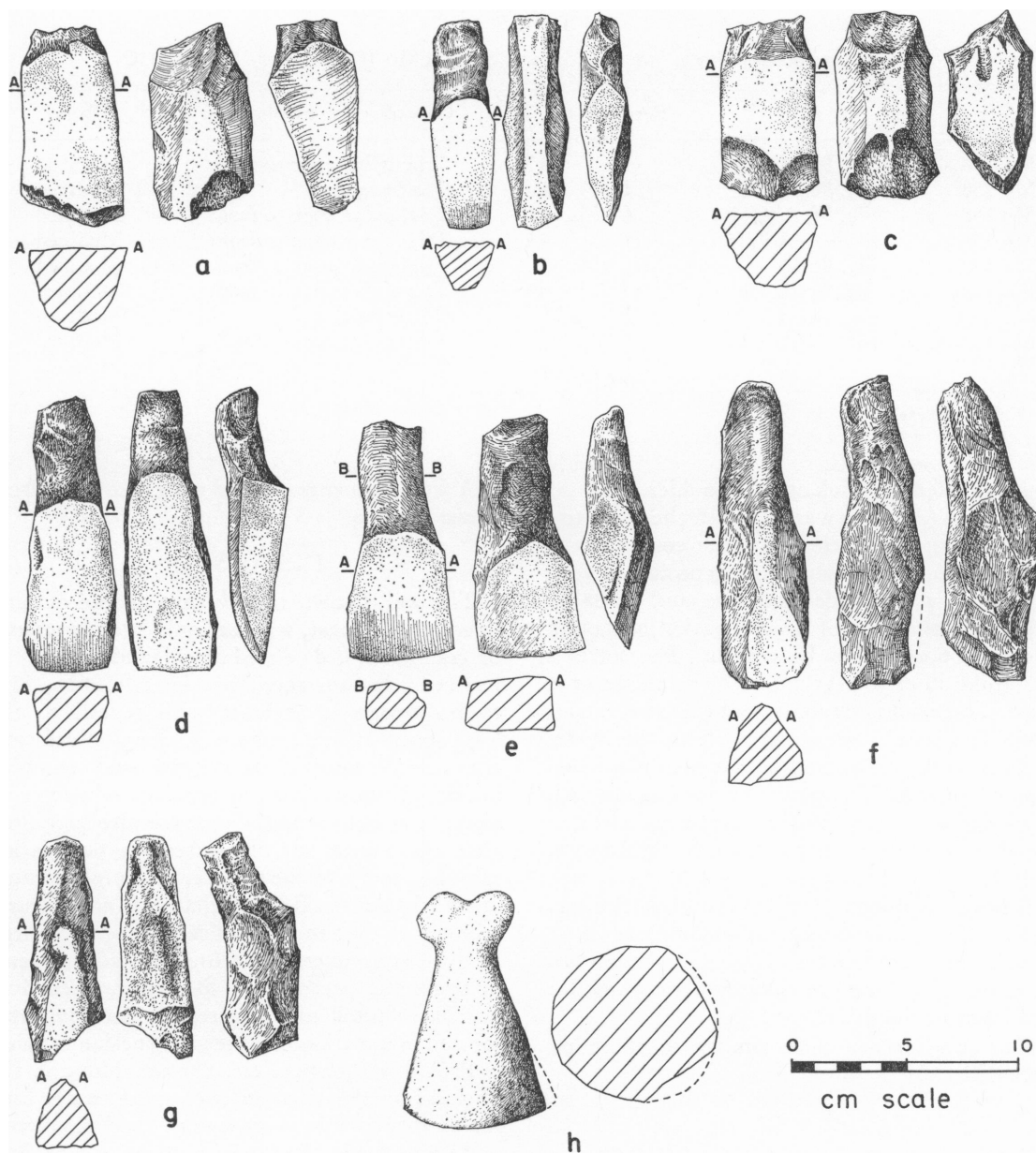


FIG. 9. Stone artifacts from Sites ScMo 103C and 158. a-g. Adzes, with front, base, and side views from left to right and section at shoulder underneath, with front toward top. h. Pounder.

section, polished on front, sides, and back, with the front of the butt reduced and unground. The front of the adze is straight, and the back is somewhat concave. The butt is set at a slight angle to the blade. One side is slightly convex, giving the adze an uneven appearance. The total length is 124 mm.; the greatest width (at the center of the blade), 39 mm.; and the

greatest thickness (at the shoulder), 26 mm.

One adze (Fig. 9c) came from Layer 5 beneath the floor of the round-ended house. It has a trapezoidal cross-section, with the back approximately half of the width of the front. Most of the butt was missing, but it appears to have been reduced and unground on the front. The bevel is badly broken. The adze is 42 mm.

TABLE 1  
DISTRIBUTION AND TYPOLOGY OF ADZES IN SITE ScMo 158 AND SITE ScMo 103C

Site	Adze	Period	Duff Type	Cross-Section at Shoulder	Butt
ScMo 158	Fig. 9a; A 9/6 <sup>a</sup>	I	3	Triangular apex to back	Modified
ScMo 158	Fig. 9e; A 9/9	I	1	Quadrangular	Modified
ScMo 158	Fig. 9f; A 9/11	I	4A	Triangular apex to front	Modified
ScMo 158	— A 9/15	II	4A	Triangular apex to front	Modified
ScMo 158	Fig. 9b; A 9/7	III	3	Triangular apex to back	Modified
ScMo 158	Fig. 9g; A 9/8	III	4A	Triangular apex to front	Modified
ScMo 103C	Fig. 9d; A 9/23	II	1A	Quadrangular	Modified
ScMo 103C	Fig. 9c; A 9/22	II	3	Triangular apex to back	Modified
ScMo 103C	— A 9/18	III	4A	Triangular apex to front	Modified

<sup>a</sup> Field numbers.

wide and 30 mm. thick at the shoulder.

An adze (A 9/18) was found in the loose top layer of a square at the southeast corner of the round-ended house, where the deposit was very shallow. It was outside the house, and probably belongs to the time of its occupation, although it is not possible to be certain. The adze is triangular in cross-section, with the apex to the front. The front is straight, and the back is concave. The butt is set at an angle to the blade, and the front of the butt is reduced. The blade is partly ground. The tip of the blade is missing. The adze is 28 mm. wide and 32 mm. thick at the shoulder and probably was about 115 mm. long.

A bevel fragment (A 9/14) found on the surface of the cooking area is too incomplete for its form to be reconstructed. The cross-section appears to have been rectangular or triangular with apex to the front.

The sling stones were similar to those on Site ScMo 158.

#### MIDDEN

Refuse was as scarce here as in the midden at Site ScMo 158. Some pig bones that were found in what appeared to be a small shallow pit just outside the round-ended house are probably contemporaneous with it. Pig teeth were found in the topsoil near the east wall of the round-ended house, and at the base of one of the Period-III pits. Fragments of shell were found in the terrace wall and at a few other places on the site. Something that appeared to be a fish tooth was found under a curbstone in the west wall of the round-ended house.

A few fragments of coral were recovered from Layer 3.

#### DISCUSSION

The well-known theory that people of rank lived on the coast, whereas only the *manahune*, or commoners, dwelt inland (Handy, 1930, 7) has been demonstrated by Green (1961a, 171) to be incorrect, at least with regard to the 'Opunohu Valley, where archery platforms, community houses, and large and complex *marae*, all indicating the presence of people of rank, have been found. Green has also suggested that the reason for the extensive occupation may be sought in the reliance of its inhabitants on cultivated food, and that the agricultural techniques that they practiced were most suited to this environment (p. 216). Extensive systems of terracing, presumably for wet taro cultivation, are found inland, a region also favorable for the cultivation of other Polynesian staples.

Probably the small circular pits found in the Period-I occupation on both sites were used for storage of these important food resources.

At Site ScMo 103C, these pits not only were found in Period I but seem to have been present in identical form in Periods II and III. At Site ScMo 158, they were also present in Period II. Similar pits were found to be associated with both periods of the round-ended house at Site ScMo 4. The early house on this site has been radiocarbon-dated to the thirteenth century (p. 166).

Some of the pits at Site ScMo 4 contained charcoal-stained stones and were very similar to pits for the storage of fermented breadfruit,

which were seen and described by Banks. These pits were therefore tentatively interpreted as breadfruit pits (p. 167). Most of the pits encountered on Sites ScMo 158 and ScMo 103C also contained large stones and may have been used for the same purpose.

Suggs (1961b, 63, 310) described similarly shaped pits in the Marquesas which were used as rubbish pits, and small pits inside ovoid houses which he believed were used to cache valuables. There is no evidence that the pits in the 'Opunohu Valley were used as rubbish pits, but, as so little rubbish was found, the fact that none was found in the pits does not provide conclusive evidence that they were not rubbish pits.

The presence of the drain at Site ScMo 158 lends strong support to the interpretation of the pits as storage pits. The drain would be very useful in drawing off rain water from the site.

If this interpretation of pits is correct, Period I at Site ScMo 158 appears to represent a time when this site was used extensively and almost exclusively for storage and to suggest some form of communal storage, for the pits were far too numerous to have accommodated only the food of a small family group. At Site ScMo 103C, however, the pits were fewer and were outnumbered by post-holes, suggesting that here they were scattered among dwellings.

Period IIa at Site ScMo 158 seems to have been similar to Period I at Site ScMo 103C. The evidence suggests that there were several house structures, associated with a few storage pits. Unfortunately, these house structures can only be inferred from the number of post-holes, and their exact form cannot be defined.

Not until Period III at both sites were details of a complete house structure recovered. The details of the round-ended houses of Period III at Site ScMo 103C, and Periods IIIa and IIIb at Site ScMo 158, are described above, and the three houses are illustrated together for comparison in Fig. 5. The descriptions by early visitors to the Society Islands of the structure and function of the two types of dwellings observed in the Windward Group are extensively summarized (pp. 170-174). The two types of dwellings were the small rectangular sleeping house, or *haupape*, and the round-ended *fare pote'e* which served as the residence of a high-ranking person or as a community house. The Greens (pp. 171-174) summarize

the ethnohistoric data on the function of the *fare pote'e*.

Of 21 round-ended houses recorded in the 'Opunohu Valley, only five were in the Amehiti side. Of these, four were not large enough to have served as anything other than the residences of ranking members of the community. Only Site ScMo 4 and one other site (which did not have surface evidence to justify recording it as a round-ended house) remain as large enough and with the necessary accompanying features to suggest that they served as principal community houses. On the more extensive eastern portion of the valley, however, the position is much more complex. Three large round-ended houses were identified as community houses, and two other sites, one of which was Site ScMo 103C, were believed to be community house sites, although such could not be proved without excavation.

The evidence furnished by the community houses is complemented by the evidence of other kinds of structures. There are more small round-ended houses, a number of large and complex *marae*, and specialized structures, such as archery platforms and raised paved platforms, on the east side of the valley. All this evidence suggests that the eastern side of the valley was occupied by a larger and more ramified descent group which was characterized by greater social stratification than the group inhabiting the Amehiti division of the valley. It is possible, too, that the eastern section of the valley was inhabited for a longer period of time.

Site ScMo 158 was the largest community house recorded in the valley. Site ScMo 103C proved, on excavation, to be even larger. These two sites, then, as the two largest community houses in the valley, must represent a peak of socio-political development when a large and prosperous community was able to build and maintain such structures.

The two community houses are not identical. Site ScMo 103C more closely resembles Site ScMo 4 in the western portion of the valley, which also had a large pavement in front and a small rectangular house at one end, although the built-up terrace was lacking. At Site ScMo 4 remains of a smaller house of similar pattern were found within the area occupied by the more recent one. Both had ovens outside and storage pits inside, and the floor level of both was difficult to locate. This situation conforms

with the ethnographic evidence that the floors of these houses consisted of carefully laid grass and mats.

The two houses at Site ScMo 158 and the house at Site ScMo 103C are very similar. In all three, central posts supported the ridgepole—further evidence that the king pin was not known in the Windward Islands before the arrival of Europeans. The post-hole patterns for all three were similar. In each house there was either a gap or fewer post-holes along the side fronting the terrace or pavement. At neither site was the entire perimeter of the house marked by curbstones, possibly because the stones were robbed for later houses.

It is not clear to what extent these houses were enclosed by walls. There is some evidence that some houses had walls of wooden or bamboo poles, although large sections were left open. Otherwise the walls were open, with mats serving as protection when necessary (p. 174). The curbstones marked the limits of the house and contained the grass and mats which were strewn on the floor. It is possible that the ditch on Site ScMo 103C was, in fact, used to accommodate sections of a wall. The other possibility is that it served as a drain.

Storage pits were found inside the community house at Site ScMo 4. In spite of the profusion of pits at Site ScMo 158, none was found which seemed to belong to Period III. At Site ScMo 103C only three small pits could be assigned to Period III. These would surely not be sufficient for a house of this size. Probably the inhabitants of both these sites drew on resources stored elsewhere. The large ovens at Site ScMo 103C testify to lavish entertaining. Only one oven, of Period IIIa, was found at Site ScMo 158, which is remarkable considering the length of occupation indicated by the rebuilding of the house. One can only conclude that the ovens were outside the area of the excavations. Similarly no associated houses were found at Site ScMo 158, but a small square house was associated with both Site ScMo 103C and Site ScMo 4. This does not mean that such a structure did not exist at Site ScMo 158, for the curbstones outlining it could well have been removed subsequently. Moreover, a small hut need not have been outlined with curbstones. The presence of the fragmentary Pavement E suggests that a house may have been associated with it on the upper level at some time.

On the available evidence, the community house at Site ScMo 103C conforms more exactly with the ethnohistorical descriptions. All the features to be expected are present: the house itself, the large pavement, at least one associated small house, and an extensive cooking area. At Site ScMo 158, it appears that entertainment may have taken place within the house, watched by those outside, who would be seated on the long Pavement C, looking down into the house below. The line of stones and backrests along the pavement provides the evidence for this reconstruction, at least during Period IIIb. Neither associated houses nor cooking area was found within the excavated area, except for the large oven of Period IIIa.

It is suggested that these houses must have been built by a large and prosperous community. The radiocarbon dates for the Period-III occupation on each site suggest that the houses were in use later than the middle of the eighteenth century. They may have been contemporaneous or one may have succeeded the other as the principal house of the entire community. It is clear that they represent a peak of development, for no larger house succeeded them. According to tradition the descent group which inhabited this section of the 'Opunohu Valley was among the most powerful on Mo'orea and was able to resist an invasion from Tahiti in the time of Cook, though the valley was apparently still dominated politically by a group in Ha'apiti on the west coast of Mo'orea (Adams, 1947, 167) who had gained this control considerably earlier.

Site ScMo 103C was the largest community house known in the 'Opunohu Valley. Nearby were a number of large inland *marae* in varying states of preservation. The largest and best-preserved was one of the largest inland *marae* recorded in the valley. In the same area also were found one of the smaller round-ended houses, considered to be a chief's residence and also one of the three archery platforms found in the valley. Inferring the presence of a very high-ranking personage near one of the largest known accumulations of sacred and secular structures in the valley strengthens the suggestion that this was the site of a sacred and ceremonial center when the power of the local group was at its height, and that Site ScMo 103C was the last large community house built in the valley. There are no larger houses in the

'Opunohu Valley and few *marae* larger than one of those in Site ScMo 103. However, much larger *marae* than any found in the interior are recorded from the Ha'apiti and Varari sections of the coast (Emory, 1933, 97-100). Tyerman and Bennet (1831, Vol. 1, 113) also described a larger assembly house on that coast, providing further confirmation of the traditional account that, though the population of the 'Opunohu was numerous and powerful and included persons of high rank, Ha'apiti held the political dominance of this part of Mo'orea as did other coastal centers for other parts of Mo'orea (Adams, 1947, 167, 172; Henry, 1928, 92).

If the Period-III houses represent a late eighteenth-century peak of development in the valley, the Period-IV occupations probably represent the remnant populations that still inhabited the valley in the early nineteenth century, when the majority of the population was concentrating on the coast. The Period-IV house on Site ScMo 158, typical of the *haupape* described by Handy (1932), was evidently an ordinary sleeping house.

The sequences obtained from the two sites were remarkably similar. The available radio-carbon dates place the Period-III community houses as contemporary. These dates are supported by traditional and historical evidence reviewed in the concluding section (pp. 220-223) for a large and powerful population inhabiting the valley in the late eighteenth century. Excavations on both sites seemed to indicate a considerable period of occupation prior to the construction of these round-ended houses. The date (1600 A.D.  $\pm 110$ ) for Period II at Site ScMo 103C is in line with these conclusions. However, the modern date of less than 180 years before 1950 for Period I at Site ScMo 158 suggests that the entire sequence of Periods I, II, and III, including the rebuilding of the Period-III house and its decay, occurred after 1770 A.D. Such seems unlikely, whereas a series of occupations covering as much as 200 years or more, as suggested by the date for Site ScMo 103C, is entirely reasonable. It is possible that Sample GaK-367 was contaminated in some way (industrial effect on a particular type of tree?) in which the others were not. Another possible explanation is that the actual date in this case falls, as it sometimes must, within the third standard deviation, rather than within the two allowed in the normal practice of citing its

age as less than 180 years ago. If so, Period I would correspond more closely in time to the earlier occupations at Site ScMo 103C, and a late seventeenth century dating would allow adequate time for the various occupations of the site.

If, then, the date for Period I at Site ScMo 158 is treated with reservations, it appears that both sites were occupied intermittently or continuously during the time the population was building up to the large community of the eighteenth century. During a period covering perhaps 200 years before the construction of the two community houses, the sites were used for storage and for dwelling.

No evidence exists that the culture of the people changed in any way during that time, or that any new elements were introduced. The artifactual material uncovered was not sufficient to provide evidence of changes in types. All adzes tended to be rather small and simple in contrast with those that are sometimes said to be typical of the Society Islands. The single pounder found was also small and simple.

The midden material was quantitatively just sufficient to justify the statement that traces of midden were present. The pig was present throughout the entire sequence. The dog was present only at a late point in the sequence at Site ScMo 103C.

The question of access to marine food resources poses a problem with the limited amount of information recovered. The people evidently lived in this part of the valley because they were predominantly agricultural and their mode of food production was best adapted to this environment. However, although agricultural products provided the staple, sea foods must also have been welcome. The relationship between the people in the valley and what must have been a smaller group who lived on the coast is not known. However, the sites provided sufficient evidence to suggest that the inhabitants obtained fish, shellfish, and even cetaceans from the coast.

## CONCLUSIONS

These two sites were excavated in order to obtain further information about the round-ended houses. However, both sites yielded additional information which showed that they had already been occupied before the round-ended houses were built.

People had, therefore, been living on these sites for some time before the two large community houses were built, and when they first occupied the sites they were already well adapted to the particular inland environment that they were exploiting. The people evidently depended on cultivated food, supplemented by seafood from the coast, and they built storage pits for their produce. Their basic adaptation probably did not change much throughout the occupation of the valley.

Site ScMo 158 was at first used exclusively for storage; later, dwellings and a few more storage pits were built. Site ScMo 103C was probably occupied by houses and storage pits. Both sites were modified in exactly the same way to accommodate the round-ended houses which appear to be contemporary. A terrace retaining wall was built across the lower edge of the site which was leveled by piling fill behind the wall and cutting back into the slope on the upper edge of the site.

A large round-ended house was then built on

both sites. These round-ended houses may be identified as community houses, and are believed to represent the peak of sociopolitical development in this eastern portion of the valley. The associated features of these houses have been discussed and compared with a similar house in the smaller Amehiti or western portion of the valley.

Finally, both these houses were abandoned, and no larger one was built. Instead, the sites were occupied by small sleeping houses. These may represent a time when the population was diminishing as a result of contact as mission efforts slowly met with success on the coast. These excavations expanded our knowledge on the nature of these community houses. However, the sites provided no data on the essential form of earlier houses. It is therefore impossible to reconstruct the development of round-ended houses in the valley, as the five community houses on the three sites so far excavated were all very similar in design, varying only in size.



# SURVEY AND EXCAVATION AT SELECTED RELIGIOUS STRUCTURES IN THE EASTERN PORTION OF THE 'OPUNOHU VALLEY

ROGER C. GREEN

NO NOTICEABLE ADVANCE in our knowledge of the religious structures, or *marae*, of the Society Islands occurred after the early descriptions by explorers, missionaries, and traders, until the inter-island survey of the better-known stone remains that was undertaken by E. S. C. Handy and K. P. Emory in the 1920's (Emory, 1933). Emory (1933, 28-33) divided *marae* into three types: coastal, intermediate, and inland, in which the time-space distribution of each type appeared to be almost exclusive. Because little additional information on this subject has appeared since Emory's publication, the categories have tended to remain unaltered. However, in 1961 I made a survey complementary to that carried out by Emory. In this survey all the stone remains in a single valley, 'Opunohu, on Mo'orea, were recorded (Green, 1961a), permitting me to assess Emory's results in detail. The survey revealed that religious structures in the 'Opunohu Valley formed a complete series for which it was possible to use Emory's types as broad divisions, but several types and varieties of *marae* could actually be distinguished within each division (Green, 1961a, 171).

Emory, in his survey of the 'Opunohu Valley, described three rectangular enclosures with uprights, but without *ahu*, which he designated as shrines. He also described three typical inland *marae* (Emory, 1933, 105-107). These six sites have since proved to lie in the midst of 36 detached shrines and 58 inland *marae* recorded for the eastern portion of the valley.

For Emory (1933, 24) an inland *marae* consisted "... of a low rectangular platform (*ahu*) at one end of a rectangular court which is either a platform, a terrace, or a low enclosure, or a combination of these. One or three upright stones stand on the rear of the *ahu*, and three uprights against the face of the *ahu*. Out on the court in line with the middle of the *ahu* stands a single upright, or a pair of uprights. Others may stand to the left or right, nearer the *ahu* or farther from it."

Because inland *marae* display a wider range of variation in the 'Opunohu Valley than that Emory described for this category on both Tahiti and Mo'orea, it was necessary to designate a new type as a shrine and to relegate to the inland *marae* category both the type with enclosed rectangle and primary uprights, but no *ahu*, and the type with a set of primary uprights on a pavement, but with neither *ahu* nor enclosing wall, together with those other examples Emory considered typical (Green, 1961a). In addition, a close study of various features commonly associated with inland *marae* made it necessary to divide this category into several distinct types.

For these reasons, the shrine, which was observed both as a separate structure and as attached to a *marae*, was defined as a rectangular and unenclosed stone pavement, its longest dimension in general less than 20 feet, and bearing at least three uprights at one end and a backrest in the midline at the opposite end (Green, 1961a, 171). On some of these shrines, and presumably at one time on many more, a human image (*ti'i*), crudely carved in stone, was situated in the midline between the central upright and the backrest, with its base buried below the level of the pavement. This demonstrable association of the stone *ti'i* with the shrine is also supported by the fact that, of the 20 figures that we found, none was in a context from which it was possible to infer an association with the inland *marae* except where a *ti'i* was found on a shrine attached to the *marae*.

When only the smallest and simplest religious structures were designated as shrines, the category inland *marae* was so expanded as to permit division into six principal types, according to the position of the *ahu* platform with respect to the enclosing wall, the decorative treatment of the facing on the front of the *ahu*, the presence or absence of an enclosing wall, and the presence or absence of the *ahu* itself (Green, 1961a, 172). Garanger (1964, 8), who used this classification, has suggested,

however, that the typology also take into account the numbers and distribution of the up-rights on the *ahu* and in front of it. This proved impossible in the 'Opunohu survey, because up-rights seldom stand in numbers sufficient for this purpose. Thus Emory's shrines in the 'Opunohu Valley become types of *marae*. Attached to *marae*, and also occurring separately, are the structures we have called shrines.

A more detailed account of one of Emory's sites (101), now ScMo 161, was published in order to define one type further and correct the inaccuracies in the record made by Handy and published by Emory (Green, 1961b, 312). This provided a detailed description of *marae* Type III F, which has an enclosing wall, a detached *ahu* with bands of coral facing in the front wall, and a cist within the enclosing wall formed by the use of elongated stone placed at right angles in the thickness of the wall. A second site described by Emory (99), now ScMo 163, situated just downstream on the next flat below ScMo 161, has also proved to be of the same type. We decided, therefore, to make selected excavations in ScMo 163 in order to learn additional details about the construction of this type, to determine, if possible, the function of the coral slab-lined boxes set into its pavement, and to obtain charcoal or other material that might assist us in assessing its age.

According to Emory (1933, 9), walls with dressed curbstones at the base and worked stones with rounded ends in the facing above, or what he termed a worked-stone facing, were associated with the coastal *marae*, a type distinguished by its stepped platform (*ahu*) and a distribution restricted to the coasts of Tahiti and Mo'orea (Emory, 1933, 28). He correlated this *marae* type with those members of Tahitian society who ranked as *ari'i* and *ra'atira*. Our more intensive survey of a single valley revealed that such worked-stone facings were also actually associated with *marae* without a stepped *ahu*, a conclusion confirmed by Garanger (1964, 17) in Tahiti. We also found that not all *marae* with stepped *ahu* and worked facings were situated within a mile of the coast, as Emory's data suggested, but may occur inland (Green, 1961a, 171). For this reason, ScMo 129, the only large *marae* encountered in the eastern portion of the 'Opunohu Valley that had both a stepped *ahu* platform and dressed-stone

facings along all its walls, not only attracted our attention but warranted complete clearing and some excavation. In practice, this resulted in the stratigraphic excavation of deposits accumulated against the upslope end, the removal of stone and debris from the southeastern corner of the *ahu* platform to reveal its construction, and the clearing of debris on its other three sides where observable stratigraphy was limited.

In selecting Site ScMo 103 for excavation, we intended to investigate not only the probable round-ended house structure (C) but also several of the associated *marae*. Unfortunately, these excavations were cut short because of limited time. However, a full description of the *marae* and the curtailed excavations will serve to set the extended excavations at the house site (pp. 119-139) in a broader context and to provide additional data on the types of inland *marae*, their features, and dating.

Seven inland *marae* of different types and a number of small structures, all part of Site ScMo 103 (Fig. 10), are laid out in radial fashion around a group of large boulders forming a slight knoll on top of a ridge. We intended to investigate these *marae* to learn if they formed a chronological sequence, and, if they did, whether that sequence supported a typological series. Structure I, one of the largest inland *marae* encountered in our survey, was of particular interest. As the excavation demonstrated, it was situated in the same cluster as the largest assembly house, suggesting that this cluster was one of the principal focal points for the zone of settlement in the eastern portion of the valley. This suggestion would, of course, be fortified considerably by the results of any excavations that demonstrated that the assembly house and the *marae* were, in fact, contemporaneous.

The focal nature of this remarkable site was also supported by information on other nearby sites. These include: ScMo 131, one of the three known archery platforms, situated less than 100 yards down ridge from ScMo 103 and facing toward a deep stream gully on the western side of the ridge; ScMo 178, a medium-sized, round-ended house with attached pavement, about 25 yards upslope from the archery platform and closer to the gully on the eastern side of the ridge; and ScMo 181A, one of five long, raised, and paved platforms, which I have interpreted

**Site ScMo 103**

The plan shows several rectangular and irregular structures, some with internal divisions or courtyards. Structures are labeled with letters A through Q. Some structures have numbers indicating specific features or measurements. A stream flows along the left side of the site. A compass rose indicates North (N) and Magnetic North (M.N.). Slopes are indicated by arrows pointing downwards.

**Legend:**

- [Symbol] terrace wall
- [Symbol] stone alignments (curbing)
- [Symbol] enclosing wall
- [Symbol] coral block facing
- [Symbol] Ahu (platform)
- [Symbol] pavement
- [Symbol] stone uprights
- [Symbol] tree

**Scale:** 0 5 10 15 20 25 30 meters

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as *tahua*, or chief's platform, on the next ridge to the west and approximately parallel with ScMo 103. In the gully between and upstream from this point, a low boundary wall extended along its western bank and separated this area from another cluster of structures. Thus, if one assumes an approximate contemporaneity for at least some of these important structures, the evidence provided by distribution is almost indisputable, that within the eastern zone of settlement, Site ScMo 103 would have been a focal point within the cluster and one of the principal locations among the four or five such foci that can be identified, although there may be others as well.

In brief, this report describes all the structures included in ScMo 103, as well as the results of our brief investigations in some of its *marae*, in an attempt to assess their temporal relationships. It also presents a more detailed report on excavations at a Type-III F inland *marae* at ScMo 163, together with the results of similar excavations at the coastal type of *marae* found only at ScMo 129.

#### SITE ScMo 103

The site was situated on one of the principal ridges between two incipient streams common in this portion of the valley. A small and almost permanent stream flowed in the deeper gully to the west. The shallow gully on the east did not deepen noticeably until further downstream, where it joined the valley of one of the permanent streams (Fig. 1). The site was mapped by plane-table survey after a crew of Tahitian workmen had cleared the stone remains of the smaller trees, brush, and tree limbs. A large patch of ginger growing on the flat of Structure C was the only notable feature of the vegetation which was predominantly composed of Tahitian chestnut (*mape*) and hibiscus trees (*purau*). These trees, as common inside the enclosing walls of the various structures as they were outside, account for a large portion of the damage suffered by the stone remains. A large candlenut tree occupied the northwest corner of Structure L.

The major excavations on this site, restricted to Structure C, are described above by Davidson (pp. 119-139). Test excavations were made both inside and outside the wall in the southwest corner of Structure K, along the face of

the *ahu* and outside the wall on the southeast end of Structure I, outside Structure D along its eastern wall and at its northern end, and outside the wall at the southern end of Structure E. Except for the excavations in the corner of Structure K, the information obtained for the *ahu* and coral veneer in Structure I, and the collection of slingstones from within the rubble fill of the eastern enclosing wall of Structure I, the results were disappointing. Carbon was rarely encountered either in sufficient quantity or in a stratigraphic context useful for dating. Therefore a descriptive account by structure seems to be the most useful approach (Fig. 10).

#### STRUCTURE A

A small, rectangular, raised and paved platform formed a structure which attained a height of 2 feet along the eastern side, with the southwestern corner 1 foot, 10 inches above the ground surface and the southeast corner flush with it. The southwestern cornerstone had been partly cut and dressed. Two broad stone uprights like those that served as backrests on *marae* were on the upslope side of the pavement. Number 64 stood 1 foot, 8 inches above the pavement surface and was 1 foot, 9 inches wide. Number 65 was 2 feet tall and 1 foot, 2 inches wide. As this pavement was too small to have served as a council platform, its function is at present obscure.

#### STRUCTURE B

This structure was composed of two pavements that lay to the east of the assembly house and next to a steep slope that descended into the gully. The smaller northern pavement was flush with the ground on the upslope edge. It consisted of selected stones, a single course high on the downslope side. A small rectangular house may have occupied the flat area behind this pavement, but there was no surface indication of such a structure. The more formal rectangular "pavement" on the upslope side, some 12 feet distant, was outlined by rather large stones. When examined, its interior proved to have an extremely uneven composition. The condition of the structure, which had been robbed of all but its basal stones for the building of some other structure, strongly suggested that it had been a raised platform similar to Structure A.

## STRUCTURE C

This terrace flat contained the remains of what proved, on excavation, to be a round-ended assembly house, with a rectangular building at the east and a main pavement in front. A full description of the period of house occupation, together with the evidence for earlier and later occupations, is presented above.

## STRUCTURE D

A partially paved enclosure lacked the definitive interior features that would make possible its conclusive identification as the remains of a *marae*. However, its general size and position among other *marae* in this group, and the fact that only basal stones from the enclosing wall were extant, make it reasonable to conclude that this structure represents an older *marae* from which stones had been robbed for building more recent structures. Test excavations along the west wall of the enclosure yielded only a very poor sample of charcoal from a deposit with no apparent stratification beyond that of the contemporary soil profile. In a classification of stone remains from the valley, this structure was listed under Type V B or among those enclosures without definitive features, most of which were destroyed *marae* (Green, 1961a, 171-172). It is particularly significant because it indicates that all seven of the inland *marae* were not contemporaneous, that stones borrowed from one *marae* were used in the construction of others (cf. Garanger, 1964, 17).

## STRUCTURE E

A paved enclosure contained sufficient evidence to identify it as a *marae* and to assign it to Type III G, a type in which a low stone *ahu* was attached to the enclosing wall and was usually situated, as this structure, in one corner of the rectangle (Green, 1961a, 172). In this structure the *ahu* was almost completely destroyed, being marked only by a large pile of stones. Its front facing must have consisted of basaltic stone, because we found only one piece of a thin slab of coral veneer, which is commonly associated with this type. One fallen stone upright, No. 19, 4 feet, 7 inches long, lay against the *ahu*. The only other stone upright, No. 18, 1 foot, 3 inches high, stood in its correct position in front of the *ahu*. The condition of this *marae*, especially the

*ahu*, and the absence of subsidiary uprights, suggested that it may have been abandoned some time before general occupation of the area had ceased.

The excavations were conducted outside the rear enclosing wall, the most intact portion. Here the wall stood 2 feet, 11 inches above the ground surface on the outside and only 1 foot, 4 inches above the pavement on the inside. This artificial infilling of the interior on the downslope end has been noted within a number of enclosures and was confirmed by excavations at ScMo 163. No obvious stratification or signs of an earlier occupation were encountered in the test excavation outside the wall. Only a fair sample of charcoal found immediately above the former ground surface was recovered.

One pavement, probably once a shrine, was attached to the northwest corner of *marae* E, but it now has no uprights. A second shrine between *marae* D and E may have belonged to either *marae*. Stone upright No. 20 on the upslope end was 1 foot, 2 inches, and No. 21 was 1 foot, 3 inches, high.

## STRUCTURE F

A terrace flat bounded by a line of stones one course high, extending between Structures E and G, had a dirt fill with very little evidence of stone paving. The uprights on the side next to Structure G may indicate that a part of it had served as a shrine which is now buried in debris. Upright No. 15 rose 8 inches above the present ground surface; No. 16, 11 inches; and No. 17, 1 foot, 2 inches.

## STRUCTURE G

This pavement was enclosed on three sides, but only the two opposite walls were free standing, of a fairly crude construction, less than 2 feet high. The stones on the upslope end actually formed a retaining wall where the structure had been cut back into the slope. The debris at this end was insufficient for one to infer the former presence of an *ahu* platform. No uprights were observed. The sole stone upright in evidence was a backrest in the midline at the other end. It was 1 foot, 11 inches high, 1 foot wide, and 5 inches thick, the typical dimensions for the backrest of a stone seat. Because of the evidence provided by this backrest and the possible uprights on the shrine at Structure F, the

site was assigned to Type III L as an unclassified *marae* (Green, 1961a, 172).

#### STRUCTURE H

Although the entire unit was slightly larger than most shrines attached to *marae*, its size may be accounted for by the exceptionally large dimensions of the adjoining *marae*. Also, this was one of the few shrines with free-standing walls, which rose from 11 inches to 13 inches in height on two sides. The interior pavement was divided into two parts: the upper pavement was 14 inches to 18 inches above the lower one. Downslope, the terrace wall stood 22 inches above the ground surface. The following heights above the pavement were recorded for stone uprights: No. 10, 1 foot, 4 inches; No. 11, 1 foot, 6 inches; No. 12, 10 inches; and No. 13, 11 inches. Upright No. 9 was a flat slab resembling a backrest. It was 1 foot wide, 2 inches thick, and 1 foot, 5 inches high. Neither the pattern nor the location of the surviving uprights, particularly the backrest, was consistent with the pattern on other shrines attached to *marae*; hence, we concluded that additional uprights must have been disturbed.

#### STRUCTURE I

This *marae*, one of the largest encountered in our survey, was approximately 113 feet long and 55 feet wide. It was exceeded in size by ScMo 163, which was 122 feet by 51 feet, and by a *marae* in the Papenō'o Valley, 120 feet long and 59 feet wide (Emory, 1933, 26, 96). The last-mentioned was the largest court dimension recorded by Emory for the inland class of these structures. The *marae* was built on sloping ground so that there was a difference in elevation of 12 feet to 15 feet between its two ends. In the interior, a step 1 foot, 4 inches high divided the court in two. All the standing stone uprights were on the portion of the pavement above this step. Their heights above the pavement were as follows: No. 4, 1 foot, 10 inches; No. 5, 1 foot, 3 inches; No. 6, 1 foot, 2 inches; No. 7, 1 foot, 10 inches; and No. 8, 1 foot. They were not grouped in such a way that a uniform pattern might be derived. Upright No. 3, however, did seem to represent a consistent feature of some *marae*, in which, according to Emory (1933, 26), the main *ahu* platform was off center, usually to the left. In the 'Opunohu Valley, however, the right-hand position, as at

this site, seemed to have been favored. In such cases, the wider space between one end of the *ahu* and the enclosing wall may have been occupied by a low rectangular platform with a single upright. This feature, according to Emory (1933, 21-22), may be interpreted as an *ahu ari'i* type of *ava'a*. In this example, although the platform surrounding the upright was disturbed and very difficult to distinguish, the pile of stones, with the upright rising 1 foot, 8 inches above them, was present.

The *ahu* was of the low type, attached to the rear enclosing wall. It had a veneer of thin slabs of coral set in front of the crude stone wall that faced onto the court (Fig. 11a). This veneer, which averaged about 1 foot in height along the base of the *ahu* wall, was made with fan coral. One fan stood 17 inches high when it was excavated. The core of the *ahu* consisted of the usual small stone fill in which two uprights occupied central positions at each end of the platform rather than three positions at the back of the platform. Their location was similar to that of uprights recorded by Handy and by me (Green, 1961b, 313) on the *marae* at ScMo 161. Because of tree-root disturbance, it was very difficult to fix the boundaries of the end wall on the western side of the *ahu*. Excavation was necessary in order to place it in the position indicated. Only one upright, No. O, which was more than 1 foot, 2 inches high, remained in front of the *ahu*.

In those places where the enclosing wall was still intact, it rose 2 feet to 3 feet in height; its measurement of 31 inches on the western wall was typical. The facing of the wall was of the flat type, the result of the careful selection of the natural stone used. There were indications that the top of the wall had been capped by selected slabs, many of them of a local dike rock also used for uprights. At least three cut and dressed stones were used in the northeast corner and two in the northwest corner, bearing witness to the care lavished on the enclosing wall to give it a finished appearance. A stone cist similar to those encountered in ScMo 161 and ScMo 163 occurred within the western enclosing wall at the same point as in the other two inland *marae* (Green 1961b, 313).

The test excavations outside the enclosing wall at the northeast corner resulted in two important finds. One was the discovery that the *marae* was built directly on top of the sterile



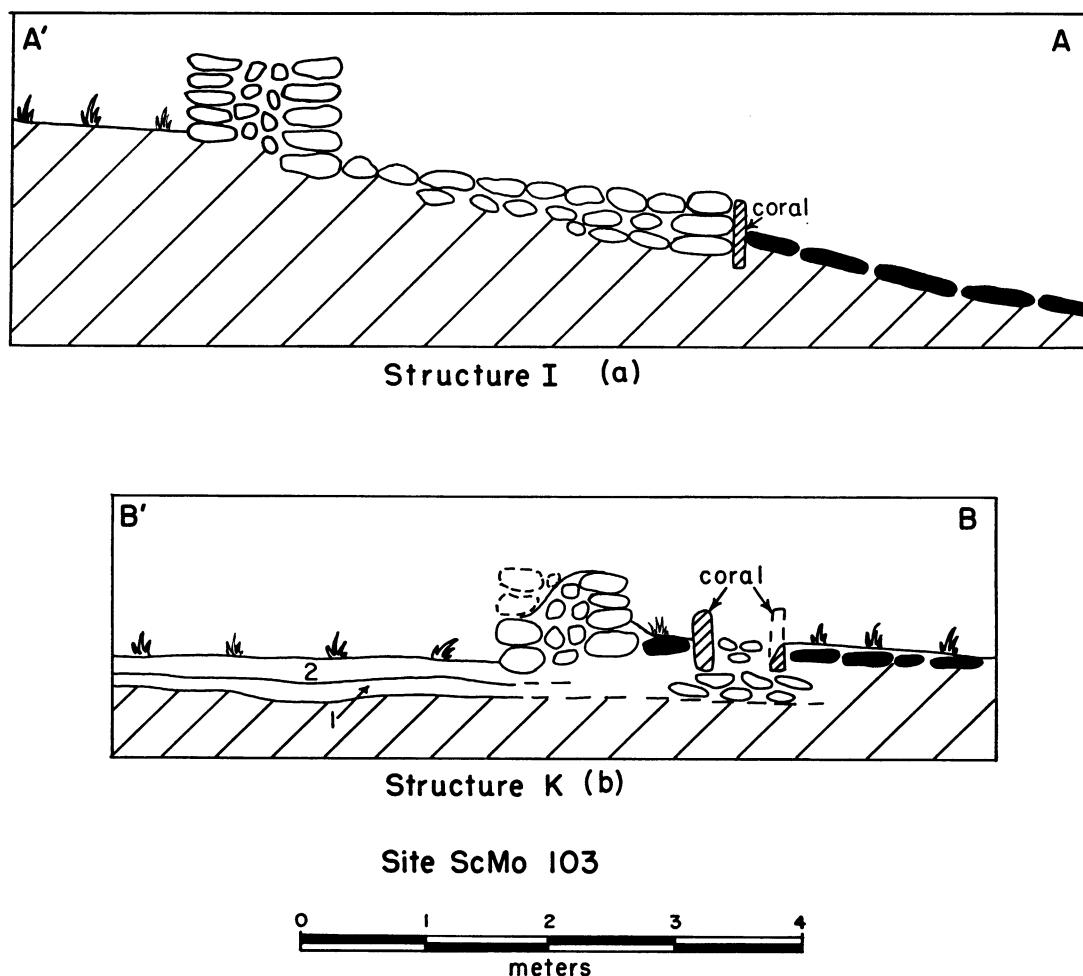


FIG. 11. Site ScMo 103. a. Section through *ahū* Structure I. b. Section through rear enclosing wall and coral-slab cist in *marae* court, Structure K.

subsoil, with no evidence of an earlier occupation. A good charcoal sample was obtained next to the wall just above the sterile ground surface. Other test excavations along the eastern wall made it necessary to clear away debris that had fallen from the upper portion. During this operation one of the workmen made the second discovery. He found a nest of 25 slingstones in the rubble core of the wall about 3 feet from the corner. They were all carefully selected, very smooth stream-worn pebbles of uniform size, in which the maximum diameters varied between 2 inches and 3 inches. This was the second collection of slingstones encountered within a religious structure; the first was found

in the terrace wall among a complex of three shrines at ScMo 157.

*Marae* I has been assigned to the inland Type III G, a type in which an *ahū* platform lower than the enclosing wall was attached to it, the front face of the *ahū* commonly being decorated with coral veneer. This placed it in the same category as Structure E, a smaller and more completely destroyed version of the same type, but one that lacked the cist in the enclosing wall.

#### STRUCTURE J

This was a very large intact shrine. Apart from its size, it was typical of shrines normally

attached to inland *marae*. The pattern of three uprights at one end and the backrest at the opposite end was common, but the structure, which was oriented at an angle to the adjacent *marae*, appeared to have been a late addition to *marae* K with its other associated and more typical shrine. The following heights were recorded for the slender uprights: No. 22, 11 inches; No. 23, 1 foot, 8 inches; No. 24, 1 foot, 4 inches. Number 25 was a slab, 2 feet, 2 inches in height, 1 foot, 7 inches in width, and 8 inches in thickness. Thus the central upright, as was common, was the tallest, and the backrest was clearly differentiated as a broad flat slab rather than a slender shaft made from the local dike rock.

#### STRUCTURE K

The almost intact condition of this *marae* suggested very strongly that it was in use more recently than some of the others. It was of some importance, therefore, that the limited excavations in the northwest corner, both inside and outside the enclosing wall, revealed an earlier gray-colored occupation layer under a black layer associated with the building of the *marae* (Fig. 11b). These excavations also revealed an artificial buildup, common to many *marae*, inside the enclosing wall on the downslope end.

The excavations outside the wall were profitable because they revealed the two levels of strata, with the *marae* clearly associated with the later black layer. But we were disappointed in the attempt to find charcoal samples associated with either layer suitable for dating. A large natural stone block of fine-grained igneous rock, No. 66, encountered outside the wall at the end of the *marae*, proved to be a grinding stone of a kind used to sharpen adzes.

The *marae* itself was a relatively typical example of Type III F, in which the enclosing wall was constructed with a rubble-core fill, flat facing, and a dike stone and slab capping on the upper surface. The corners were well made: worked stones were used in the northwest corner and a piece of cut coral limestone was used as a decorative device in the two southern corners on the upslope or *ahu* end. This decoration consisted simply in placing coral slabs in each corner in the course of stone below the capstone. The wall here was between 28 inches and 29 inches high, as compared with 34 inches for points outside the wall on the opposite end. A

cist, situated within the body of the enclosing wall, was in the same position as in other *marae* at this site and in the *marae* at ScMo 161 and ScMo 163. It was fashioned from large dike stones laid lengthwise the width of the wall, with the other stones laid at right angles to them.

The form and position of the *ahu* platform and pattern of the uprights associated with it served to classify the *marae* as Type III F, in which the *ahu* platform was lower than, or the same height as, the enclosing wall. Dike stone and coral slabs of blocks were used as bands to decorate the side facing onto the court. Where intact the front wall retained five courses that rose to a height of 27 inches above the pavement. The basal course was formed by dike-stone slabs laid lengthwise; the next two courses were composed of carefully selected but unworked basalt blocks. The fourth course appeared to have consisted of a band of coral slabs starting at a height of about 17 inches, but, although the band occurred at both corners, we found no conclusive evidence that it extended completely across the front. The final course consisted of the usual large selected basalt slabs. The interior fill, however, was composed of larger stones than usual and did not have the common rubble appearance.

The two uprights along the back of the *ahu* were built into the line of the wall as were those described by Emory (1933, 27). A third upright may be inferred on the evidence he presented. The three uprights in front of the *ahu*, with the tallest in the center, conformed to the typical pattern which Emory observed in all well-preserved *marae*. The single upright between the south end of the *ahu* and the enclosing wall was on the opposite side from that which one would expect, as the off-center position of the *ahu* to the right left no room for the small rectangular platform commonly associated with an upright in this position. The following heights were recorded for these uprights: No. 29, 1 foot, 5 inches; No. 30, 1 foot, 10 inches; No. 31, 10 inches; No. 32, 1 foot, 7 inches; No. 33, 1 foot, 10 inches high and 13 inches wide; and No. 34, 1 foot, 7 inches.

The uprights on the court did not conform to a particular pattern, but the backrest which occupied the usual position in line with the *ahu* was of very large dimensions. The following measurements were recorded: No. 28, 1 foot

high; No. 27, 1 foot, 9 inches high and 1 foot, 2 inches wide; No. 35, 1 foot high; and No. 26, 1 foot, 10 inches high and 3 feet, 5 inches wide.

The presence of rectangular chambers or cists in the courts of inland *marae* was recorded by Emory (1933, 13), but he was unable to suggest a function for them. As one such cist was present in the northwest corner of this *marae*, excavation of it provided an opportunity to throw some light on the function of these cists. Three sides of the cist, which was let into the floor of the paved court, were composed of coral slabs; a stone slab had been used on the fourth side. As both the intact coral and stone slabs projected above the level of the pavement, we may infer, as Emory suggested, that the box so formed had a raised lip and could have been covered by a course of slabs laid across its width.

The results of our excavations within the cist were in large part disappointing. Although it was possible to define all four walls, the fill yielded only some unworked stone flakes, fragments of *Turbo* shell, a piece of fishbone, some human bone, and other fragments of either human or pig bone, all of them in a very decomposed state. Most of this material lay near the surface where several large rocks were also encountered. Below this level the fill consisted almost entirely of dirt, until, at a depth below the base of coral slabs, a number of large stones were again encountered, spread over a wider area than the box and belonging to an occupation prior to the construction of the *marae*.

The uprights in the shrine attached to the southwest corner were placed in the customary pattern, that is, a set of three were at one end and a backrest was at the opposite end. In this shrine two sets of uprights were placed side by side; the smaller set lacked a backrest. The following were the heights of the uprights above the pavement: No. 37, 1 foot; No. 38, 10 inches; No. 39, 8 inches; No. 40, 11 inches; No. 41 (fallen), total length, 3 feet; No. 42 (fallen), total length, 3 feet, 4 inches. The backrest, No. 36, was 1 foot, 4 inches high and 1 foot, 2 inches wide.

#### STRUCTURE L

Although this, the second largest *marae* of the cluster, was fairly intact, it exhibited relatively few of the features normally found in structures of this size. Thus the enclosing wall contained

neither the basalt finishing slabs for the last course nor dressed stone in the outside corners. This construction, together with the lack of care in selecting stones, produced a cruder appearance than that of the flat finished walls of Type III F. As usual, the core was rubble. The wall stood some 28 inches high on the outside and 21 inches on the inside along the rear. The end wall on the north incorporated a very large boulder and was even more crudely constructed; large boulders predominated.

The construction of the *ahu*, too, was relatively simple, utilizing only some selected stone. Careful facing was observed only in the side toward the open court. The interior fill was also of larger blocks than were usually found in *ahu*. Standing free, and only 16 to 18 inches high, the *ahu* was detached and lower than the enclosing wall, but there was no sign of the use of coral either as facing or decoration. Of 12 *marae* placed in Type III H, this was one of the two that did not have coral facing.

Only a few uprights were still in position. As a consequence, they did not fall into any specific pattern. It was possible to align two uprights in front of the *ahu*, with a third stone in between and in the correct central position. However, it was a large triangular block with its point 2 feet above the ground. It was 17 inches broad where it disappeared below the surface. Despite its odd shape, I interpret it as an upright, because it conforms to the pattern of three uprights in front of the *ahu* in which the central one is the tallest. The other two uprights, Nos. 47 and 48, were each 1 foot, 7 inches high. Among the remaining uprights, No. 49 was 1 foot, 4 inches and No. 50 was 2 feet, 2 inches high. A large but now fallen stone slab at position No. 63, 26 by 19 inches, was probably the backrest.

In a developmental series, the absence of a cist in the enclosing wall of coral and the absence of an attached shrine, as well as the presence of a simple type of enclosing wall and *ahu*, all suggest an earlier type of *marae*. In the present context, however, no chronological evidence exists to prove that this particular example was earlier than any other of the *marae* in the cluster, even if the type itself developed first. Thus its typological position merely raises the suspicion that its chronological position in the group may be earlier. Typologically, the *marae* has been classified as a variant of Type III H, and construed as being

contemporaneous with Structures I, K, and N, or earlier.

#### STRUCTURE M

Although classified as a shrine, the pavement of this structure far exceeds (by more than a factor of two) the normal length of 20 feet or less for shrines. It represents the only structure where so large a pavement, with only a few uprights, was attached to a well-built *marae*. In this context its position and form suggest that it is preferably identified as an attached shrine. Except for the alignment of three uprights at one end, the five remaining uprights exhibited no clear pattern. Presumably, a number of uprights were, in fact, missing, as were all indications of backrests. The heights of the eight uprights were: Nos. 51, 54, and 56, 1 foot, 1 inch; Nos. 55, 57, and 58, 10 inches; No. 52, 10 inches; and No. 53, 1 foot, 10 inches.

#### STRUCTURE N

In shape, this *marae*, the second example of Type III F in this cluster, was even less symmetrical than most, with its short rear wall and sides of unequal length. On the other hand, it possessed most of those features that marked it as one of the more elaborate types of inland *marae*.

The enclosing wall, although low, only 23 inches high on the outside and 21 inches on the inside along the rear wall, was well constructed, with a flat facing achieved by the careful use of selected stone. Its top courses were finished with dike stone. It had a rubble core except on the southeast side, where a cist within the wall had been constructed from large slabs. At least one, and in some places several, partially dressed stones occurred at each outer corner, a typical feature in enclosing walls of this type.

The *ahu* was especially well constructed. Several stones with dressed faces appeared at the corners facing the court; one corner was formed from two stones and the other from one such stone. Between them the base course of the false wall facing the court was built of dike slabs laid on their sides, end to end; above them were at least two courses of rectangular coral blocks from 7 inches to 11 inches in length. Above these courses, the upper portion of this wall was difficult to reconstruct. It had probably been capped by dike stone in the same way as the upper course on other side walls of the

*ahu*, and the enclosing wall seems to have been capped. The other side walls of the *ahu* below this course were built of unselected stone, as was the true wall behind the false one described above. The interior was composed of the usual rubble fill of small stones. Because of the banded facing in the front wall of the *ahu*, which was detached and of about the same height as the enclosing wall, and an enclosing wall with flat facing containing a cist, the *marae* was placed in Type III F.

Few uprights were extant on this *marae*; presumably some had fallen. Number 61 in the center of the *ahu* was 2 feet, 2 inches tall; No. 62, which had fallen, was 2 feet, 10 inches long; No. 60, out on the court, was 1 foot, 8 inches high. The backrest, which was aligned with the surviving upright and *ahu* and was thus to the right of the middle of the structure, was only 1 foot, 5 inches high, but was 2 feet broad, so that, as usual, the shape indicated a difference in function.

#### STRUCTURE O

This detached shrine consisted of a pavement flush with the ground and three larger than usual stone uprights aligned along one of the longer sides, rather than at one end. Dimensions for these uprights were: 2 feet, 2 inches above the pavement; Nos. 44 and 45, 1 foot wide; and No. 46, 1 foot, 7 inches wide. The shrine was not typical and lacked any sign of a backrest.

#### STRUCTURE P

This small rectangular structure was outlined on three sides by curbs of selected stone. It is about the same size as that recorded ethnohistorically for sleeping houses. In front, a terrace pavement with a ramp on the downslope side provided an access way. The structure was best identified as a Type II A residence unit.

#### STRUCTURE Q

This unique structure was not discovered during our initial survey of the area but was found in the course of the later excavations. It consisted of a terrace pavement, flush with the ground on the upslope end, and a long narrow pavement above it that was raised one course above the ground at the rear and two courses in front, facing the pavement. Its function cannot be determined, although its form was vaguely reminiscent of the simpler Marquesan

house structures illustrated by Suggs (1961b, 160, Fig. 38).

#### SUMMARY

Site ScMo 103 consisted of a cluster of structures in such close proximity that we were led to map them as a single site. When considered in connection with still other sites in the immediate vicinity, the entire complex formed one of several focal points within the zone of settlement on the eastern side of the 'Opunohu Valley. This focal point was one in which examples of nearly every type of structure known to occur, except for III B, D, and M types of *marae*, were actually found within this small locality. Consequently, the full description of these structures serves to elucidate further the nature of the types previously described (Green, 1961a), particularly those of the "inland" *marae* category.

Their description also provides a fuller context within which detailed excavations of the assembly house in the cluster, Structure C, can be set and from which, on the basis of reasonable assumptions, further interpretation may be based. We return to these interpretations below (pp. 223-227). At this point in our discussion it is important to emphasize that, although no firm conclusions can be drawn as to the contemporaneity of all structures, it can be reasonably assumed that specific structures do represent the last major phase of occupation. Thus the relatively intact condition of three *marae*, I, K, and N, belonging to Types III F and G, and the meager but positive evidence from brief excavations at two of the *marae*, suggest that they represent a final rather than any prior occupation. Their typological position at the complex end of a developmental series of inland *marae* types which is presumed to have preceded them also tends to support such a conclusion. They possess certain attributes in common: flat facing in the enclosing wall and dike-stone capping of it, both features that probably developed late. In this respect the smaller *marae* (E), also of Type III G, which was apparently in disuse for a longer period than the intact *marae*, lacks these features. *Marae* E, together with *marae* D which had been looted, and G which was unclassified because of its condition, form a second group. These *marae* were all connected by shrines and appear to have belonged to earlier occupations

of this locality. Perhaps on typological grounds, especially because of the absence of the features cited above, *marae* L, which was of Type III H, might be placed with them. Because of its better preservation, it could equally well be placed in the later category. No means are now available to demonstrate either position. At Structure C, two earlier occupations are demonstrable. These date back to the seventeenth century before the assembly house of the late eighteenth century occupied the site. If, as seems highly likely, the later set of *marae* (I, K, and N) belonged roughly to the same period, then one of the largest inland *marae* encountered in the valley, together with two others of Type III F, also considered a late type, would be contemporary with the largest assembly house recorded, as might be expected.

#### SITE ScMo 163

Situated in a locality known as Titiroa, this site is the same as No. 99 mapped by Emory (1933, 106, Fig. 70). However, as a result of our remapping, certain corrections and additions have been made. Limited excavations have provided a number of new details and important information about the chronological position of this *marae* and its type.

#### MAPPING

Initially, on the basis of Emory's statement that "no coral appears along the front, but pieces of thin slabs scattered 6 to 10 feet in front" (Emory, 1933, 106), the *marae* was assigned to Type III H (Green, 1961a). Closer investigation of the *ahu* construction revealed that the base courses were intact, and no coral veneer was present in front. Thus the coral slabs Emory and I found must derive from the upper course of the *ahu* wall facing the court—a better explanation for their scattered position in front of the *ahu*. Also, as known from other *marae* of Type III F, for instance Structure K at Site ScMo 103 (p. 148), slabs forming bands in the upper courses of the *ahu* wall facing the court did occur. This fact, plus the occurrence at this *marae* of such features as flat facing in the enclosing wall and a capping course of dike stone (Emory, 1933, 106), as well as a cist in the long wall at the northwest corner not recorded by Emory, all serve to indicate that the *marae* should be reassigned to Type III F. As the detached *ahu* was lower than the enclosing wall and the *marae* conforms in all other features to

Type III F, this reassignment is made here.

Other changes that should be noted in Emory's Fig. 70 (1933) are the locations of Uprights Nos. 15, 16, and 17, which are incorrectly situated according to our remapping of them. Also, Emory's Feature 23, or our coral Box c, in the northwest corner should be more

tightly up against the rear wall than he indicated. In Fig. 12 of the present paper we have followed Emory's plan of numbering the first 20 uprights, but the designations for the remaining features differ. Thus it is unnecessary to repeat Emory's information on these first 20 features. He did not record Upright 21; we

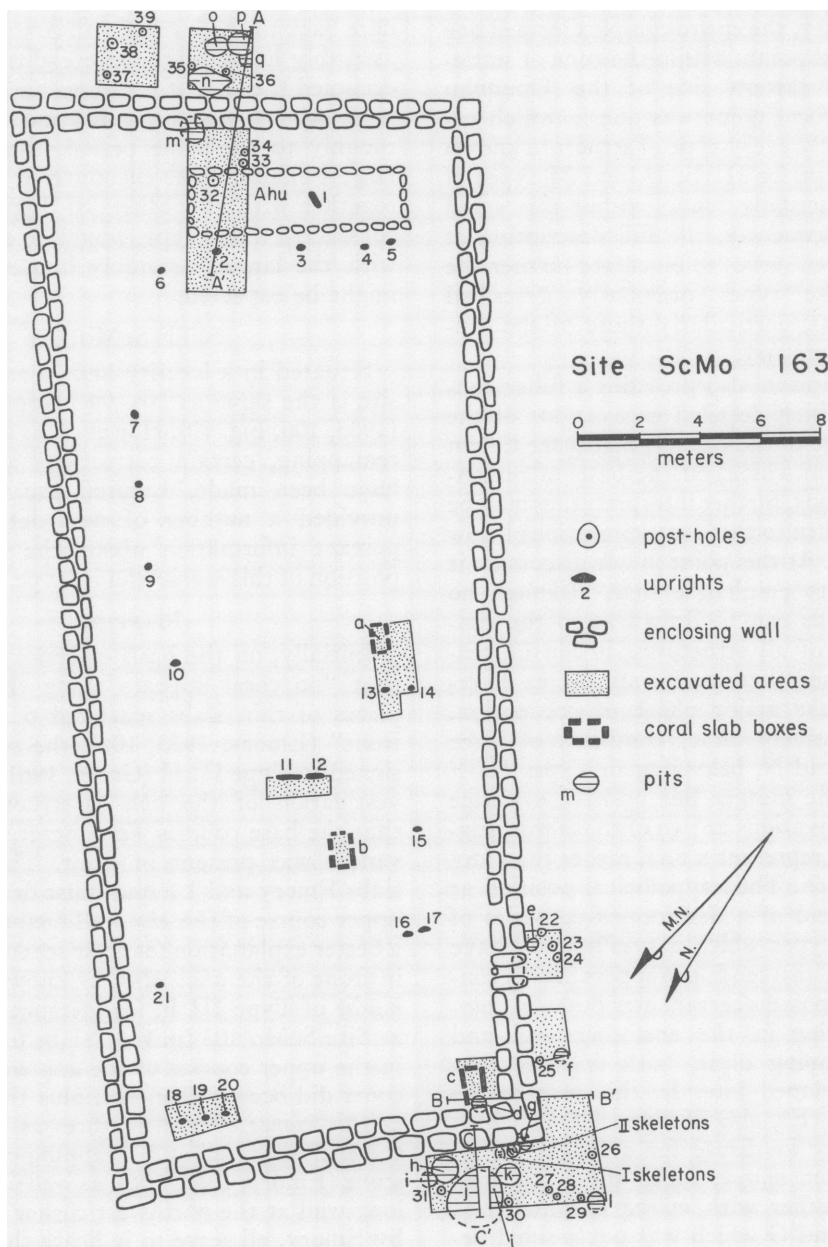


FIG. 12. Detailed plan of Site ScMo 163, indicating excavated features of *marae* of Type III F (cf. p. 153).



did not find Upright 9 which he listed as 15 inches high. However, in the intervening years the upright may have fallen as the result of root action by the large *mape* trees that grew in the court. Finally, the main stone that formed the southwest outside corner and some of the stones in the northwest corner had dressed outer surfaces, as was typical of at least some cornerstones in *marae* of this type. Except for these minor changes, the two plans are in substantial agreement.

#### EXCAVATION

The remaining details set out below stem from our excavations. First, we investigated each of the three rectangular boxes or cists (Fig. 12a-c) made from coral slabs let into the paved surface of the court. The interiors produced only the expected accumulation of debris and dirt had they been left open when the structure fell into disuse. The rims of all the boxes appear to have projected above the court pavement, but no slabs suitable for covers were observed. Cist c is situated in a position identical to that of a similar cist in the rear corner of Structure K at Site ScMo 103, another *marae* of Type III F (Fig. 10; p. 148). As noted above, on excavation that cist also produced no significant contents other than dirt. Sinoto reported the same negative results of his investigation of such a cist in the court of *marae* M5-4 at Afareaitu (Emory and Sinoto, 1965, 53). He also recorded three such cists, the same number as in the present *marae*, in the court of a better-preserved *marae* of coastal type, but was not able to examine them (Emory and Sinoto, 1965, 54). From their discussion of the general occupational sequence at Afareaitu, including the fact that the other coastal *marae* (M5-3) was of late date, it seems possible that this well-preserved coastal *marae* with three cists in the pavement also belongs to the eighteenth-century occupation. On Mo'orea at least, where the cist has been present, it has been associated only with two late types of *marae*. As it can also be demonstrated that the general occurrence of rectangular court cists was fairly restricted in relation to all types of *marae*, it may be inferred that they are a late development.

Although, according to some native traditions, uprights on the court mark burials (cf. Emory, 1933, 117), the accuracy of these traditions has not been demonstrated in either

Hawaii or Tahiti. However, the idea did merit a test by excavation; this we did. At the same time, these excavations provided information on the underlying stratification, including the point in the sequence at which the uprights had been erected and the depth at which they were buried. No signs of skeletal material or related disturbance appeared under any of the eight uprights around which we dug. In general, the bases of these uprights were buried between 22 cm. and 30 cm. below the pavement surface. As they were not set in deeply, any later disturbances may easily cause a few to fall, as our survey results revealed. However, as were wooden house posts, some at least were braced by the packing and impacting of small stones around them. Emory (1933, 20) guessed that Uprights 18, 19, and 20 were *aho*. I cannot say why this set of three uprights should be so singled out. Such sets of three uprights were common in a variety of positions on the courts of many different types of *marae*, and none, given the vagueness of ethnohistorical definitions of *aho*, appears any more plausible as an *aho* than any others.

The excavations around uprights and cists, those through the *ahu* and outside the enclosing wall, did reveal indications of an extensive occupation in the locality prior to the erection of the *marae* itself. Thus at no point in time (Fig. 13) did the enclosing wall or court pavement of that *marae* ever rest on natural or undisturbed soil, and only occasionally were holes for uprights cut into it. On the contrary, features and debris from an earlier occupation, including large charcoal fragments, stone-filled pits, and post-holes, were everywhere encountered in situations stratigraphically earlier than the *marae*. It was also evident, particularly from Section B'-B (Fig. 13), that not only had an initial cultural deposit existed on the downslope end of the court prior to *marae* construction, but also more of the same material had been added inside the enclosing wall after it had been built, presumably to provide the court with a more level surface. We often noted this practice of filling in behind the downslope end of enclosed *marae* on sloping ground, because we habitually measured heights on the inside and outside of such walls. This feature has also been demonstrated stratigraphically by Garanger (1964) for *marae* sites in the Tautira District of Tahiti.

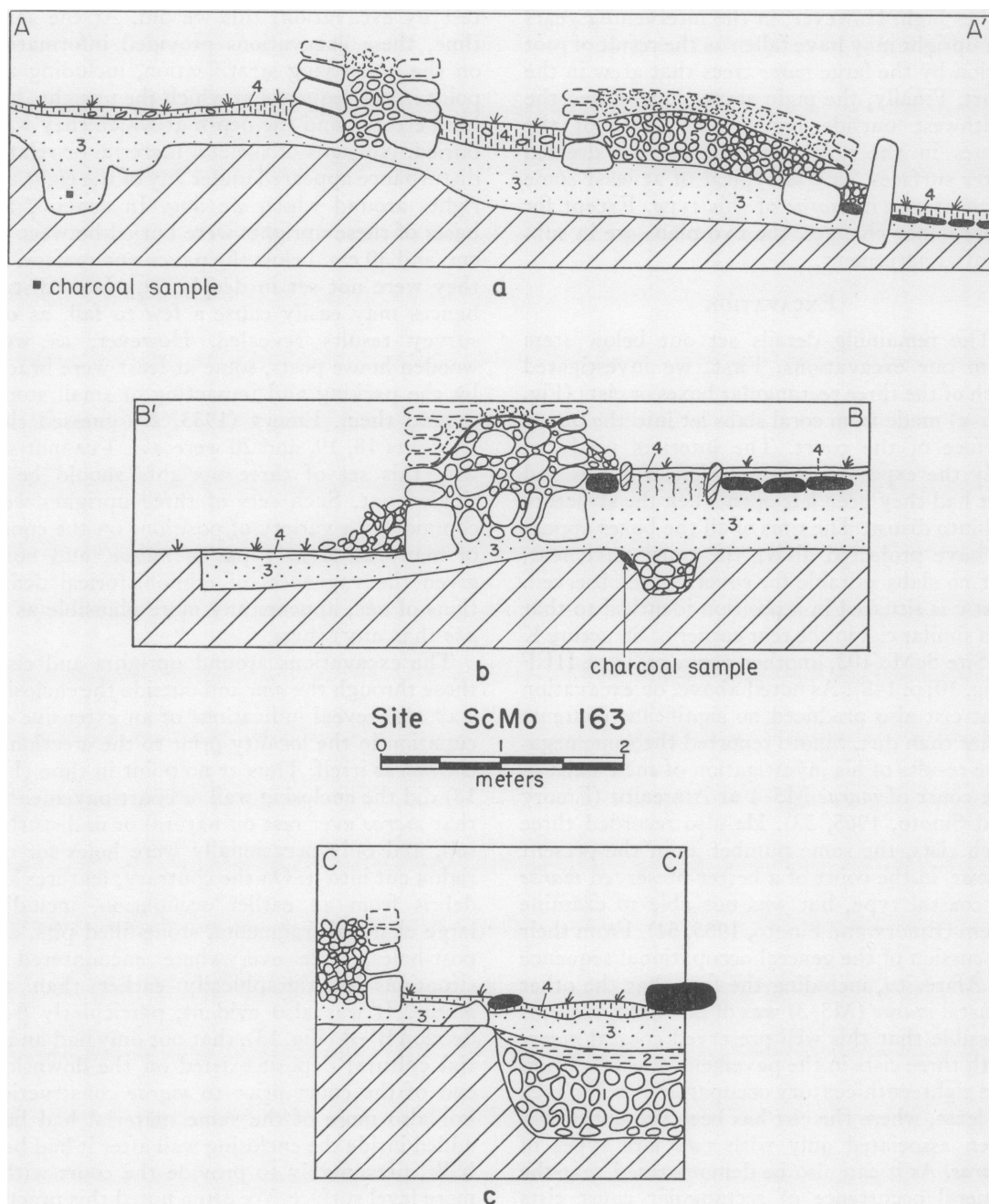


FIG. 13. Site ScMo 163. a. Section through *ahu* and enclosing wall of *marae*. b. Section through enclosing wall and coral-slab cist in *marae* court. c. Section behind rear wall of *marae* through large pit.

Two main features, post-holes and pits, were characteristic of the earlier occupation, but they yielded no discernible pattern, doubtless because of the limited area uncovered. The objective of the excavations was achieved, however, in demonstrating the existence and nature of this occupation and in collecting charcoal samples suitable for dating it.

Most of the pits were small; they ranged between 46 cm. and 57 cm. in depth below the undisturbed natural surface (Fig. 12d-g). Nearly all the pits belonged to the first occupation; many were filled with stone, a common practice revealed in all our excavations of such pits to date. Three pits (e, j, and p) merit additional discussion.

In the fill near the surface and extending some 53 cm. in depth into Pit e, the nearly intact skull of a large pig and a few of its long bones were found. This refuse was apparently related not to the first occupation but to that of the *marae*.

Pit j deserves additional comment not only because it was the largest pit discovered, but also because it yielded the best stratigraphic sequence, a description and discussion of which will serve for the entire site. Layer 1, composed of small to medium-sized stones and loose dirt, was obviously an artificial infilling. It included one stone (40 cm. by 30 cm. by 15 cm.) bearing two hollow surfaces used for grinding stone artifacts. Above it was Layer 2, a highly compacted and almost sterile clay derived from the surrounding natural clay subsoil which served to seal the pit. Overlying the pit and covering the surrounding surface, we encountered the charcoal-flecked, dark brown, compacted clay of Layer 3 that everywhere underlay the *marae* and filled most of the features cut into the underlying subsoil. Layer 4, the brown, root-disturbed, surface soil was related to Layer 3, but is now part of the modern soil profile and recent soil accumulation.

I interpreted the visible stratigraphy as follows: During the initial occupation of the site, pits were cut and structures erected. This construction resulted in considerable disturbance of the pre-occupation surface and subsurface soil, so that it was no longer possible to delineate the precise surface or surfaces from which the various features were originally cut. During this period at least one large pit (j) was pur-

posefully filled in. These secular activities then ceased. All the then existing features were raised or covered during the preparation of the site for the erection of the *marae*. At that time, to level the court for paving, some of the disturbed soil was used to fill in behind the enclosing wall.

Of various charcoal samples recovered from these pits, the sample from p, one of the deepest pits encountered, seemed to be among the best that could be unambiguously related to the enclosing wall. Therefore the sample (GaK-369), which came from well down in the infilling of that pit, was selected for analysis and was radiocarbon-dated at  $350 \pm 100$  years before 1950. It establishes the sixteenth or seventeenth century as a probable date for the occupation that preceded the construction of the *marae*. It seems reasonable to assume, then, that the construction of the *marae* dates to the eighteenth century, which would place this *marae*, together with many of the other structures, in the eighteenth century, the period of major occupation. Importantly it also establishes one example of *marae* of Type III F, with its related features, as sufficiently late to be contemporaneous with various coastal types of *marae*.

The post-holes (nos. 22-39; Fig. 12) were, in general, deeper than the pits. Their depths below the natural surface were between 52 cm. and 78 cm. Few, if any of them, appeared to derive from the later occupation, although we were not always certain.

Other results include the recovery of portions of two skeletons along the outside of the rear enclosing wall near the northwest corner (Fig. 12, I and II; Pl. 22). Skeleton I, found under a very large (60 cm. by 65 cm.) paving stone next to the wall and 25 cm. to 30 cm., or less, below the surface, consisted of the upper part of an articulated body. The head lay nearest the wall, the skull on its side, facing west (Pl. 22). The torso rested on its back, with the arms and vertebral column on a north-south axis. The pelvic region and lower limbs were missing. The other skeletal material (II) lay on one side of a pit about 50 cm. deep, near the surface. It also appeared to be associated with the *marae* construction. It consisted of cranial portions of at least one, and probably two, individuals and long bones (femur and tibia) of an adult. The deposition of these bones was, of course, sec-

ondary. The right maxilla of an adult was also recovered from the rubble core of the wall at the northwest corner.

Emory and Sinoto (1965, 52) noted the deposition of skeletal material outside the walls of *marae* M5-3 at Afareaitu. The material consisted of two extended burials outside one wall, four skulls under irregularly placed paving stones, and a bundle of long bones under a cornerstone. Whether this skeletal material should be construed as the remains of sacrificial offerings, dedicatory bones of ancestors closely connected with the *marae*, or as burials, or as all three, is not clear. Each suggested possibility has some traditional warrant. Greater knowledge of the frequency of the various types of occurrences in relation to *marae* will have a major bearing on the interpretation. It seems certain, however, that the bones from ScMo 163 cannot be considered simple interments, but must in some way be associated with one or more of the religious practices known to have been carried out on Society Island *marae*.

#### SUMMARY

Site ScMo 163 contained evidence of two major occupations, the first secular, probably attributable to the late sixteenth or early seventeenth century, and the second religious, identified with a *marae* of Type III F dating to the eighteenth century. The *marae* not only belongs generally within Type III F, but possesses a number of specific resemblances to Structure K, another *marae* of Type III F at Site ScMo 103, where excavation also revealed an earlier occupation. Therefore dating of the *marae* at ScMo 163 in the eighteenth century period of major occupation tends to substantiate the dating of Structure K in the same period. The earlier dating of the initial occupation at ScMo 163, when considered in conjunction with the same dating for an earlier occupation of like nature at Structure C at Site ScMo 103, supports other evidence that occupation of inland localities had begun well before the eighteenth century period. Also, in this valley at least, the settlement was neither sporadic nor temporary but large and permanent, and was built up during 200 years or more of the prehistoric period. Garanger (1964, 17) reached exactly the same conclusion on the basis of his work in the Tautira Valley of Tahiti. Emory and Sinoto (1965, 15) appear to have misunderstood the

implications of Garanger's work and the conclusion to which he came.

#### SITE ScMo 129

Only one *marae* with a stepped *ahu* was encountered in which both *ahu* and court walls had worked stone facings (Fig. 14). Because the type is distinctive and one normally encountered only on the coast, excavations designed to reveal the various details of its construction and provide information that would date this event were a major objective. In this respect, despite their limited extent, the excavations were highly successful. A stratigraphic sequence and charcoal samples capable of dating the *marae* were obtained from excavations on the southern, or upslope, end. Excavations into the raised pavement and *ahu* of the southeast corner and all around the walls of the raised platform forming the court revealed major constructional features and confirmed the general nature of the stratigraphic sequence determined on the upslope end.

#### STRATIGRAPHIC SEQUENCE

The construction and use of the *marae* constituted the only major occupation of the site. Everywhere the court walls of the *marae* were built on or into natural subsoil, and few or no signs of cultural activity existed prior to this event. The only well-stratified sequence encountered, therefore, was against the upslope end where recent debris could accumulate. The three-layer sequence (Fig. 15 and Pl. 24) may be described and interpreted as follows:

Layer 1 consisted of an old infilling of sterile clay with many large stones that, in part, appear to have been banked up against the base course of the platform walls after they were constructed. Its greatest depth was behind the *ahu*. Its surface probably represented ground level at the time the structure was in use. A series of shallow depressions with charcoal and one small oven were sealed in by this layer only on the upper end at various points behind and partly under the platform wall. No great interval of time seemed to have elapsed between the fires that produced the remaining charcoal and the construction of the *marae*. More likely, these depressions should be associated with the clearing, burning, and ceremonies that took place perhaps just prior to its construction. Of a number of charcoal samples recovered from



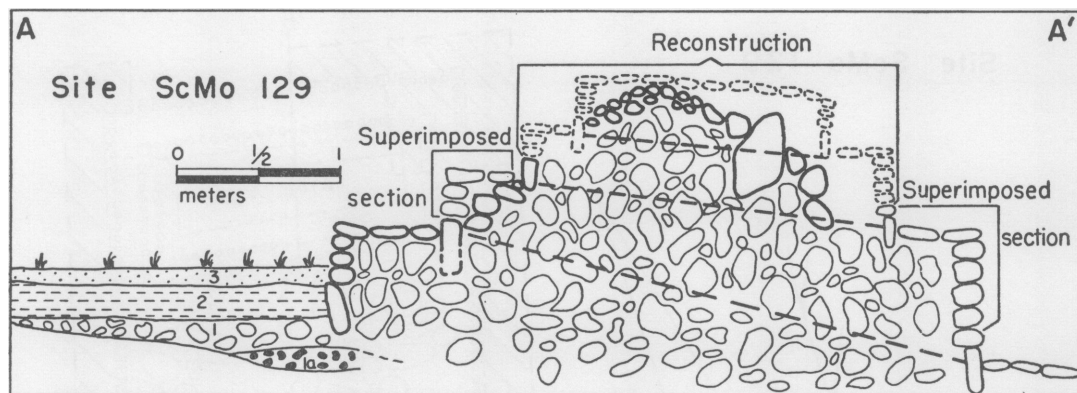


FIG. 15. Section through stepped *ahu* platform of ScMo 129, showing stratigraphy, existing remains of *ahu*, and reconstruction.

early nineteenth century date would be preferred. A similar date was proposed by Emory and Sinoto (1965, 56–57) for a coastal *marae* (M5–3) at Afareaitu on the basis of their excavations and a sixteenth century radiocarbon date for the period prior to the construction of the *marae*.

A sterile clay fill above Layer 1 on the *ahu* of the *marae* was derived from slope wash and soil creep, and contained some debris, especially fallen stone from the *marae*. It was designated as Layer 2 and intergrades with a rich, dark-brown, surface layer, 3, in which leaves, nuts, and surface roots combine to form the present soil profile. These layers were interpreted as natural accumulations of the historic period. Elsewhere than behind the *ahu*, Layer 2 was missing, and only Layers 3 and 1 were present, as might be expected on sloping ground.

#### STRUCTURAL DETAILS

The *marae* was reasonably intact, although a fairly large *mara* (*Neonauclea forsteri*) had destroyed the northeast face of the *ahu*, and a large candlenut tree (*Alcurites moluccana*) grew on the court as shown in a published photograph (Green, 1961a, Pl. Qa). The growth of these large trees, after construction and abandonment of the *marae*, is important because it indicates that the larger trees in the present forest are capable of having developed in the 100 to 150 years after the locality was abandoned. Thus the present extensive and closed vegetative cover is not necessarily characteristic of conditions at the time of settlement.

The *marae* consisted of a large, rectangular,

raised, and paved platform with a stepped *ahu* at one end. The construction of the worked stone facing of the walls of the raised platform was the same as that used in the *ahu*. Excavations revealed that the entire base course of the platform walls on all sides was formed by dressed or partially dressed and fitted stone slabs (Pl. 24). Above it, four courses of worked, round-faced stone rose between 2 feet, 2 inches and 2 feet, 6 inches. The capping course was level with the large, flat, selected slabs of basalt used to pave the court (cf. foreground wall in Green, 1961a, Pl. Qa). Only three courses of round-faced stones appeared in this wall around the three sides of the *ahu*. The fourth course was composed of flat basalt or dike-stone paving slabs as in the *ahu* steps themselves (Green, 1961a, Fig. 2). All four cornerstones in the platform were dressed as was usual with this type of facing.

The reconstruction of the *ahu* above the first step was more difficult. However, the existence of three steps above the raised platform may be inferred from superimposed sections at different points where the walls had been preserved (Fig. 15) and from the evidence provided by fallen cornerstones still on the *ahu*. Thus, in addition to the four basal dressed cornerstones still in place in the *ahu*, a second set of four such stones, between 2 feet, 2 inches and 2 feet, 8 inches long, and a third set of four about 1 foot, 4 inches long had fallen around the *ahu*, suggesting that there had been two additional steps, each higher one smaller than the one below. The present distribution of the fitted stones once at the base of each step on the *ahu*

and the remains of the core infilling also lend weight to this interpretation. However, portions of the second step were intact only on the north and west sides of the *ahu* and in places along the back.

Typical worked-stone facing seems to have been employed in the *ahu*. The base course in the lowest step was formed either from dressed and fitted basalt and tuff slabs or from similar selected dike stones of like size. Above them, five courses of round-faced stones were employed on the face fronting the court, but only two courses along the back. This arrangement helped to some degree to offset the steep slope of the platform itself and provided relatively more level steps. In the second step, and probably the third as well, the round-faced stones appear to have been slightly smaller, whereas the base course of the second step at least had dressed-stone slabs as well as coral. The capping layer of each step was of selected flat basalt and dike-stone slabs which also served to pave the surface between the steps, just as they did the areas on three sides between the *ahu* and the edge of the platform which here, in effect, formed a fourth step.

Investigations into the interior of the *ahu* on the southeast corner revealed additional points of interest. No signs of skeletal remains or cists were encountered during these operations, and none were in evidence elsewhere in the *ahu*. The core consisted simply of large, crudely stacked boulders. Most of the more usual small-stone rubble was restricted to the uppermost levels, suggesting that only the last step of the *ahu* contained this characteristic fill (Pl. 23). In the southeast corner a very large boulder, the height of the raised platform, underlay the position of the dressed cornerstone for the first step. The position of the *ahu* seemed to have been planned as the platform was built and this stone placed to provide one of its underlying foundations.

Two sets of three uprights and two backrests occurred on the court of the *marae*, together with the usual set of uprights in front of the *ahu* itself (Fig. 14). Heights above the pavement and some other dimensions have been recorded for these. Numbers 2 and 3 in the set of three in front of the *ahu* were 1 foot, 3 inches high; No. 1, 2 feet; No. 4, a single upright farther out from the *ahu* and off to the side, was 1 foot, 4 inches; Nos. 5, 6, and 7 formed a low

set of three, No. 6 at 1 foot higher than No. 5 at 10 inches, and No. 7 at 6 inches on each side. Numbers 8 and 9 were backrests, with No. 8, 1 foot, 4 inches high and 10 inches wide, and No. 9, 1 foot, 5 inches high and 1 foot, 7 inches wide. Numbers 10, 11, and 12 formed a third set of three and were 10, 11, and 11 inches high, respectively.

To one side a small irregular pavement flush with the ground was associated with one possible upright, No. 13, some 1 foot, 3 inches high along one side, but off the pavement. It was difficult to determine, on the available evidence, whether this structure represented the remains of a detached shrine associated with the *marae*, but it seemed highly likely that it did. A wall below the *marae* formed a small flat terrace that was also investigated, but nothing of significance, except several bits of shell, was found. Its main function seems to have been to protect the end wall from erosion.

#### TYPOLGY

With a stepped *ahu* and worked-stone facing in both the *ahu* and the wall of the court, this structure would be classified a coastal *marae* according to the original definition by Emory (1933, 28), but one that occurred well inland. However, it lacked the enclosing walls generally associated with the 46 *marae* in Emory's sample and, instead, had a raised platform court. As such, it might be viewed as a separate but related type. Both Garanger (1964, 17) and I (Green, 1961a, 172, Type III C) have also found other *marae* in inland situations lacking stepped *ahu* and thus of inland form with worked-stone facings in *ahu* and enclosing walls. When this fact is taken into account, it becomes obvious that the presumed association of worked-stone facings only with *marae* in the coast or only with those that have stepped *ahu* is not so uncomplicated as Emory envisioned from his sample, which was limited, particularly with regard to *marae* in inland situations. Obviously, "coastal" is no longer an appropriate term applicable to the distribution of worked-stone facings. We may question whether the term should be used even in connection with *marae* that have stepped *ahu*, because not all such *marae* are necessarily coastal in their distribution. In short, it is not the coastal location of *marae* with worked-stone facing or with stepped *ahu* that should be emphasized. It



seems more likely that Emory was on the right track in stressing their correlation with the *ari'i* and *ra'atira* ranks in the society. Then the predominantly, but not exclusively, coastal distribution of *marae* with these features would be a reflection of the dwelling places of the majority of people of these ranks, as revealed in the very appropriate chant which he cited (Emory, 1933, 28). On the other hand, their occurrence inland could be predicted wherever conditions for settlement there permitted establishment of populations in which stratification typical of Tahitian coastal settlement might be expected to occur.

I propose, therefore, that the term "coastal" be dropped and that we refer to these *marae* as a class with worked-stone facings. Several types may be identified among them, according to the various features of the *ahu*, the court, and their relationships, similar to my classification of other *marae* (Green, 1961a). If such a proposal is accepted, most of Emory's coastal *marae* fall into a previously undefined type that does not occur in the 'Opunohu Valley, but does occur around the coast of Mo'orea and Tahiti. This Type, III M, had a stepped *ahu* with worked-stone facing that stretched entirely across one end of the court and was thus attached to the enclosing wall on three sides. An enclosing wall surrounded a paved court and was normally faced on the outside, in some cases on the inside, with the same type of worked-stone facing. The *marae* under discussion here was of a second type, with stepped *ahu* built on a raised platform with the walls of both faced in worked stone. It would be Type III B in my earlier classification (Green, 1961a). Site 14A found in Tautira by Garanger (1964, 17), a *marae* of Type III F, inland form, but faced in worked stone and similar to *marae* in the 'Opunohu Valley, would fall into a third type that I have designated Type III C. The latter is a residual category reflecting existing inland types in form, but employing worked-stone facing. Eventually, when more is known about the dating and distribution of these latter *marae*, they may be divided into several types or simply merged with the forms they resemble, depending on interpretations placed on the occurrence of worked-stone facings.

#### ETHNOHISTORIC PARALLELS

*Marae* Type III M is best known historically

from the records of Cook, Banks, and Wilson for the largest example, Mahaiatea, and its physical nature is fully discussed by Emory (1933, 72-74). Little doubt exists that in size, number of steps, and other details, it reflects one of the better-known but ill-fated attempts among many that occurred during the eighteenth century to achieve a greater measure of political integration or domination (Beaglehole, 1955, clxxxiii-clxxxiv). *Marae* Type III B, however, has not been distinguished previously nor have its associations with Tahitians of rank been established. But the type and its function can be inferred from the writings of Bligh and Tobin in 1792 and the fine watercolor drawings by Tobin, one of which, for the *marae* at Pare, has been published (MacKane, 1951, 288; Newbury, 1961, Fig. 3). This is Emory's Site 1 (not 4) of which little remains (Emory, 1933, 56-57).

Close study of these descriptions (MacKane, 1951, 256-260), particularly the unpublished writings and drawings of Tobin, makes it clear that two, not one, *marae* are involved in their commentary. One is the stepped pyramid on the point more than 30 feet long and 14 feet high, called the Great Temple by Bligh and given the name Taputapuatea when the god was brought there. This is where the two human sacrifices, particularly the presentation of one eye, took place, one at the bringing of Oro to the *marae* (Bligh, 1920, 92) and the other at the investiture of Pomare II (Bligh, 1920, 123). It was here that Tobin saw a number of human skeletons laid out. It was here also that both saw some 14 *unu* in upright positions on the *ahu*, some resembling men and some birds.

The other *marae*, referred to sometimes by both as the pavement, was called "Teppah" by Bligh (1920, 123) and is the place where Pomare II was invested with the *maro'ura*. The structure is well described by Tobin and accurately illustrated in his drawing published by MacKane and Newbury.

The *marae*, as pictured, is identical with Type III B. Its pavement was about 1 foot high and 64 by 42 feet wide and seems to have worked stone in the facing. An *ahu* at one end was raised 4 or 5 feet above the pavement in two steps (Tobin, MS, 177, and watercolor). The indicated facing of the *ahu* appears to be of the worked-stone type (although this is not certain).

The stone uprights that Tobin described as 3 or 4 feet high may be seen in his illustration. The largest and tallest upright is centered in front of the *ahu*; another stands out on the court some distance from it, with a slightly taller carved wooden upright in between. Another set of three uprights appears in the back part of the court, with a fourth toward its center and a fifth at the back in the center line. The *unu*, representing *hiva* dancers, birds, and lizards, appear in upright and leaning positions at the back or, in one instance, on the top step of the *ahu*. Another plain upright in either stone or, more likely, wood (judged from the color and the fact that stone uprights do not seem to occur on stepped *ahu*) may also be seen on the lower step of the *ahu*.

Off to the right is a low stone pavement on which more upright *unu* occur, including one from which hang two objects that Tobin (MS, 177) describes as the skull of a human being and that of a hog.

The stage for a *fare atua*, or god house, the *fata* or stage for displaying the offerings, two other tables, and a round-ended house are also described and illustrated. The whole complex will be treated in more detail in another publication. The important point here is that Site ScMo 129 has almost the same formal properties as the one *marae*. It is of approximately the same size (69 by 30 feet), although a little narrower, and its court platform is raised about 1 foot higher. Also, a greater height is recorded for the *ahu* for which an additional step is inferred. A smaller stone pavement occurs at one side, presumably without stone uprights because *unu* stood there instead. Out on the court some uprights occur in rather similar sets and positions, although the correspondence here is not so close as might be expected.

These parallels are sufficient, I believe, (a) to establish the existence of this type both archeologically and historically in the late eighteenth century on Mo'orea and Tahiti, and (b) to associate the type with ceremonies involving high-ranking members of Tahitian society.

#### SUMMARY

Investigation of the only *marae* in the 'Opunohu Valley that possessed both a stepped *ahu* and a worked-stone facing demonstrates that its construction occurred during the final

period of major occupation in the valley. Although the *marae* had the two features that would place them in the coastal type established by Emory, closer examination of the various associations of these features with different forms of *marae* in both inland and coastal situations suggests that Emory's typology should be revised. I make such a revision here, first, by defining a new type, III M, which most closely approximates the *marae* Emory described as coastal; second, by placing the *marae* at ScMo 129 in Type III B; and, third, by assigning others with an inland form to Type III C. *Marae* of Types III M and B, and perhaps *marae* of Type III C, are apparently best interpreted as religious structures associated with the higher-ranking members of the social group, thus reflecting the development of the kind of social stratification known to have characterized coastal Tahitian society at the time of European contact. The presence of even a single site like ScMo 129 in a sample of the entire 'Opunohu Valley implies that such social stratification had also developed in this ecologically favorable inland situation. This interpretation is consistent with and supports other evidence from the eastern division of the valley, that social stratification was well developed in this inland community at the time of its last major occupation, in contrast to the situation in the western portion of the same valley.

#### CONCLUSIONS

The analysis of a number of *marae* at three sites in the eastern portion of the 'Opunohu Valley, based on detailed mapping and limited excavations at some of them, permits identification of six *marae* distributed among four types which may be confidently associated with the last major occupation of the locality and dated to the eighteenth century. These *marae* are therefore contemporaneous with the two large assembly houses in the eastern portion of the valley and one in the western section reported on in other sections of this monograph (pp. 119-139; 164-174).

The six contemporary *marae* include one of Type III B, one of Type III G, one of Type III I, and three of Type III F. Another, of Type III F, published previously (Green, 1961b), Site ScMo 161, can also be included in this group because of its excellent preservation and because it possesses certain late features com-

mon to Types III F and G. It was associated with an archery platform. In Emory's typology, one of these *marae* belongs to the late coastal type; the rest, to his earlier inland category. It is shown above that his coastal category is in need of revision. It is clear on the total evidence presented here and in Green (1961a) that the same holds true for his intermediate and inland types. As a category, "inland" does not distinguish typologically earlier *marae* from later ones, nor did all inland *marae* types necessarily develop before any of Emory's intermediate or coastal types appear. In fact, on the available evidence presented here and by Garanger (1964) for Tautira, some, at least, of the inland types are contemporary with these others. It is possible to assemble additional evidence to demonstrate the same conclusion for intermediate *marae*. Thus, Emory's types, as presently defined, fail to provide discrete categories that distinguish among a number of *marae* forms in each of his categories, or to reflect an evolutionary or developmental sequence from inland to intermediate and coastal. Finally, at least some of these inland *marae* types must once have been more common on the coast, so the term itself provides a misleading orientation in its emphasis. In my view, all three terms should be abandoned as new types are defined and the excavation and mapping of *marae* proceed.

Therefore, on the basis of the evidence from the 'Opunohu Valley, it is difficult to agree with Emory's discussion of the evolution of the Tahitian *marae*. The evidence appears to challenge his statement (Emory, 1933, 40) that "... the unenclosed, inland Tahitian *marae*s with an *ahu* faced with coral slabs is the earliest type of religious structure throughout the Society Islands." To my knowledge this has not been demonstrated. In terms of logical sequential developments, examples of the simpler unenclosed *marae* types, including those without *ahu* or without coral-facing slabs, are equally likely candidates for ancestral forms. To repeat, to distinguish the ancestral forms from the later *marae*, a finer typological division of the inland category is necessary, together with numerous excavations of these structures in the coastal remains.

Quantitative evidence from the 'Opunohu Valley suggests to me that various *marae* types had a far more complex developmental history;

that they did not progress from an inland form of the type noted above to more complex inland *marae*, to intermediate, and finally, to coastal *marae*. Thus, rather than postulate on 'Opunohu *marae* evidence that this valley was settled continuously from the earliest periods of Tahitian prehistory, I prefer to interpret the evidence as reflecting the fact that the valley contained no *major* settlement before the fifteenth or sixteenth century, although small populations may have resided there, beginning with the thirteenth century. This means that social and religious differences are to a great extent reflected in the large number of *marae* of all types that occur and, only secondarily, the historical development of new types. Although it is probably true that greater numbers of the less complex *marae* were recorded, in part because some of them are actually earlier than some of the less numerous and more complex types that definitely belong only to the later periods, it seems to me that, as Tahitian society differentiated and became increasingly stratified, *marae* types also proliferated to fulfill these new functions. Nevertheless, the older types persisted in their former roles. Such persistence is demonstrated if one assumes, as the evidence suggests, that the identical sequences of layer in the upper and lower areas of Site ScMo 158 are contemporary (p. 122). Then Structure A, a simple enclosed *marae* with primary uprights of Type III I, is of the same or later date than the community house and belongs to the late eighteenth century occupation. Therefore, some of the simpler family types of *marae*, for instance, may have persisted over a long span of time right up to contact, and other types exhibit quite different time spans as the social and religious activities for which each existed became established in any particular population. Thus, in my view, the evolution of the Tahitian *marae* more closely corresponds to a model that stresses the proliferation of the basic types and the existence of a number of them at any one time. It is the appearance of new features, frequently incorporated into several types, that provides the chronological time markers. If this position is adopted, the frequency of various *marae* types then becomes intelligible in terms of the social differentiation and stratification that had developed by the eighteenth century in the eastern, but not in the western, portion,

of the 'Opunohu Valley. This development is in keeping with the favorable ecological situation of this particular inland settlement.

As is true of adzes, different *marae* types and different features belonging to several types may represent different time spans. To assign a *marae* to a type does not necessarily date it with respect to all other *marae*, except on analysis of its context and some knowledge of the local occupational history. Our problem, therefore, is to establish a typology that will permit classification of various *marae*, so that as information on their distribution in time and space accumulates, it will be possible to outline the development of religious structures in the Society Islands. Another problem is to analyze all the

types from a single locality or settlement so as to abstract some information on the social and religious organization that they reflect. Such is the orientation in the present study.

*Marae* are artifacts and should be treated as such. They are not significantly less numerous than localized adzes, nor do they exhibit fewer changes in their features through time. Moreover, better than adzes they reflect sociological and religious developments in Society Island society. They also possess a number of important historical relationships to religious structures in other island groups of Polynesia and beyond. As such, their continued detailed mapping, excavation, and analysis are the more pressing tasks of Society Island archeology.

# INTERPRETATION OF ROUND-ENDED HOUSE SITES OF THE 'OPUNOHU VALLEY BASED ON EXCAVATION OF AN EXAMPLE IN THE WESTERN PORTION OF THE VALLEY

ROGER C. GREEN AND KAYE GREEN

SEVERAL EARLY EUROPEAN VISITORS to the Society Islands have reported that large oval-shaped structures served as dwellings for important men at and prior to the time of contact. Formed by adding a rounded end (*pote'e*) to an enlarged version of the ordinary rectangular sleeping house, these structures occasionally attained enormous size. Under missionary influence, house building was one of the first aspects of culture to undergo radical change. The old structures, as did the customs associated with them, crumbled away very quickly but survived in modified form for some time in buildings used for meeting houses or for administration. By the 1920's, only a few *fare pote'e*, all in the Leeward Group, still survived in the Society Islands. Handy (1932), who described them, also summarized the available data concerning these structures. His additional information on the dimensions, frequency, and details of construction in early contact times was based on the journals of early travelers and missionaries.

Emory (1933, 44), during his archeological survey of the Society Islands, recorded outlines of only three reasonably complete pre-European houses of this type and contributed little additional information beyond the suggestion that these structures may not have been foreign to the earliest cultures. The three dwellings recorded by Emory lay deep within the interior of the 'Opunohu Valley, Mo'orea, so it is not surprising that during a recent survey of prehistoric structures within the same valley the remains of 21 *fare pote'e* were discovered. Among these the three sites reported by Emory (1933, 105) were identified.

Excavation of one of the best-preserved examples of these structures was undertaken in April, 1960. As a result of this survey and excavation, it is possible not only to expand the data presented by Handy, but also to draw some inferences concerning the role these houses played in the social organization of the settlements with which they are associated.

## SITE ScMo 4

This site, in the western or Amehiti side of the 'Opunohu Valley, lies approximately 2 kilometers inland from the end of 'Opunohu Bay. It is on a slight rise in the open flat lying between the westernmost branch of the three streams that converge just below this point and one of the high and rather barren, fern-covered ridges that dominate the interior of the valley (Fig. 1).

## COMPOSITION

When cleared and surveyed, the site was found to consist of three visible structures, a large pavement, and a low flat boulder (Fig. 16). Two of the structures were clearly outlined by curbstones, selected from naturally occurring igneous rock, set on edge end to end, and buried in the ground so that their upper edges protruded partially above the present surface. One set of curbstones defined a large, round-ended house, designated as A; a smaller, rectangular building so outlined was designated as B. Although small, indiscriminately shaped stone pavements were attached to one side of each house; both faced a large, well-defined, rectangular court paved with flat stone slabs (labeled C). A portion of another small stone pavement to the west of House A and a few isolated curbstones suggest the former existence of a third building (designated as D). Between Houses D and A, a low boulder (E) with a fairly flat upper surface served an unknown purpose—perhaps that of a seat.

## EXCAVATIONS

The interiors of Houses A and B were excavated to the sterile underlying clay, as were the area surrounding House A and selected areas between it, House B, and Pavement C (Fig. 16 and Pl. 20). In general, excavation was accomplished in two steps. First, the multitude of guava stumps left from clearing the site were carefully grubbed out, and the top soil in which no features were distinguishable was removed

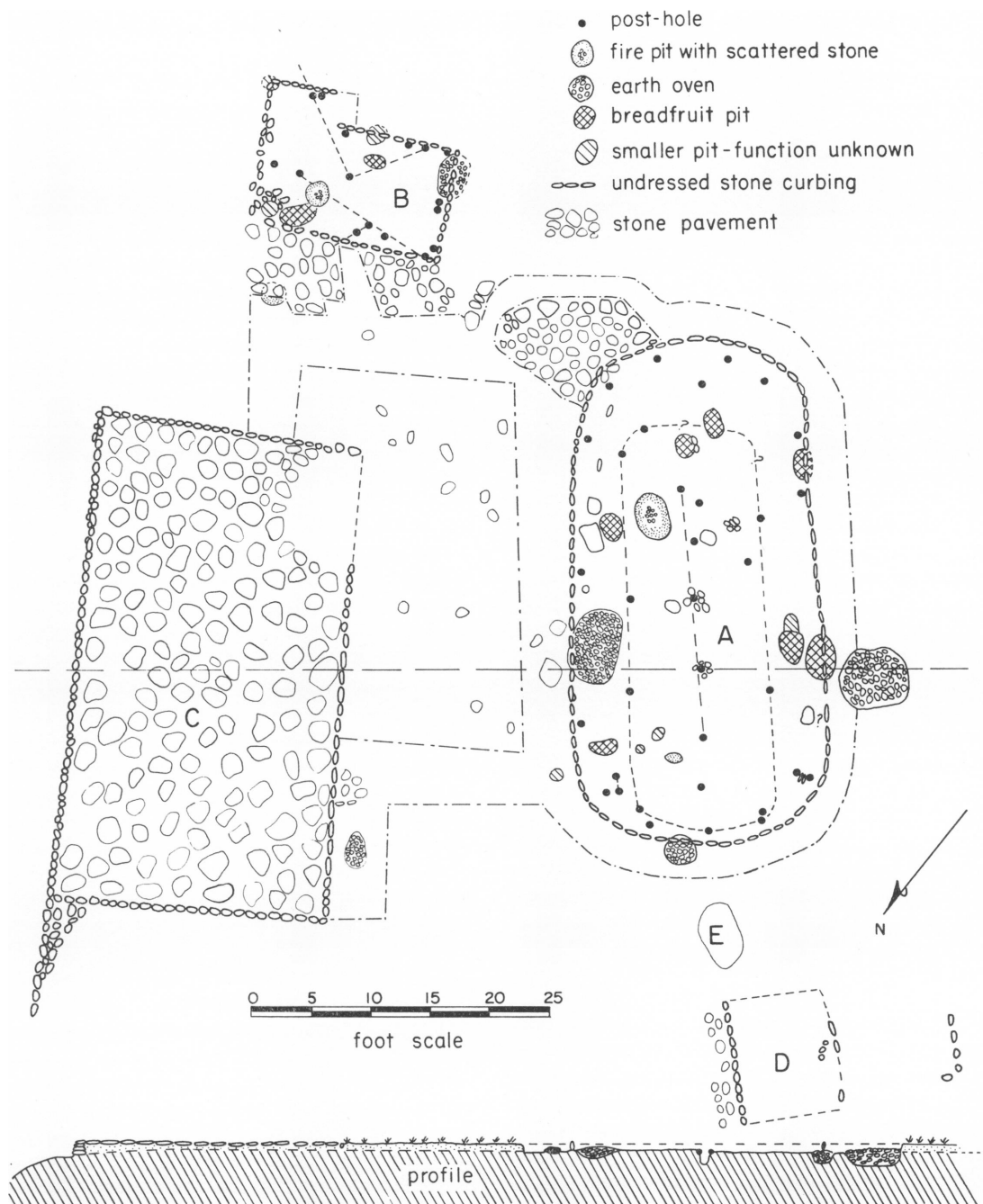


FIG. 16. Plan and main stratigraphic section of Site ScMo 4. Structure A, large round-ended community house. Structure B, rectangular house of performers. Structure C, large, separate, well-defined, rectangular pavement. Structure D, small ill-defined house. Structure E, low boulder, with fairly flat upper surface.

with shovels. This involved the removal of 4 inches to 6 inches of fill over the entire area. Second, the remaining soil was excavated by hand trowel, and the various features were ex-

posed and defined. This excavation involved removing an additional 2 inches to 6 inches of fill and sectioning all the pits and post-holes before they could be fully defined.

During the second step in the excavation, various features were uncovered, indicating that at least two periods of occupation were represented. First, we observed that the base of curbstones rested between 2 inches and 4 inches above the surface of sterile earth. It gradually became obvious that the surface associated with the curbstones lay within a few inches of the present surface but was no longer identifiable. Because the actual floor must have consisted of 3 inches to 4 inches of carefully laid grass, the absence of a compacted dirt floor, similar to floors commonly found in early structures elsewhere in the world, was not unexpected, especially in a situation as exposed as is this site.

Only such features as pits and post-holes that had been cut into the underlying occupation layer or sterile clay remained. When a larger number of post-holes in a pattern more complex than would be expected from a single occupation began to appear, little doubt remained that earlier buildings had formerly been situated at each of the positions presently occupied by Houses A and B. The final proof of at least dual occupation, the first on a surface only a few inches above sterile ground, was furnished by both ovens and pits that lay under the curbstones of the later structures.

Charcoal from one of these ovens (Fig. 17a, No. 4) at the west end of House A yielded a date of 1260 A.D.  $\pm 80$ ,<sup>1</sup> thus fixing the earlier occupation of the site in the late thirteenth century. For this reason the various features that become quite complex within both houses are presented in separate plans, one for the early and the other for the late period.

#### FEATURES

The assignment of features to an earlier or later period has been accomplished with varying degrees of success. Either because most pits lie under the wall of a later house or were filled purposefully with stone and debris prior to the construction of the later houses, they have been fairly confidently assigned to one period or the other. Similarly, an assignment to period was possible for most fire pits and ovens. According to the reconstruction presented here, the features for which the evidence was not decisive (as, for example, the very large oven on the southwest side) have been assigned to the later

house, so that all ovens lie outside the houses and all fire pits within them. It was possible to distinguish fire pits from ovens because larger numbers of heating stones were normally associated with ovens.

The assignment of post-holes to periods proved more difficult. Fortunately, only a single set of well-defined post-holes was encountered at the eastern end of House A. Because they were clearly associated with the later house, they proved to be of considerable help in the assignment of the remaining post-holes. Their size and position with respect to the curbstone walls provided additional aids, so that the post-holes associated with the later house were plotted with the other features of this period. It became evident, then, that all of the remaining post-holes lay within a smaller area of the same general form as the later house and could be used for the construction of a smaller version with the same general outline. When these were plotted against other features definitely belonging to the earlier period, it was also evident that ovens that formerly lay within or under the walls of the later house were now outside the boundaries suggested for the earlier building.

The same technique was applied to House B, with less satisfactory results. The minimum number of post-holes that seems to be associated with the later structure are plotted with it, although some of the remainder may also be part of it. The rest apparently belong to an earlier building, but its shape is not obvious from the area excavated.

#### HOUSE A

##### Figure 17

The early period is represented by two ovens, one much larger than the other, a small, shallow fire pit, 16 post-holes, and eight pits, two of which are believed to have served for storing breadfruit. Both ovens (Fig. 17a, No. 4) are not only stratigraphically earlier than the curb wall of the later house, but, on the basis of the structure suggested by the post-hole pattern, they would have been just outside the wall but within the shelter of it. For this reason, the two are believed to be associated. The smaller oven, as noted above, has been dated to the late thirteenth century, whereas the larger oven occupies a position analogous to one of similar size on the opposite side of the later house. The large

<sup>1</sup> Isotopes Inc., Radiocarbon Code Number I(AMNH)-204; 700  $\pm 80$ .



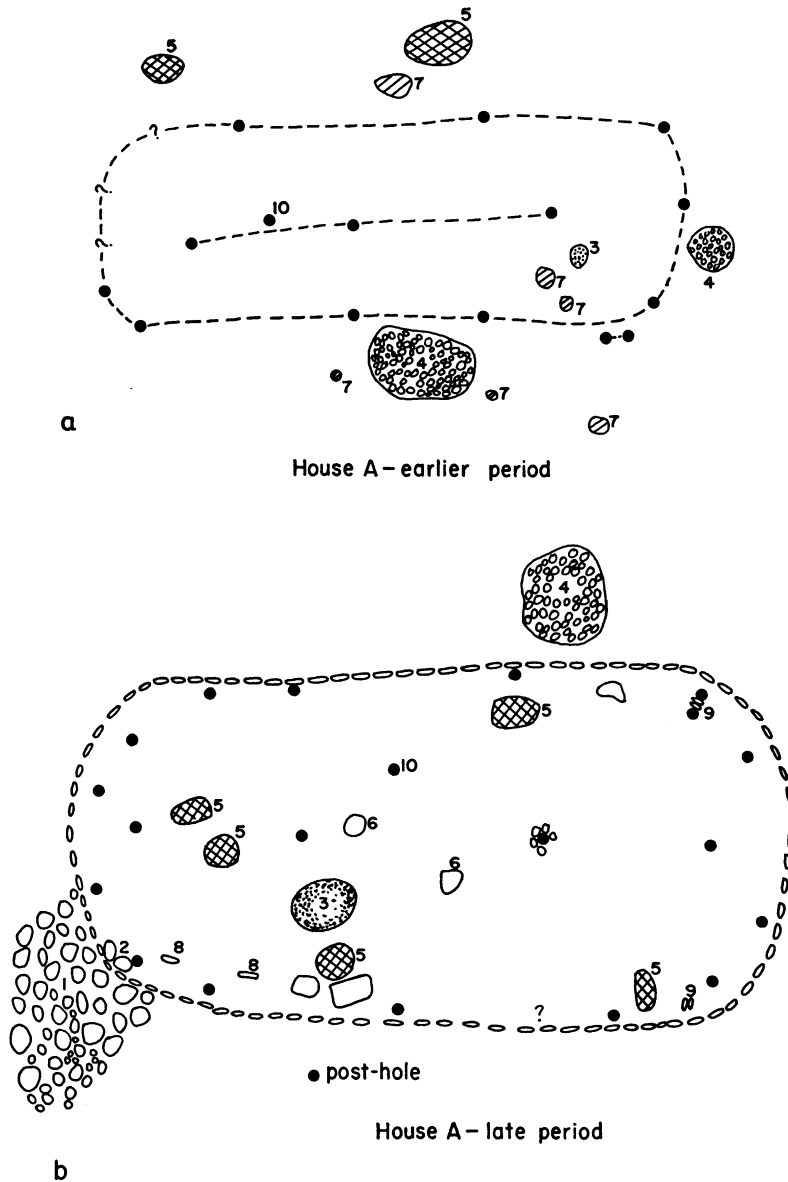


FIG. 17. Detailed plans of House A at two periods. Features from Fig. 16 assigned as follows: a. Earlier period. b. Later period.

oven contained evidence of continued use at the base of its pit in the form of several bands of charcoal and dirt.

Two small, shallow pits, one on each side of the oven, are probably natural depressions or areas from which boulders were removed, but the other four, all 12 inches to 14 inches deep, may have served for storage (Fig. 17a, No. 7). Suggs (1961b, 64, 159) found similar pits in

ovoid houses in the Marquesas. The two large pits on the south side of the house are believed to have functioned as storage pits for fermented breadfruit (Fig. 17a, No. 5). Their stratigraphic position under the curb wall of the later house serves to assign them to the earlier period. They contained 10 inches to 14 inches of charcoal-stained fill and a number of medium-sized boulders. A number of pits belonging to both

periods contain such fill; the boulders are too large and dense to have been oven stones, and the pits show no evidence of having ever contained a fire. Banks's (Beaglehole, 1962, 344) description of pits for storing fermented breadfruit seems to resemble the appearance of these pits most closely. At the same time the absence of fire and the presence of large stone are explained. According to his text, the fermented paste was stored in a "hole dug for that purpose, generally in their houses; the sides and bottom of which are neatly lined with grass; the whole is covered with leaves, and heavy stones laid upon them."

The 15 post-holes assigned to this early period do not fall into a completely satisfactory pattern. The one suggested is the best that we can offer. Although the absence of some holes may be explained by subsequent construction, others are either missing or occur in positions not reconcilable with the present arrangement. In general, the post-holes of this earlier period are slightly smaller in diameter and not so deep as those assigned to House B. They range from 7 inches to 9 inches in diameter and from 6 inches to 14 inches in depth. Few of the post-holes had stabilizing rocks tamped around the base of the pole, as was the practice in the later period. The unsupported or unstabilized poles, and a slight decrease in the size of the post-hole, might be expected, however, in the construction of a smaller building. One post-hole (Fig. 17a, No. 10) may be for the *fata*. It was "a single light post planted in the floor" of every house on which calabashes of water and baskets of food were suspended" (Ellis, 1833, Vol. 1, 155).

The later period at House A (Fig. 17b) is represented by curbstones outlining its ground-plan, a small pavement at one end with two sill stones just inside the wall, a large fire pit, five storage pits for breadfruit, stone seats, single and dual slab uprights, and a large earth oven just outside the wall on the south side. The small pavement (Fig. 17b, No. 1) attached to the northeast end of the house marks the usual entrance. The two sill stones (Fig. 17b, No. 2) on the inside of the wall confirm this suggestion. They were apparently placed there as an aid in stepping over the low wall formed by the line of curbstones.

The consensus of early observers is that the sides of houses were not walled, but left open or largely so, and that mats served for protection

when needed (Handy, 1932, 29). Only a few houses had walls consisting of horizontal wood or bamboo poles set an inch or so apart, and, even when such walls were used, large sections of the sides were left open.

There is no evidence to indicate the extent to which the walls of this house were enclosed. No ditch or holes for the reception of a set of wall poles was found. Both Baessler (1900, 17) and Huguenin (1902, 116) mentioned the use of stone curbs as framing at the base of the walls. Although such curbstones could have served to stabilize the base of any wall, they do not necessarily indicate that one existed. An earlier observer, J. R. Forster (1778, 457), described a low bamboo wall, not more than 1 foot high, that marks the perimeters of some of the houses in place of walls. Although such curbing was not common, it would serve, as would the low stone curb wall of this house, to demarcate the living area and retain the grass and mats that covered the floor, whether or not the sides were enclosed.

A smaller fire pit (Fig. 17a, No. 3) in the earlier houses and a larger one in this period (Fig. 17b, No. 3) were primarily intended to provide warmth. Suggs (1961b, 64, 159) found similar fire pits in the Marquesan ovoid houses. Large ovens (Fig. 17b, No. 4), like the oven just behind the house, were intended for cooking.

As in the earlier house, five of the oval pits (Fig. 17b, No. 5) that contained large stones, but no indication of fire, were probably used to store fermented breadfruit, although they may have served as caches for other goods as well.

Several of the boulders that protruded above the dirt surface of the floor could have served as seats (Fig. 17b, No. 6). The remainder were probably covered by a thick carpet of grass and mats. Two single slabs (Fig. 17b, No. 8) set upright in the northeast side of the house probably mark some special position, although an over-all height of 1 foot precludes their functioning as backrests. The double slabs (Fig. 17b, No. 9) were lower than the single slabs; at least in one case they were set between a double house post. Their function is also unknown.

Except where a rock interferes, there were six post-holes around each end of the house. Two additional post-holes were on the straight portion of the south wall, but on the north side, which faced the paved court, only one was observed. The ridgepole was supported by four

main center poles on the midline of the house. Combining the evidence that center poles were used in both periods with the supporting descriptions of most of the early observers, we can conclude that in the Windward Islands, at least, center posts in the house were not superseded by king posts until the time of European contact. Handy's contention (1932, 13) that, before the contact period in the Leeward Islands, center poles were replaced by king posts set on top of massive tie beams and supported by the side posts has yet to be demonstrated archeologically.

With one exception, all the post-holes of the later period were deep and bore evidence of the frequent use of impacted stones for pole stabilization. The diameters of the original post-holes ranged between 8 inches and 12 inches; their depth varied between 13 inches and 18 inches. One post-hole (Fig. 17b, No. 10) 7 inches in diameter and 8 inches deep, is believed to be the hole that held the *fata*, as it failed to fit into the pattern of the house supports, was smaller, and its position was near the center of the room as described by Ellis (1833, Vol. 1, 155). Its function is discussed above (p. 168).

#### HOUSE B

Figure 18

The early period at House B includes an oven

(Fig. 18a, No. 4) and a fire pit (Fig. 18a, No. 3), both clearly earlier than the rectangular hut. Three storage pits (Fig. 18a, No. 7) and a breadfruit pit (Fig. 18a, No. 5) were, on available evidence, also of this period.

Deciding which of the post-holes belongs to this early period is a more difficult task. We have resolved this doubt by assigning to the later house the minimum number of post-holes which, by association with the walls, would be required to support its roof. The remainder have been placed with the remains from the earlier period. Without further excavation it is impossible to know whether they define a specific building type.

In the later period, House B, like House A, was outlined in curbstones, with the floor at or near the surface (Pl. 21). It also included a fire pit (Fig. 18b, No. 3) and another small storage pit (Fig. 18b, No. 5). The house was 9 feet by 16 feet, smaller than most of the ordinary household structures.

Side poles supported the two long walls. The side facing the court was probably open; the remains of a badly disturbed pavement adjoined it. In the rear a jog apparently served as a door in an otherwise enclosed wall. Whether there were only two center poles at each end, as shown, or a third in the center, is not clear. One post-hole, now assigned to the earlier period, could with equal justification be assigned here.

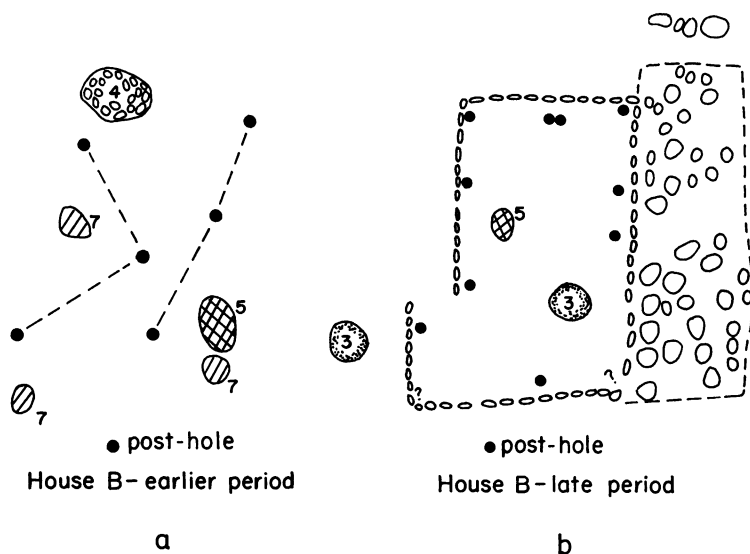


FIG. 18. Detailed plans of House B at two periods. Features from Fig. 16 assigned as follows: a. Earlier period. b. Later period.

Pavement C (Fig. 16), the large pavement in the court in front of House A, belongs with the later period. Twenty-four by 40 feet, it was well laid, except where stone had been borrowed from the southeast corner. It was one of the largest separate pavements, set flush with the ground, found in the valley. Other pavements of this size or larger were raised, except where associated with community houses.

#### ARTIFACTS

Excavations produced only a meager artifact collection: portions of two adzes, an adze-sharpening stone, a flake tool, and a possible polishing stone.

Although broken, the adze, from the first 6 inches of fill in the southeast end of the house, has sufficient diagnostic features for it to be identified as a Duff Type 3A (Duff, 1956, 170 ff.), in the style typical of the Society Islands. The cross-section at the shoulder is triangular, apex downward; the face of the blade is rectangular and polished. A small portion of the tang shows the same triangular cross-section as Duff's Type 3A.

The second adze, from a pit in the northwest corner of the rectangular hut but belonging to the early period, is more difficult to classify. The central portion of the blade was triangular or subtriangular. The base, however, is flat and polished and forms an angle of 44 or 45 degrees with the bevel, in contrast to the incurving or hollow base typical of the common Type-4A form illustrated by Duff (1956, 178 ff.) for the Society Islands. It is of the same style as the adze (Fig. 21a) described below, which was taken from a twelfth- or thirteenth-century context in the Te Amaama Site. The context in which the illustrated specimen was found, in the early period of Site ScMf 4, suggests a similar date.

A blade-shaped flake 65 mm. long, struck from dense basalt, exhibits fractures along both edges, especially noticeable at the narrower end, which may be the result of usage. The blade is slightly curved longitudinally; the narrower end would have served admirably for boring wood. It was found in the middle of House A along the north wall, on the surface associated with the earlier period.

A rectangular block of stone with polished surfaces could have served as a rubbing agent, although we are inclined to believe the rounded

edges and polished surfaces are the result of water rolling.

A large block of very fine-grained igneous rock situated at the middle or the northwest end of House A proved, on examination, to be a grinding stone. As it was partially exposed, it should probably be associated with the later period. It is 30.3 cm. by 23.2 cm. and 7.1 cm. to 9.3 cm. thick; the shape is irregular. The stone had not been dressed; only the upper surface had been modified by continual grinding of stone objects across its surface. This grinding produced a large central trough, about 2 cm. deep, that covered most of that face. One edge, however, retains a small section of an older polished face, giving the distinct impression that this stone was broken from an originally larger grinding stone.

#### MIDDEN

If the artifact collection be considered meager, the midden contents were more so. Compared with the situation in coastal sites, the absence of shell and bone was particularly striking. One well-decomposed *Turbo* shell and one pig tooth that had been in an oven were recovered from House A. Portions of six well-decomposed *Turbo* shells were found in the rectangular hut, which yielded neither bone nor teeth. Five unused basalt flakes from House A and one from House B constituted the remainder of the midden material.

#### ETHNOHISTORIC DESCRIPTIONS

The ethnographic record against which we can project the archeological data provides fairly full descriptions of Society Island residences. The earliest explorers identify two principal house forms observed in Me'etia and Tahiti at the time of contact. One was rectangular, the other oval. According to Ellis (1833, Vol. 1, 142), they constituted "the usual forms of their permanent habitations." In addition, he and Handy (1932, 3) both listed a number of specialized and temporary structures that were less common.

The rectangular *haupape* served as the ordinary sleeping house and household residence. The following dimensions are given for those on Me'etia: length, 22 feet to 27 feet; width, 11 feet to 14 feet; height at the center, 10 feet. The side walls, 6 feet high, were open; the floor was covered with dry grass (Boenechea in Corney,

1913-1918, Vol. 1, 294-295). Almost identical dimensions and descriptions are given for the most common dwelling form in Tahiti. The middle-sized dwelling of this type was 24 feet long, 11 feet wide, and  $8\frac{1}{2}$  feet high at the center poles. Normally, the pandanus-thatched roof was supported by three rows of pillars; the sides of the house, standing  $3\frac{1}{2}$  feet at the eaves, were left open; the floor was covered with grass (Beaglehole, 1962, 340; 1955, cciv-ccviii, 128 ff.). The dimensions given by George Forster (1777, 456-457) are: length, 15 feet to 20 feet; width, 10 feet to 15 feet, with a middle row of poles 8 feet to 10 feet high.

Evidence for the existence of similar houses in Mo'orea was obtained from a survey of ruins in the 'Opunohu Valley (Green, 1961a, 200). Of 42 houses sufficiently well outlined by curbstones to be classified as rectangular, none exceeded by any significant measurement the dimensions given above for Tahiti and Me'etia. Some smaller-sized houses occur in contexts suggesting that they served as specialized structures in religious complexes, or as temporary shelters or sheds, but others fit nicely in the category of ordinary residences around which the household centered. An upper limit of 15 feet by 30 feet seems, on the present evidence, to define the measurements of this class in the O'punohu Valley.

The *fare pote'e* constitute the second form of house. Both in the ethnographic literature and in the archeological record, they exhibit a much greater range in size than the *haupape*. Their function is equally broad. Ellis (1833, Vol. 1, 142) identified the *pote'e* as "the most common form of the chiefs' houses." It consisted basically of a version of the rectangular house to which rounded ends, *pote'e*, have been added (Handy, 1932, 12). Larger versions of this form served as assembly houses for a number of community functions.

Bonacorsi (Corney, 1913-1918, Vol. 2, 56) identified the oval form as the larger type of Tahitian house, that in which crowds of people gathered. He also noted that the homes of *ari'i* were better built, but did not specify the details in which they excelled. Early observers gave a fairly wide range of dimensions, most of them for extremely large houses. Although, on their part, there was doubtless some bias in favor of describing the larger or more dramatic houses observed, there are also good political

reasons (p. 172) why these observers saw and were entertained in the larger of these buildings.

The dimensions that we have been able to cull from the literature are presented in Tables 2 and 3 and summarized here. Over-all dimensions of the house plan range between 140 feet and 397 feet in length and 28.5 feet to 60 feet in width. A row of nine to 20 center poles, from 16 feet to 30 feet high, supported the ridge of the roof, while the sides rested on a larger number of poles between 10 feet and 12 feet high. These dimensions characterize the larger and more important assembly houses of the pre-missionary period described by early observers. Most, if not all, of them refer to houses on the main island of Tahiti. Ellis (1883, Vol. 1, 142) reported that such houses were erected only for leading chiefs. Wilson (1799, 193) mentioned a smaller house, only 100 feet long, that belonged to a chief. The native house built for Bligh (1920, 126; Wilson, 1799, 60) was 48 feet by 108 feet, with four center poles 18 feet high and sides 9 feet high. Turnbull (1812, 355) described the houses of great chiefs as oval in plan, with from three to five center poles, according to the size of the house, and sides 6 feet to 7 feet high. It is doubtless true that residences of other than leading chiefs were of the same size or smaller. A house of a Tahitian *ari'i* with a small walled courtyard of about this size is illustrated in one of Sydney Parkinson's sketches (Beaglehole, 1955, Fig. 30). The only small *fare pote'e* of a size comparable to the largest of those in the 'Opunohu Valley is one described in detail by Davies in 1809 (Newbury, 1961, 127-128). This was not a community house or that of a lesser ranking chief, but a newly built god's house, 28 feet by 56 feet, observed in Huahine.

Later observers, such as Wilkes, Melville, and Tyerman and Bennet, described smaller houses, dimensions of 20 feet by 50 feet or 60 feet being common. According to Baessler (1900, 18), they range in size from those with scarcely enough room for a family up to those of a length of 45 meters. One of Pomare II's residences was only 40 feet by 100 feet when Tyerman and Bennet (1831, Vol. 1, 61) visited it. Ellis (1833, Vol. 1, 142) explained this diminution in size of the house as resulting from a decrease in population. He commented that, even after his arrival in 1817, several houses 100 feet long were still extant. However, probably

TABLE 2  
DIMENSIONS (IN FEET) OF ROUND-ENDED HOUSES MENTIONED IN THE ETHNOHISTORIC LITERATURE

Width	Length	Observer or Source
48	397	Wilson, 1799, 210 f.; Ellis, 1833, Vol. 1, 142
42	327	Wallis, 1773, 462
—	50–100 <sup>a</sup>	Mühlmann, 1955, 52
—	180–300	Henry, 1928, 242
—	83 <sup>b</sup>	Maximo <i>in</i> Corney, 1913–1918, Vol. 3, 171
60	240	Henry, 1928, 242
45	210	Tyerman and Bennet, 1831, Vol. 1, 113
30	200	Beaglehole, 1955, 129
45	186	Tobin, MS, 144
28.5	162	Beaglehole, 1962, 341
—	140	Wilson, 1799, 206; Ellis, 1833, Vol. 1, 142
48	108	Wilson, 1799, 60; Bligh, 1920, 126
40	100	Tyerman and Bennet, 1831, Vol. 1, 61
—	100	Wilson, 1799, 193; Ellis, 1833, Vol. 1, 142
28	56	Newbury, 1961, 128, footnote
20	50–60	Wilkes, 1845, Vol. 2, 21
—	50	Melville, 1861, 285

<sup>a</sup> Figures given in meters.

<sup>b</sup> Figure given in paces.

other factors in addition to population size are involved. In the survey of the 'Opunohu Valley, Mo'orea, for example, we found that none of the houses attained anything like the size range of the large houses described for Tahiti, and only the largest in the sample reach the dimensions given by Melville and Wilkes (Table 4).

This explanation, we believe, is that in the Windward Islands these extremely large houses are probably a Tahitian phenomenon, correlated with the rather late struggle between

leading chiefs for political ascendancy over large portions of the island, a struggle intensified with the coming of Europeans. The new, larger sociopolitical concentrations required, of course, new, larger assembly houses, structures capable of accommodating the population of several districts. It is quite natural that the Europeans would have seen, been entertained in, and have described these houses. On the other hand, in the 'Opunohu Valley political dominance was exercised from the coast and

TABLE 3  
NUMBER AND HEIGHT (IN FEET) OF POLES IN ROUND-ENDED HOUSES  
MENTIONED IN THE ETHNOHISTORIC LITERATURE

Center Poles		Side Poles		Observer or Source
Number	Height	Number	Height	
14	30	39	12	Wallis, 1773, 462
20	21	124	10	Wilson, 1799, 210 f.
9	16	72	8	Tobin, MS, 144
—	16–20	—	—	George Forster, 1777, 456
4	18	—	9	Wilson, 1799, 60
—	20	—	—	Beaglehole, 1955, 129
—	18	—	—	Beaglehole, 1962, 341
9	—	70	8	Tyerman and Bennet, 1831, Vol. 1, 62, 113
3–5	—	—	6–7	Turnbull, 1812, 355
2–3	—	32	—	Newbury, 1961, 128, footnote

TABLE 4  
ROUND-ENDED HOUSES IN THE 'OPUNOHU VALLEY, MO'OREA

Site Number	Section of Valley	Dimensions (in Feet)		Pavements			Associated Structures	
		Width	Length	None	Small and Attached to House	Large and Separate from House	Rectangular House	<i>Marae</i>
ScMo 124	Eastern	?	?	x	—	—	—	—
ScMo 71	Western	10	20-25	x	—	—	—	—
ScMo 114A	Eastern	8-10	20-25	x	—	—	—	—
ScMo 59	Western	12	25-30	x	—	—	—	—
ScMo 98A	Western	12-14	22-25?	x	—	—	—	—
ScMo 115E	Eastern	13	26-29	x	—	—	—	—
ScMo 136	Eastern	17	28	x	—	—	—	—
ScMo 15K	Western	15	30-35	—	?	—	—	—
ScMo 19D	Eastern	15	30-35	—	x	—	—	—
ScMo 162	Eastern	15	32-37	—	x	—	—	—
ScMo 119G	Eastern <sup>a</sup>	18	35	—	x	x	x	x
ScMo 178	Eastern	18	37	—	x	—	—	—
ScMo 187A	Eastern <sup>a</sup>	17	34-38	—	x	—	x	?
ScMo 164A	Eastern	18	38-42	—	x	—	—	—
ScMo 168A	Eastern	18	40-42	—	x	—	—	—
ScMo 169A	Eastern	20	40-42	—	x	—	—	—
ScMo 170	Eastern	16-18	42	—	x	—	—	—
ScMo 167	Eastern	18	43	x <sup>b</sup>	—	—	—	x
ScMo 4	Western <sup>a</sup>	21	43	—	x	x	x	—
ScMo 120	Eastern <sup>a</sup>	18	45	—	—	x	—	x
ScMo 158D	Eastern <sup>a</sup>	27	56	—	x	x	?	x
ScMo 103C	Eastern <sup>a</sup>	26	66	—	—	x	x	x

<sup>a</sup> Sites identified as probable assembly houses.

<sup>b</sup> Large, well-built, dirt-filled terrace to one side.

local power was confined to the descent line residing in a portion of the valley, and the need for extremely large assembly houses never arose, so that the archeological evidence for them is not to be expected.

The large assembly or community houses served a variety of functions. Cook (Beaglehole, 1955, 129) observed that there were two or three of these larger houses in every district and commented that they were "not only built for the accommodation of the principal people but common to all the inhabitants of that district and raised and kept by their joint labor." Banks (Beaglehole, 1962, 134) noted that these large structures also probably served for meeting houses, for the reception of visitors of consequence, as well as for dwellings of the most important people. Ellis (1833, Vol. 1, 142) stated that these very large houses served not only the leading chiefs but also their very

numerous retinue. Most of the early observers at one time or another witnessed *arioi* dances inside these houses and commented on the numbers of people who spent the night in them in dancing and revelry. That the *arioi* houses served as guest houses for the entertainment of important visitors was confirmed by Mühlmann's studies (1955, 52, 85).

Additional activities associated with these houses took place on an adjoining courtyard, usually surrounded by an enclosing fence constructed of bamboo, reeds, and *purau*, between 1½ feet and 4 feet high. Ellis (1833, Vol. 1, 143), commenting on these courtyards, wrote that "... every chief of rank, or person of what in Tahiti would be termed respectability, has an enclosure round his dwelling, leaving a space of ten or twenty feet width withinside. The court is often kept clean, sometimes spread over with dry grass, but generally covered with black



basaltic pebbles, or *anaana*, beautiful white fragments of coral." On one of these enclosed courtyards Banks (Beaglehole, 1962, 272) and Cook (Beaglehole, 1955, 90) observed wrestling matches, and in front of one of the largest of these houses, J. R. Forster (1778, 325) saw the "king" sitting cross-legged in the middle of an enclosed area 20 yards by 30 yards in size. Turnbull (1812, 356) noted that in the yard there were also sheds and smaller huts which he believed served as a kind of office for attendants and menial servants.

Handy (1932, 35) specified that the house used for the performance of the dramatic dance (*hiva*) was a special form, but it seems more likely that this was an extension of the use of the community house. Wilson (1799, 370), who observed a dance, described the house as open at the end and front, the back being screened by coconut leaf matting. The dancers performed in front of the house on a mat-covered court enclosed by a railing a foot high. Plate 28 in the atlas of Cook's last voyage, entitled "A Dance at Otaheite," illustrates a mat-covered court in front of a large round-ended house. The side wall facing the court is open, but the rounded ends are enclosed by cane or bamboo walls. The musicians play within the house while the dancers perform on the court in front of it (Handy, 1930, Pl. 4A). The most detailed description of the setting for a *hiva* seen on Huahine, however, is that by J. R. Forster (1778, 398 ff.):

The place where it was performed was an area about twenty-five yards long and ten wide, enclosed between two houses which stood parallel to each other. The one was a spacious building, capable of containing a great multitude of spectators, but the other was only a narrow hut, which was supported on a row of posts and open toward the area, but perfectly closed up with reeds and mats on the opposite sides, one corner of which was walled on all sides, and this was the dressing room of the performers. The whole area was spread with three large mats of the best workmanship, striped with black on the edges. In the open part of the hut we saw three drums of different sizes.

In summary, it is clear that one or more of these large houses, with its adjoining courtyard and probably smaller surrounding buildings, served its ranking member as a focal point for the more secular activities of the community or district, whereas the larger *marae* were re-

served for sacred activities. The smaller houses of the same form, usually with a courtyard, but lacking the interior space or separate area suitable for a large assemblage and infrequently mentioned by the early observers, probably served as residences for other high-ranking members of the community or district.

## INTERPRETATION

With this summary of the *pote'e* form of house in the ethnohistoric literature, it becomes possible to extend our interpretation of the results of the survey in the 'Opunohu Valley beyond the limits permitted by archeology. It becomes possible also to identify the various features at Site ScMo 4 with some precision.

The preliminary survey indicates that settlement followed the natural division of the valley into two unequal portions, each of which now has a separate name (Green, 1961a, 169). The western section still bears the ancient name of one of the eight *mata'eina'a* (ramified descent line), Amehiti, that traditionally inhabited the area, but the name for the eastern section appears to have changed. Anciently it belonged to another of the eight *mata'eina'a*, the Tupaururu (pp. 223-224). The survey data clearly uphold this division, indicating, as they do, two major areas of settlement. The more densely settled area on the eastern side was once the territory of the Atiro'o, one of the strongest descent groups in Mo'orea prior to its defeat by Ha'apiti. Even in Cook's time it was large and strong enough to repulse an attack from Tahiti (Adams, 1947, 4 ff.). It is also evident from the complex *marae* and numerous specialized structures within Tupaururu territory that people of all ranks, from *ari'i*, *ra'atira*, and *aito* (chiefs, subchiefs, and warriors) to *manahune* (commoners) were in residence (Green, 1961a, 170).

Of the 21 round-ended house remains in the valley definitely identifiable from the curb-stones set in the ground, five occurred in the Amehiti section of the valley. The remainder were scattered throughout the center of Tupaururu (Table 4).

Only a stone terrace retaining wall was associated with three of the five structures in Amehiti. These three structures, ScMo 59, 79, and 98A, were situated among settlements scattered along the smaller valleys that radiate from the central cluster around the confluence of the streams flowing from each of these val-

leys. The remaining two structures were within several hundred yards of each other, near the confluence of these streams, and thus within the main area of settlement. At ScMo 15K, only half of the house was defined by curbstones, whereas a very small section of disturbed pavement lay off to one side of the undefined end. However, neither the size of the house nor its setting in comparison with other structures suggests that it ever served as much more than a residence for a ranking member of the community.

Thus the round-ended house at the excavated site of ScMo 4 remains as the only building of significantly large size in Amehiti territory. It is also associated with a large separate pavement and smaller rectangular building, making it the logical candidate for the community house. Except for the placement of the small rectangular dressing hut at the end of the pavement, it fits well into Forster's description of the *hiva* dance house. In the context of the Amehiti district, it is the largest centrally situated secular structure.

A second site (ScMo 15J) consisted of a large, rectangular pavement. At one side was an artificially flattened area in which the remains of a large building were partially outlined by curbstones. A smaller rectangular house adjoins it. The complex may represent another assembly house, but no final interpretation is possible without excavation.

On traditional grounds and because of the presence of one, and perhaps two, community houses, it is suggested that we are dealing with a single descent group ramified into one or two sub-lines. This conclusion is supported by additional evidence. Among the numerous wet terraces, only one formed an extensive system into which water was diverted from a permanent stream. This terrace was on the opposite side of the central cluster above the confluence of the streams and would, on the basis of its size, have required the attention of a number of households. Among the *marae*, again there were only two of the more complex type: one with dressed stone in the *ahu*, the other with an *ahu* in which coral facing was used. The remainder were of the least complex inland type, presumably associated with families or households (Green, 1961a, 171).

On the existing evidence, we believe an earlier community house of slightly smaller propor-

tions occupied the same position at Site ScMo 4 in the late thirteenth century. It suggests that a smaller population, representing a single descent line, was already occupying the valley at that time.

The situation in the center of Tupauruuru was not originally so well defined as in Amehiti, but additional excavation has allowed us to clarify what is a more complicated record. The survey data again revealed three groups of *fare pote'e* (Table 4). The first four structures lay at the small end of the size range and lacked any associated features to distinguish them further. A second group of seven intermediate-sized *fare pote'e* had small pavements either attached to, or directly adjoining, the curbs outlining the wall and were larger than ordinary rectangular sleeping houses. From their settings and lack of direct association with other types of structures, it would appear that they belonged to high-ranking, though not the highest-ranking, individuals. From the various specialized structures and *marae* in Tupauruuru but not appearing in the Amehiti portion of the valley we know that people of such rank resided here, so should expect to identify their residences as well.<sup>1</sup> Finally, three of the sites were tentatively identified as community houses on the basis of survey data. With further investigation two others tentatively assigned to this group have now been shown to belong to it. One (ScMo 187A) had a large pavement, but adjoined the house wall so closely that it was not classed as separate. However, with the excavation of ScMo 103C, where the large pavement and house wall also adjoined, size in relationship to house, not simply separateness, was seen to be the significant factor. The other, of course, was ScMo 103C, which was not originally listed in Table 4 because the presence of the round-ended house and its dimensions were doubtful and could be determined only by excavation. This one, as the Davidson report shows (pp. 119-139), proved it to be a site very similar indeed to ScMo 4.

<sup>1</sup> A single large house (ScMo 167) lacks the usual pavement. However, it is associated with the only *marae* of Type III B in the settlement and as such parallels the situation at the *marae* of the same kind at Pare, described by Tobin (MS), where a round-ended house of undetermined function was noted next to it. These houses are, we believe, one of the god's or "priest's" houses so vividly described by Davies (Newbury, 1961, 127-128).

The presence of five *fare pote'e* assembly houses, and the greater number and range of smaller structures serving as residences of other *ari'i*, *ra'atira*, and similar ranks of Tahitian society, suggest that in Tupauruuru we are dealing with a larger population which is socially more stratified than that in Amehiti. The distribution of these houses in Tupauruuru and their close association with types of *marae* and specialized structures encountered only in this section of the valley (see Table 13) suggest that the local descent group was also segmented. In

size, however, the range represented by these houses and those described in the ethnohistoric literature contrasts strikingly, reflecting, we believe, a marked difference in the political position of the ranking members of this settlement in relation to those on the coast who dominated them. Of course, the size difference as well marks the greater degree to which attempts at such political consolidation had progressed on the main island of Tahiti in the last half of the eighteenth century.

# DESCRIPTION OF TEST EXCAVATIONS IN COASTAL SITES

ROY A. RAPPAPORT AND ANN RAPPAPORT

## MATA'IRI'I (ScMt 1)

MATA'IRI'I IS ON THE eastern shore of the mouth of 'Opunohu Bay. It is convenient to a major pass through the barrier reef and to the 'Opunohu Valley. The coastal flat at this point is about 500 yards wide. Toward its rear, two small house platforms and a stone alignment were observed, and, upon the surface, members of the 1960 Bishop Museum Expedition (Emory, 1962, 119) discovered several shell artifacts. At one location on the beach, differential erosion had left two protrusions, 5 feet to 7 feet long, projecting from the general line of the bank. Both seemed to contain a deep midden deposit; in one, the remains of an earth oven were exposed. Excavation of both of these projections was undertaken, involving portions of two 9-by-9-foot squares.

The best stratigraphy was found in Square A1, which contained the earth oven:

Bed 5, 4 inches to 6 inches thick: a thin layer of clay, mixed with gravel from the adjacent modern road.

Bed 4, 4 inches to 6 inches thick: a layer of sterile white beach sand.

Bed 3, 24 inches to 30 inches: a midden layer of dark gray to almost black sand, with scattered charcoal. This layer was badly disturbed by the burrowing of land crabs.

Bed 2: mottled white and gray sand, the mottling apparently caused by mixture (by land crabs) with the overlying cultural layer.

Bed 1: a brown to gray beach sand with no signs of cultural occupation.

## PORTABLE ARTIFACTS

A crude stone pounder was discovered in Bed 2 in Square C1. No other definitely artifactual material was recovered from this site.

## FEATURES

The earth oven in Square A1 was very large, 5 feet to 6 feet in diameter. Although it lay mainly in Bed 3 in the northwest quadrant, it extended at least 14 inches to 20 inches deeper. Excavation ceased at these depths.

## CHARCOAL

It was impossible to collect significant samples.

## SHELL AND BONE

All 10 types of "common shell" (Table 7), plus representatives of 22 other genera, were encountered at this site. A fragment of pig found in Layer B of Square C1 was the only mammal bone discovered. Fish bone was absent, as were any evidences of post-contact materials.

Layer C contained the greatest quantity of shell by weight (Table 7). However, the evidence of disturbance by land crabs was so extensive that any inference drawn from this fact would be unwarranted.

No column sample was taken at this site.

## HAUITI (ScMf 2)

The land traditionally called Hauiti lies on the coastal flat at the eastern end of the village of Papeto'ai, just within the mouth of 'Opunohu Bay. At this point the flat is unusually narrow, being no more than 150 yards wide. The mean elevation of the site is about 4 feet above sea level. Hauiti is convenient to an important pass through the barrier reef, and landing by outrigger is easy and safe.

Much of the present site is covered by coconut trees with, near the water, some *purau* (*Hibiscus tiliaceus*). That portion of the site not given over to coconut cultivation was covered by low underbrush; a fair amount of acacia was also present.

The surface soil over most of the site was basically coarse sand, very much darkened by organic materials. The surface of the entire site was covered with broken shell, concentration being densest within 50 feet of the sea. Seven pieces of worked pearl shell, four pieces of bonito lure, and a stone bait sinker were found on the surface close to the sea.

A great concentration of basalt flakes was observed between 150 feet and 200 feet from the

sea. Some of these, obviously fragments of stone adzes, were polished on one or more surfaces.

The site has been much disturbed by animals, weather, and man. The area is awash during occasional severe storms (rarely in recent times, but probably more frequently in the past before the ground level was covered by the midden build-up). Land crabs, in centuries of burrowing, have churned through every cubic inch of the surface not occupied by large stone or coral objects, and generations of pigs have rooted over it.

Seven squares, related to one another on a large grid, were excavated at this site. The squares were 12 feet by 12 feet, including balks of  $1\frac{1}{2}$  feet. Initially, all the balks were left standing, leaving, therefore, excavations measuring 9 feet by 9 feet. The actual digging proceeded by quadrants of  $4\frac{1}{2}$  feet. All the quadrants were excavated in four squares; three quadrants were excavated in one square. In the remaining two squares, farthest from the sea, one and two quadrants were excavated. Two intervening balks were finally removed. The particular squares selected for digging involved a consideration of surface indications and distance from the sea. In each square, excavation proceeded either to sterile ground or to the area below the present water level where digging became impossible. Sterile ground consisted either of white coralline sand or the concretized coral limestone that most frequently underlies the white coralline sand but occasionally lies directly under the darker midden layer. The water table varied from 36 inches to 40 inches below the surface.

Inasmuch as no stratigraphy was encountered, excavation proceeded by arbitrary 6-inch levels. Selected midden samples were retained from all the squares. Square-foot column samples were taken, 1 foot by 1 foot, from six of the seven squares. Quarter-inch mesh screen was used for this purpose, except in situations near or below the water level where it was necessary to wash the thick muck through a  $\frac{3}{8}$ -inch mesh.

#### PORTABLE ARTIFACTS

Sixteen fishhook fragments, 102 pieces of cut pearl, 52 basalt flake knives, two stone adzes, and 24 objects of European manufacture were recovered from the excavations. Additional sur-

face finds included two fishhooks, seven pieces of cut pearl, six stone flakes, one stone bait sinker, and one adze.

Because of the completely disturbed nature of the site, the depths from which these objects were recovered are not significant. The adzes, which are too heavy to have been moved by land crabs, may prove to be an exception. An adze (85-2288<sup>1</sup>) was discovered 29 inches below datum in the northeast quadrant of Square X50. A very small chisel (85-2289) was found at 24 inches below datum in the southeast quadrant of Square V54.

#### FEATURES

In Square V54, indications of two house posts were discovered in the sterile sand at the base of the midden layer, at 18 inches below datum. These were sectioned and diagrammed. In addition, a small, slightly belled pit, perhaps used for storage, was uncovered in the underlying coral limestone of the same square at a depth of 18 inches and which attained a depth of 40 inches.

#### CHARCOAL AND MIDDEN

Forty-five charcoal samples were collected. Of these, Nos. 23, 24, and 25 from the bottom of Square X49 may be assumed to be from the basal deposition. No dates from the site have yet been run, however.

Analysis of the midden from four of seven squares at Hauiti was undertaken in the laboratory. These were R48, X50, Y50, and V54.

Square R48, farthest from the sea, was situated about 150 feet inland. Despite evidence of the activities of land crabs, the soil in this square was quite compacted, and consequently digging was difficult. The only bone found, pig, came from the surface of the square; therefore it cannot be assumed to be old. Twenty genera of shells were found in addition to the "common shells." However, several genera of common shells were absent. These included *Terebra*, *Pteria*, and *Mytilus*. This last is noteworthy, inasmuch as it was absent from no other site. Glass was found at 0 to 6 inches and at 6 inches to 12 inches below the surface; glass and china

<sup>1</sup> All artifact catalogue numbers bearing the numeral 85 refer to the catalogue for archeology of the Pacific of the Department of Anthropology of the American Museum of Natural History.

were observed on the surface. The only artifacts present, four basalt chips, three showing signs of having been broken from a worked implement, complete the inventory. The proportion of midden to stone and coral by weight, shown in Table 6, is consistent with the ratios prevailing in the other coastal excavations.

Square X50, entirely within 30 feet from the sea, showed a wider range of midden material than did R48. Mammal and fish bones in very small quantities were encountered at each level. Of the bone, that of pig occurred most frequently; dog bone and a small portion of a rat cranium were also found. Most of the mammal bone, however, was so fragmentary that identification was impossible. Fish were represented principally by part of or whole palates.

Twenty-three genera, in addition to nine of the 10 types of common shell, were found (Table 7). *Terebra* was missing. As *Terebra* was found in the sample from the adjacent Square Y50, however, little significance can be attached to its absence here.

European material was found from 0 to 12 inches, at 28 inches, and as deep as 36 inches to 42 inches below the surface. Five worked and several unworked basalt flakes were also found. The ratio of midden to stone and coral by weight did not deviate from the expected range for coastal sites. At the level of from 26 inches to 30 inches, the percentage of midden increased slightly to 13 per cent, but, because of the extreme disturbance of the site, the significance of this increase cannot be assessed.

Square Y50, contiguous to Square X50 on its seaward margin, had the same midden composition as the square adjacent to it. Again, bone was found throughout, except in the layer of from 0 to 6 inches. Fish, pig, and possibly dog bones were also identified. One bird bone was found in the 26-inch to 32-inch level. Half a pig mandible lay at 12 inches to 18 inches below the surface. The full complement of common shells was recovered; in addition, 23 genera of less frequent types were identified (Table 7). Again, modern materials such as bottle glass and metal were found throughout, except at the level of from 18 inches to 24 inches. Worked stone flakes were found at the top and bottom levels of the square. As with Square X50, the ratio of midden and stone to coral in Square Y50 fell within the range found at the other coastal squares.

Square V54, approximately 75 feet inland, was an intermediate site in terms of proximity to the sea. It rises 6 inches to 12 inches higher in elevation than Square X50. The deposit is much shallower and contains less of a mixture of the black midden layer and white coral sand beneath it. Fish and mammal bones were found in all the layers, although in small quantities, and, where identifiable, the mammal bone proved to be that of pig. The full range of "common shells" (Table 7) was found, as well as 21 additional genera. European materials, such as china, glass, and metal, were found throughout, but in small quantities. However, the increase in the ration of midden to stone and coral in this square merits note (Table 6). The column sample separated the black midden material from the white underlying coralline sand. The two yielded 13 per cent and 11 per cent of midden to 87 per cent and 89 per cent of stone and coral, respectively. Thus, even the level of coral sand at this site contained a higher percentage of midden material than that at other shore sites.

#### VAIOHU'A (ScMf 3)

Vaiohu'a is about 500 yards west of Hauiti, in the direction of the center of the modern village of Papeto'ai. The coastal flat widens slightly at this point. The excavation was farther inland than any of those at Hauiti—perhaps 300 feet from the sea and about 20 feet inland from the road encircling the island. Elevation above sea level is approximately 6 feet. The site is not quite so convenient to the pass as Hauiti, but landing at the shore directly in front of it would present no problems.

In the immediate vicinity of the excavation, the surface was covered by coarse grass. The soil seemed to be a clay with considerable humus content; a little midden material littered the surface. The scarcity of midden material was attributed to the absence of land crabs, and it was hoped, therefore, that the deposit would be undisturbed.

The extent of the excavation was limited. Two  $4\frac{1}{2}$ -foot quadrants, plus one-third of an additional quadrant, and one  $4\frac{1}{2}$ -foot section of balk were excavated.

Excavation in arbitrary 6-inch levels was initiated. When natural strata were encountered, excavation was made by layer, with

midden bags being changed by 6-inch levels within the layers.

#### STRATIGRAPHY

Four midden-bearing layers were identified:

A: A sandy loam block running from the surface to a depth of 8 inches to 20 inches.

B1: Medium brown sand loam, generally 2 inches to 5 inches thick but somewhat thicker against the south wall of the southwest quadrant. This layer was not present in all portions of the excavation. The midden content was poorer than in Layer A.

B2: Chocolate brown sandy loam, generally 6 inches to 10 inches thick and somewhat more widely distributed than the overlying medium-brown layer. This layer was of a looser consistency than Layers A and B1.

C: Light-brown sand, generally 7 inches to 11 inches thick. This layer consists essentially of sand mixed with some loam and flecked with tiny bits of coral. The midden, almost devoid of shell, is composed almost entirely of tiny sea-urchin spines; some charcoal is also present. This layer extends to 44 inches below datum but it bears no midden material below 36 inches below datum. This seemed to be the bottom of cultural deposition. At 44 inches, a dirty white sand devoid of midden was encountered, and at 47 inches a compacted white sand, also sterile, was reached. Excavation was discontinued at 50 inches below datum.

#### PORTABLE ARTIFACTS

Three fishhook fragments, 14 pieces of cut pearl, six basalt flakes, and three European artifacts were recovered from this site. One fragment, of a simple hook (85-2127), was found at a depth of 16 inches below datum in Layer A in the northwest quadrant. Another is a simple fishhook (Fig. 19k) found at 25 inches in Layer C in the southwest quadrant and in close proximity to an earth oven in the southeast quadrant. The dating of this hook is discussed below. It may be assumed that this hook is contemporaneous with the earth oven and that the others are more recent.

#### FEATURES

1. At a mean depth of 19 inches to their tops and 24 inches to their bases, that is, with their bases in Layer B2, a stone alignment running approximately north to south was encountered.

About 1 foot from the west wall, this alignment was close to 7 feet long.

2. At a depth of 25 inches to its top and 30 inches to its base in Layer C, a post-hole, approximately 6 inches in diameter, was discovered.

3. In the south-central portion of the southwest quadrant, a peculiar semicircular pit, full of tiny sea-urchin spines, was encountered at 28 inches to 30 inches in Layer C. In the same layer another such pit was uncovered at 25 inches below datum in the southwest balk. The earth in both of these pits was extremely soft and slightly darker and grayer than in the surrounding areas.

4. An earth oven was uncovered in the western portion of the southeast quadrant. Its top was at 27 inches, and its base was 41 inches to 42 inches below datum. It rested on the sterile, dirty white sand layer underlying Layer C. A large sample of charcoal was taken from this feature.

#### CHARCOAL AND MIDDEN

Nineteen charcoal samples were taken from this site. One of these taken from the earth oven in Layer C, yielded a radiocarbon date of  $540 \pm 75$  before 1950 [Radiocarbon Code Number I(AMNH)-189].

The midden at Vaiohu'a was not rich but showed a significant difference from the disturbed squares of Hauiti in the relative absence of stone and coral. Its bone content was insignificant. Six grams of mammal bone were found around the earth oven at a depth of 28 inches to 35 inches (Table 7); 2 grams in addition were found elsewhere in Layer B2. A greater quantity of fish bones was present. Fourteen grams came from Layer A and 2 grams from Layer B2 from the same portion of the excavation as the 2 grams of mammal bone. Unfortunately, the mammal bone was not identifiable. Twenty-two genera of sea shells were found, and one of land snail and nine of the 10 common shells were present. Only *Terebra* was absent. The sea-urchin remains, however, were found only on the surface, in a very small quantity (less than  $\frac{1}{2}$  gram) in Layer C, and as very tiny spines which composed a high proportion of the soil in the pockets of Layer C, as noted above. The midden decreased in richness as it increased in depth.

European materials were encountered in



Layer A, as expected, except for one piece of glass found near the earth oven in Layer B2. We believe that it fell from the back dirt.

#### TA'AUROA (ScMf 4)

The property called Ta'auroa is adjacent to Vaiohu'a. The site selected for excavation, a post-contact house, was about 150 feet west and 50 feet inland from the excavation at Vaiohu'a. The site was covered with the rubble of the ruined house platform. Its outlines were not clearly distinguishable. However, some of the cut coral curbstones of the house itself were still in place. The surface soil was a humus-rich clay. There was no evidence of land-crab disturbance. Several pieces of steel-cut pearl shell and a cowrie-shell scraper were found on the surface.

Two 4½-foot squares were dug: one on the house platform, and one immediately in front of it. Excavation was initiated by arbitrary 6-inch levels which were modified, as at Vaiohu'a, when stratigraphy was encountered. The upper layer consisted of clay mixed with humus. A great many stones, evidently from the house platform, and fragments of lime plaster were also present in it. At 13 inches to 14 inches in the square dug in front of the platform, and at 18 inches to 20 inches in the platform itself, a chocolate-brown layer resembling Layer B2 in Vaiohu'a was encountered.

Neither square contained much material, either midden or artifactual, below the lowest stones at approximately 12 inches. The chocolate-brown layer was sterile. A test pit, carried down to 36 inches on the house platform, revealed no underlying cultural layer.

Portable artifacts were of European or post-contact manufacture. Bottle glass abounded. Several pearl buttons, a porcelain button, a clay pipestem, and three coins were also found. The coins were Vatican (1866), French (date illegible), and Latin American (1879).

No charcoal was collected.

The midden content of this house site suggests a post-contact occupation. The quantity of shell material found proved to be the poorest of any site dug; bone, however, was very common. Mammal bone, found throughout, was probably that of pig, although only a sample from the top level of C10 could be positively identified as such. Fish bones were found everywhere except at the bottom of Level C10. The heaviest concentrations of bone were found

from 10 inches to 14 inches below datum in Level C10 (the platform square) and at 2 inches to 8 inches below datum in Square D10 where 29 grams and 48 grams of fish and mammal bone were found, respectively.

Only four genera of common shells were present: *Turbo*, *Cypraea*, *Pteria*, and *Mytilus*, and but two other genera of seashells and one genus of land snails were found.

As is mentioned above (p. 180), a considerable amount of European material was also present, especially in the topmost layers.

#### TE AMAAMA (ScMf 5)

Te Amaama lay at the center of the modern village of Papeto'ai, where the school, the church, and the village dock are situated. Te Amaama has a long history as a habitation center. Taputapuatea, one of the most important *marae* on coastal Mo'orea, was situated here. A large upright, Turamorafea, connected with the *marae*, still stands (Emory, 1933, 107). This centrality is readily understood. As indicated by the presence of the village dock, landing is easy, although it is some distance to the pass. Further, Te Amaama is situated at the mouth of Fa'ato'ai Valley, which has been heavily settled since pre-contact times. A large, ever-flowing stream runs through the floor of this valley and meanders through Te Amaama before entering the lagoon.

Neither grass nor other low vegetation covered the surface, for the area serves as a schoolyard, churchyard, and general gathering place. The surface soil was very dark, and was essentially a hard-packed sand or loam with a very rich organic admixture. There was much broken shell material on the surface; several pieces of cut pearl, as well as some adze flakes, were collected.

Much land-crab activity is evident inasmuch as the mean elevation above sea level is less than 3 feet.

Two 9-foot squares were laid out in the large open area between the stream at the west and the road leading to the wharf on the east. Square 2 was approximately 250 feet inland from the lagoon shore and 50 feet from the stream. Square 1 was approximately 300 feet from the shore and 75 feet east of Square 2. The erection of the wharf contributed to the recent in-filling of this area, so that the present locations of the excavations are now farther from the shore.

Excavations proceeded by quadrants and by arbitrary levels of 6 inches. General midden samples were collected from each level; in addition, column samples, 1 foot by 1 foot, were taken. A  $\frac{1}{4}$ -inch mesh screen was used for the column samples.

Three quadrants were excavated in Square 1. In Square 2, all four quadrants were excavated. In both squares, the earth seemed generally to be a midden-bearing sand loam, very dark gray in color. In Square 1, this was replaced at depths of from  $26\frac{1}{2}$  inches to 36 inches by a brownish clay which proved to be sterile. Water-worn pebbles and boulders up to 1 foot in diameter were found throughout the square. It was concluded that these were laid down by an extinct meander of the present stream.

In Square 2, the dark-gray, midden-bearing sand continued to the depth of 42 inches, where a white coralline sand representing an ancient beach was encountered. Inasmuch as the water level was reached at 30 inches, the last 12 inches were dug under water. This was imperative because a large earth oven, first encountered at 27 inches, continued below the present water level, resting finally on the ancient beach at 42 inches.

#### PORTABLE ARTIFACTS

Square 1 yielded a fragmentary fishhook, 18 pieces of cut pearl, three basalt flakes, three articles of European manufacture, one stone *penu* type of pounder, one large auger-shell (*Terebra*) chisel, and one auger-shell gourd stopper.

Square 2 yielded four fishhook fragments, 26 pieces of cut pearl shell, two basalt flakes, one tanged adze butt, one fragment of an adze trapezoidal in cross-section, with its base narrower than the face, one large pearl-shell grater, and one large auger-shell chisel. The adze fragments, the pearl-shell grater, and the auger-shell chisel were found in the earth oven dated at  $760 \pm 80$  years ago. Because their size and weight were sufficient to preclude movement by land crabs, their situations may be assumed to correspond to the locus of their deposition. They quite certainly, then, can be dated by the earth oven.

#### CHARCOAL AND MIDDEN

Eighteen samples of charcoal were taken from Te Amaama. The most important of these

was taken under water at the base of the earth oven. This sample [I(AMNH)-188] yielded a date of  $760 \pm 80$  years ago.

A wider range of material was found in this site than in any excavated, except Mata'i Taria. Fish and mammal bones were found throughout; in two instances bird bone was encountered (Square 1, at the level from 0 to 6 inches and in that from 12 inches to 18 inches below the surface). Of the identifiable mammal bone, pig was the most frequent. In the earth oven described above, one pig jaw and two other mammal bones, probably pig, were found. These were assumed to be refuse from the oven. In addition, a very large bone, of either horse or ox, was found in the 0 to 6-inch level below datum. A vertebra from a large sea mammal was in the level below datum of 12 to 18 inches.

In addition to these 10 types of common shell, 29 additional genera were found (Table 7). *Turbo* was overwhelmingly the most common. *Tridacna*, *Conus*, and sea-urchin spines occurred next in proportion (by weight). Modern china and glass were found throughout the site, even at its lowest levels. This was not unexpected, given its central location in the modern village and the vigorous activity of the land crabs.

The midden composition of this site differs notably in the relatively large proportion of shell and bone to stone and coral (Table 6).

#### MATA'I TARIA (ScMf 6)

The land traditionally called Mata'i Taria borders the lagoon about 200 yards west of the church in Papeto'ai Village. At this point the coastal flat is more than 300 yards wide, and there is easy access to the open sea through the pass at the mouth of 'Opunohu Bay.

The site selected for excavation, about 75 feet from the coast, adjoins a cemetery of the European period. It was totally barren of grass or other low vegetal cover and is presently given over to the cultivation of coconuts. The soil was a very dry, fairly loose, light, grayish brown sand. Land-crab activity was very evident.

Although most of the surface remains in the cemetery were definitely post-contact, as exemplified by stone columns set in coralline concrete, local tradition places at least some of the burials in either immediately post-contact times or precisely at contact. Many people are said to have been buried here following a dis-

astrous epidemic. Because many are believed to have been buried in canoes, the location is still called Fare Va'a (the house, or place, of the canoe).

Two squares, 9 feet by 9 feet, were excavated completely. In addition, one 4  $\frac{1}{2}$ -foot quadrant of a third square was dug. Excavation was by quadrant. In the absence of any stratigraphy, it proceeded by 3-inch levels; general midden samples were collected by 6-inch levels. Columns, 1 foot by 1 foot, were also taken; a  $\frac{1}{4}$ -inch mesh screen was used. Excavation ceased at the low-water line, 49 inches below datum in Square A1, 42 inches below datum in Square B2. In the southeast quadrant of Square Z1 (directly adjacent to the southwest quadrant of Square A1), it was necessary to excavate to 46 inches.

#### PORTABLE ARTIFACTS

The artifact yield at Mata'i Taria was larger than that of any of the other excavations. Seventeen fragments of shell fishhooks, 54 pieces of cut shell, and four basalt flakes were recovered from the squares. Another fragmentary fishhook was found on the surface. Because of the extremely disturbed nature of the site, however, it was not possible to arrange these hooks in a satisfactory sequence.

#### CHARCOAL

No charcoal from undisturbed contexts was recovered. Samples of wood and bone from the canoe burial were taken, but because of their presumed recent origin have not been submitted for analysis.

#### FEATURES

In Square A1, with its top 8 inches to 9 inches below datum, a large pentagonal dressed upright stone was discovered. Its base was at 35 inches below datum. Its sides and top were dressed, but, when removed from its position, a series of cut marks were found on its base. It was not clear whether these cuts were made with a metal saw or a stone tool, although we are inclined to believe it was the latter.

Protruding 8 inches from the west wall, at 38 inches to 40 inches below datum in Square A1, directly below the upright stone, what seemed to be the prow of a canoe appeared. Square Z1

was excavated to expose more of this object which proved, indeed, to be a canoe that had been used as a coffin. Several pieces of cranium and long bones were recovered from the burial, as was a cut and polished portion of a pig femur, the only piece of worked bone found in Mo'orea by the expedition.

#### MIDDEN

The range of each type of material composing the midden was wider at this site than at any other dug in Papeto'ai. Both fish and mammal bones were present throughout. Identifiable mammal (other than human) bone proved to be mainly pig. In addition to the usual fragments, these mammalian remains included such large portions as a large tusk (24 inches to 30 inches below the surface) and half of a pig skull (6 inches to 12 inches below the surface). Ox (6 inches to 12 inches below the surface) and dog (12 inches to 18 inches below the surface) were also found. Bird bone occurred once at 18 inches to 24 inches below datum.

Considerable quantities of human bone were also found in the area above and around the canoe. Small bones and teeth were mixed randomly throughout the adjacent earth, and long bones were found either in the canoe or close by. The remains included:

- Part of the head of the right femur
- Acetabulum of the right pelvis
- Left femur
- Right femur
- Left tibia
- Right humerus (uncertain)
- Portions of the skull
- Molar
- Premolar
- Miscellaneous unidentifiable fragments

The range of shell was also considerable. All the common shells were present, with *Turbo* and *Tridacna* predominating by weight; 32 additional genera were found. Miscellaneous modern materials were also present throughout, including iron, copper, glass, and china.

From our column samples, the ratio of midden to stone and coral was found to fall within the range of the ratios of other coastal sites at Hauiti and Mata'iri'i.

# DESCRIPTIVE AND COMPARATIVE ANALYSIS OF PORTABLE ARTIFACTS RECOVERED FROM COASTAL EXCAVATIONS

ROY A. RAPPAPORT, ANN RAPPAPORT, AND ROGER C. GREEN

## PROCEDURE

BECAUSE MOST OF THE excavations were made in disturbed deposits, we omit the details of the depths and specific locations from which artifacts were recovered, except in cases in which such information is not misleading. The depths and location by site, square, and quadrant of all artifacts are, however, available in the field records deposited at the American Museum of Natural History.

## FISHING GEAR

### MATERIALS

The most striking aspect of the fishing gear both from the surface and from excavations is that it is entirely of shell. No bone fishing equipment, not even fragments of worked bone, were found. It is important to note also that the Bishop Museum Expedition of 1960, surveying throughout the Society Islands, obtained a collection that was, with one exception, limited to pearl shell (Emory, 1962, 119). This experience was in sharp contrast to expectations derived from the literature and from museum collections. Both Anell (1955) and Beasley (1928), working mainly with museum collections, stated that bonito points were generally made of animal bone, only occasionally of pearl shell or turtle carapace. Final judgment at this early stage of excavation is not possible. Further work may reveal fishing gear made of bone or turtle shell, but at this time there is no purely archeological evidence for such expectations.

The museum collections are, perhaps, dubious. We note that Suggs (1961b, 86) found only three bone points (about 1% of his collection) in the Marquesas where historical sources as well as museum collections give the impression that bone was commonly used in bonito rigs. The virtual absence of bone and the fact that Suggs's excavations brought to light a range of types bearing little resemblance to those found in museums led him to conclude that generalizations based on collections other than

those gathered through stratigraphic archeology is unwarranted. We find support for this conclusion in Anell (1955, 176):

According to Nordhoff, there is scarcely a single specimen in the European museums that would be regarded by a Tahitian fisherman as fit for actual use, a statement which may have a certain justification, inasmuch as none of the bigger museums possesses spinners [bonito lure hooks] corresponding to the enthusiastic judgment of early voyagers. The reason for this is that the natives have been unwilling to sell their inherited hooks to strangers: "An old and highly successful bonito hook is property almost beyond price, cherished not only for its utilitarian value, but because in the course of forty or fifty years it has acquired in the catching of countless fish a tremendous charge of mana."

Inasmuch as the few bonito points that have been recovered are made of shell, we tentatively suggest that these aged and priceless points were made of this material, whereas the lures provided to early travelers may have borne bone points because bone was less valuable, easier to work, and would fetch as good a price as shell. Further, tentative archeological evidence suggests the unimportance of bone. This is provided by the almost complete absence from the deposits of files of sea-urchin spines, used extensively for the working of bone in the Hawaiian Islands. This evidence is discussed below (p. 196).

From direct archeological evidence, we know that at least four varieties of shell were used in the manufacture of fishing gear. These include pearl shell, *Tridacna*, Conidae, and *Turbo*. One object, probably a fragment of an octopus lure, is of cowrie. Further, the use of a shell called *Pinna*, a large brittle clam, is evidenced in hooks collected and illustrated by Parkinson (1773, 77, Pl. 13).

Of 57 fragments of fishing gear, 49 were of pearl shell, three of *Turbo*, two of *Conus*, one probably of *Conus*, and two probably of *Tridacna*. As is mentioned above, cowrie is definitely represented by one specimen, probably a

fragment of an octopus lure. Pearl shell seems to be used for all types and parts of hooks. *Turbo* is limited to small and tiny one-piece hooks, and *Conus* is limited to "lure shanks" and chisels (pp. 193-194). What may be *Tridacna* was used for a point, probably for a bonito lure and a fragment of a lure shank (pp. 193-194).

It should be noted that Kenneth Emory of the Bernice P. Bishop Museum collected from the surface on Mo'orea an object of *Tridacna* shell that was probably used as a lure shank.

The position of pearl shell as the preferred material requires some comment. Unworked pearl shell was rarely found in Mo'orea, either in the excavations or on the surface. The Bishop Museum Expedition, in its extensive survey of the Tahitian coast, found almost none. Not only was the quantity small, but the fragments were also small. Such paucity contrasts strikingly with Green's results in Mangareva where pearl shell commonly composed 10 per cent to 20 per cent of the shell content of the midden (Green, MS).

The pearl mollusk is rare in the waters of the larger Windward Islands and, further, is unlikely to be cast ashore naturally. It can therefore be generally assumed that these fragments are the waste flakes of manufacturing activity, and their small size attests to the value placed on the material: it was too precious to be wasted. It is also possible that a considerable amount had to be imported. Some support for this suggestion can be found in the literature. Maude (1959, 56) cited Morrison (1935, 200-202) to the effect that iron left at Tahiti was being traded by way of Me'etia into the Tuamotus for pearls and pearl shell (see also Danielson, 1956, 53). Suggs (1961b, 184) believed that the Marquesas also traded with the Tuamotus for pearl shell during the Expansion and Classic periods. It is unlikely that this trade developed solely as a response to the European demand for pearl shell. In all probability an old and established trade was greatly stimulated by the introduction of highly prized iron trade goods. To relate this to the presence of equipment made of species of shell other than pearl, several possibilities present themselves. It may be that there was enough constant pressure on the meager and perhaps largely exotic pearl-shell supply to require its constant augmentation through the use of

more easily attainable material, or perhaps these other materials were substituted when, for some reason, the pearl-shell supply was cut off. We favor the latter of these two possibilities. If there were a constant need for supplementary materials, it is likely that more fishing gear made from them would be found. Further, it is likely that a strong bone-working tradition would have developed, as in Hawaii. If, however, the needs were sporadic, we cannot expect these materials to be represented in substantial proportions in any collections, nor can we expect a bone-working industry to have developed. Most naturally there would have been recourse to the use of materials that resembled the favored pearl most closely, that is, other species of shell. Such materials could be worked by familiar techniques, and the finished products may have had some of the special quality of pearl. *Turbo* shines like pearl, and brightly colored *Conus* shanks were perhaps seen to have the attractive quality required of lures.

On the other hand, it is possible that the use of material other than pearl shell in the manufacture of lures was not dictated by a shortage of the favored pearl shell but merely by preference for its use for specific purposes. Anell (1955) and Beasley (1928) noted, for Western Polynesia, the use of a variety of shells in lures designed for specialized fishing; again, possibly a result of necessity rather than choice. Further, such an explanation does not cover the manufacture of one-piece hooks in *Turbo*, a material definitely inferior to pearl shell.

It should be noted that Kenneth P. Emory of the Bernice P. Bishop Museum expedition collected from the surface near Site ScMt 1, Mo'orea, an object of *Tridacna* shell which was probably a lure shank, with grooved line and point attachments at each end, similar to an early variety of lure shank from New Zealand.

The use of these subsidiary shell materials is not only limited in the Society Islands, but seems to be restricted in terms of general Polynesian distribution. In areas where pearl shell was unobtainable, as, for instance, in New Zealand and the southern Cook Islands, a limited use was made of other shell materials. In New Zealand the use of the *Haliotis* shell in lures and *Turbo* shell in one-piece hooks may be cited (Beasley, 1928, xii). In the southern Cook Islands, the use of *Turbo* is recorded (Beasley, 1928, 36).

In Western Polynesia, as has been noted by Anell and Beasley, a variety of shells was used in lure manufacture. *Conus* is reported to have been used in Samoa (Anell, 1955, 156) and in the outlier, Tikopia (Anell, 1955, 185), and the occurrence of *Conus* lures was reported by Anell (1955, 185) in Tobi and Sangasor. *Tridacna* gear was reported by Anell (1955, 185) and by Beasley (1928, xii) to have occurred in Tonga, the Ellice Group, the Solomons, New Guinea, the Admiralties, and the Carolines. No fishing gear in either of these materials has previously been reported for Eastern Polynesia.

#### MANUFACTURE

Although the collection of fishhook tabs is small, a sufficient number representing the several stages of completion are represented to give some indication of manufacturing techniques. The first step seems to have been the removal of the rough exterior of the shell; coral served as an abrasive. The second step involved the cutting from the shell of an area large enough to encompass the entire hook. In all the specimens examined this seems to have been accomplished by sawing with a basalt flake, frequently a fragment of broken adze. Banks (Beaglehole, 1962, 363) stated that shell knives were used to cut shell into square pieces. It is not likely that this statement can be substantiated or proved archeologically. The cutting commonly proceeded from both interior and exterior surfaces. In contrast to the Marquesan practice, in which the tab was usually removed from the shell by chipping, and to the Mangarevan, in which it was sometimes chipped out, the present Mo'orean evidence points to the exclusive use of sawing. Again the value of pearl shell is demonstrated, for sawing is probably less wasteful than chipping. The edges of the blank thus obtained were then smoothed and shaped with an unmodified piece of branch coral serving as a file. The use of such files in this process is confirmed by Banks (Beaglehole, 1962, 363).

A number of methods of fashioning the interior of the hook were followed in Polynesia. Our limited collection suggests that the favored method in Mo'orea involved drilling one or more holes in the interior (Fig. 19a, i). According to Banks (Beaglehole, 1962, 363), the tool used for this purpose was "no more than any stone that may have a sharp corner in it tied to

the hand[]e of a cane,<sup>1</sup> which is turned in the hand like a Chocolate mill until the hole is made; the file then comes into the hole and compleats the hook."

Our collection does show variations from this method. On one tab, after the hole was drilled, the remaining portion of the interior was removed by sawing from the periphery to the hole. In another, the filing apparently proceeded from the periphery, and neither drill nor saw was used.

These methods contrast with those practiced in the Marquesas and Mangareva. In the Marquesas drilling was uncommon; sawing and filing out the entire interior was preferred. Such drilling as was observable occurred in both large and small tabs; multiple holes outlining the entire central section were found in the larger examples (Suggs, 1961b, 85). In Mangareva there seemed to be some differentiation of technique according to size, the smaller tabs frequently were drilled, but the larger tabs were sawed (Green, MS). Such differentiation may be significant for Mo'orea also, but, inasmuch as all the tabs collected were small, we cannot be certain without further investigation. Moreover, Sinoto of the Bishop Museum Expedition, collected two small tabs very similar in size from the surface on Taha'a in the Leeward Group of the Society Islands. One of these tabs showed signs of having been sawed but none of having been drilled; the other, also with no drilling, was filed from the periphery (Sinoto, personal communication, 1961). An examination of photographs of Hawaiian bone materials (Emory, Sinoto, and Bonk, 1959, Pl. 5) indicates that the choice of techniques in Hawaii was not dictated by the size of the tab.

Since none of the Mo'orean tabs bears any suggestion of the line attachment, evidently this portion of the hook was the last to be fashioned. This absence is in sharp contrast to the Mangarevan examples, in which the line attachment is frequently found on tabs prior to the removal of the interior. It is likely that the position of line-attachment formation in the sequence of manufacture operations was a function of size and shape, the larger and more projecting attachments being necessarily considered during the removal of the tab from the

<sup>1</sup> Many of the flakes that we recovered could have served such a purpose, but the chances of recognition are slight.

shell, whereas the smaller or indented attachments could be, and frequently were, treated last.

#### TYPES

We follow as closely as possible the classification and terminology worked out by Ivan Rainwater (Emory, Sinoto, and Bonk, 1959), but, because some of our material has no definite counterpart in the Hawaiian collections, the classification must be supplemented. We distinguish between lure shanks that were definitely used for bonito and those for which the use is uncertain. We refer to the former as "bonito lure shanks"; to the latter, simply as "lure shanks." The essential criterion for this distinction is one of material: "bonito lure shanks" are made of pearl shell; those of other materials have been placed under the more general rubric, "lure shanks."

There seem to be other distinctions between the two types. None of the lure shanks is pierced or grooved at the head, but all the bonito lure shanks are either pierced or grooved, except for one specimen (85-2093), which is probably unfinished. There is also a difference in size. Although it is not possible to make a definite comparison of sizes, inasmuch as none of our specimens is complete, we can note that the lure shanks in *Conus* and some in *Tridacna* are narrower and lighter than any of those in pearl shell. At least one of the *Conus* shell lures was probably shorter than the shortest pearl-shell specimen. All the *Conus* shell lures were at the small end of the size range of the bonito lure shanks.

The distinction between bonito lure shanks and lure shanks seems further justified on the basis of Anell's statement (1955) that in Western Polynesia lures were used to catch fish other than bonito, and that lures were frequently made of species of shell other than pearl.

#### ONE-PIECE HOOKS

Thirty-six fragments of one-piece hooks were recovered. Of these, 16 were useless for any sort of classification, so only 20 are considered. Inasmuch as none of these represents a complete hook, the discussion is confined to the special features of various parts of the hooks, rather than approached through a categorization of further subtypes.

LINE ATTACHMENTS AND SHANKS: In a total

of nine specimens, five forms of line attachment are observed.

Form A, represented by four pearl-shell specimens, is characterized by a knot projecting outward, perpendicular to the axis of the shank, from a position below the pointed shank head. In three of the specimens the shank is narrow; in one it is somewhat wider. In all four the shank widens as it approaches the base.

This line attachment corresponds exactly to what Emory, Sinoto, and Bonk (1959) have designated in the Hawaiian material as "Bevel Form No. 9." A complete hook with this type of head was collected by the Bishop Museum Expedition on the island of Taha'a in the Windward Group of the Society Islands. It duplicates pearl-shell specimens found in Hawaii (Emory, personal communication, 1961).

This line attachment is found in Mo'orea on hooks in a variety of sizes. Only one specimen (Fig. 19g) is complete enough to yield an overall measurement. It is 46 mm. long, the shank reaching a width of 5 mm. The other examples are considerably smaller.

All four examples were collected from the excavations at Hauti, a site so disturbed as to make their locations and depths generally meaningless. A possible exception is the large specimen (Fig. 19g) that was discovered at 28 inches below datum in Square V54, a location that, protected by large masses of coral limestone, may have been somewhat exempt from the general disturbance.

Form B is represented by one example in pearl shell (Fig. 19d), found on the surface on the land of Turua Puru at the western edge of the village of Papeto'ai. This line attachment is composed of a projection dropped below the pointed head on the outer edge of the wide shank. The interior of the shank head is stepped angularly. The remainder of the hook is of robust construction, being 45 mm. long, with the shank, at its juncture with the base, 12 mm. wide. The point leg is missing.

Similar attachments on wide shank legs have previously been recorded for Tahiti, although these present some differences in detail, particularly in the step. A Tahitian specimen in the Dominion Museum, New Zealand (No. 367.1), of identical form, with the snooding line still attached, has the same wide shank leg and base, with a narrowing, incurved point leg.

Anell (1955, Fig. 6, No. 2) illustrated a

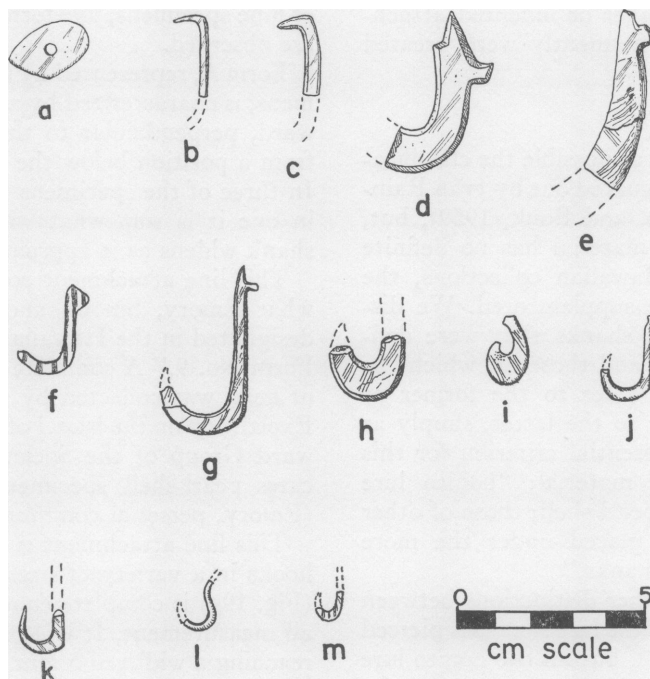


FIG. 19. Simple or one-piece fishhooks. a-e, g-l. Of pearl shell. m. Of *Turbo* shell. a. Tab with drill hole. b, c. Point legs with inturned point tips. d. Form-B line attachment on shank leg. e. Form-C line attachment on shank leg. f. Line attachment, shank leg, and base of *Turbo*-shell hook. g. Form-A line attachment on shank leg and base. h. Base with extreme widening of bend. i. Drilled tab with hook form completed by filing. j. Form-D line attachment on shank leg and base. k. Angular asymmetrical base with straight tip point leg. l. Outward-curving shank leg of very small hook. m. Base and part of shank leg for tiny hook.

Tahitian hook in the British Museum collection that differs only in the detail of the step, as does specimen No. E151.372 in the Canterbury Museum, Christchurch, New Zealand. Beasley (1928, Pl. 54) noted an almost identical line attachment on a Tahitian example (No. 403, Peabody Museum, Salem, Massachusetts); in this instance the step is angular but considerably shallower than in our Mo'orean example. He also illustrated several others of the same general form; the only difference is in the shape of the knob. There is also some general resemblance to the attachment found on a New Zealand hook made of human bone, presently in the British Museum collection, and illustrated in Beasley (1928, Pl. 12A).

It is impossible to infer the specific form of the point leg shown in Fig. 19d; the Canterbury Museum specimen cited above has a

straight point, but the remaining three examples have curved points. Inasmuch as it was a surface find, it is not possible to place this hook chronologically on the archeological evidence. The specimens in museums presumably represent the inventory current at the time of collection, early in the contact period.

Form C, represented by one specimen (Fig. 19e), is also found on a heavy shank. As on Form A, this line attachment has a knob projecting from the exterior of the shank, dropped below what was probably a pointed head. It differs, however, from Form A in several respects: first, the line formed by the top of the knob and the exterior of the head does not form a right angle; second, the interior of the shank is slightly concave, rather than straight; third, this specimen, the largest hook in the Mo'orean collection, is much more robust than



any bearing the Form-A attachment. The fragment in our possession is 47 mm. long, but the complete hook was at least 10 mm. longer, and the shank reaches a width of 13 mm. at its juncture with the base.

This line attachment corresponds very closely to the form designated as No. 12 by Emory, Sinoto, and Bonk (1959, 12). Its occurrence in Tahiti is noted above. It was illustrated by Anell (1955, Fig. 6, No. 9), although on a considerably lighter shank. Neither Beasley nor Anell has recorded it for other Polynesian areas, but Beasley (1928, Fig. 43) figured a somewhat similar form attributed to the Carolines.

A heavily shanked hook also occurs in the Marquesas, appearing first in the earliest part of the sequence, but with a rather spotty subsequent distribution (Suggs, 1961b, 81). The line attachment differs from that of either Form A or Form B of Mo'orea, suggesting that the significant aspect of these hooks, at least from the point of view of their function, is the robustness of the shank, upon which any one of a number of line attachments could be fashioned. This is substantiated by the uncommon occurrence in Mangareva of another heavily shanked hook with yet another form of line attachment.

Form D, represented by one delicate specimen (Fig. 19j), is characterized by a flat head, projecting slightly toward the exterior of the hook, forming a point with a slight stepping on the interior. This line attachment is minute, comprising an area of little more than 1 mm. by 1 mm. The light shank expands, reaching a width of 3 mm. at its junction with the base. The line attachment is tiny, not only in absolute terms, but in relation to the over-all length of the hook, which is 21 mm. The line attachment represents less than 5 per cent of the total length of the hook, in striking contrast with the hook shown in Fig. 19d which is 45 mm. long, including a 19-mm. line attachment that comprises 42 per cent of the length of the hook.

Quite possibly the modification of the shank head shown in Fig. 19j does not represent the entire line-attachment area, and that the line area was wrapped around the entire length of the shank. That the juncture of the shank and base on the exterior of the hook is somewhat angular may bear on this question. This form of shank head is very similar to line attachments

on a number of larger specimens collected by Green from the earliest Mangarevan deposits (Green, MS) and resembles many found by Suggs (1961b, 79, Fig. 26n, p) in the Marquesas. An example of a very similar form is shown by Beasley (1928, Pl. 12A) for New Zealand.

We find one more treatment of the shank head which we hesitate to classify as a line-attachment form. It is illustrated in Fig. 19f. It is of *Turbo* shell and consists of a triangular enlargement projecting from the exterior of the shank. We have found no other example of this form and suspect that this specimen is unfinished. Any one of the line-attachment forms described could be produced by further work on this shank head. The possibility that the rather weak *Turbo* shell might demand such an attachment has been considered, but, in the light of the line attachments found on New Zealand shell hooks of *Turbo* (*Cookia sulcata*) in the Bollons Collection at the Dominion Museum, such was seen not to be the case. This specimen was collected from Mata'i Taria (ScMf 6), a site so disturbed that the chronological positions of its yield of artifacts can in no case be ascertained.

A shank of a form unique in the Mo'orean collection is shown in Fig. 19l. The line attachment is, unfortunately, incomplete. The entire upper shank leg and head curve outward. This specimen is minute. The fragment in our possession is 10 mm. long, and the complete hook could not have been more than 11 mm. or 12 mm. long. This shank head characteristic seems to be uncommon in Oceania; Beasley did not figure a single example. Green has, however, recovered several large hooks with outcurving upper shank legs and heads from his earliest Mangarevan levels (Green MS).

**BASES:** Fishhook bases are represented by 13 specimens, which present some range in terms of symmetry, angularity or curvature, openness, and widening.

Symmetry refers to a comparison of the angles at which the shank and the point leg project from the base. If the angles are equal, or approximately so, the hook is symmetrical. If there is noticeable difference, the hook is asymmetrical.

Angularity or curvature refers to the quality of the exterior of the juncture of the shank and point leg with the base.

Openness signifies the openness of the angle separating the shank from the point leg. The angle is read from the interior of the hook at the points of juncture of the shank and point legs with the base. In this description, openness does not refer to the position of the point tip or catching device in relation to the shank. This is frequently impossible to ascertain from the base alone, or even from a specimen that includes the shank, the base, and a portion of the point.

Widening refers to the width of the base compared with the width of the shank. If the base is wider than the shank, it is classified as a widened base.

**SYMMETRY:** In 10 specimens, enough of each base is preserved to judge their degree of symmetry to some extent. Of these, five are quite definitely symmetrical. These specimens vary in size and other characteristics. As pointed out above, an extremely tiny hook (Fig. 19l), when complete, was scarcely more than 10 mm. long, whereas several of the others may have reached 30 mm. in length. The specimen illustrated in Fig. 19h shows extreme widening. It is 10 mm. wide at the center of the base; at the juncture with the shank it is 5 mm. wide.

Five somewhat asymmetrical hooks differ in the characteristics of width, angularity, and openness. These hooks also vary considerably in over-all length and robustness. It must be concluded that symmetry is an independent characteristic of these fishhook bases.

**ANGULARITY OR CURVATURE:** Of 13 specimens in which the juncture of the shank and base is preserved, 11 are curved; only two (Fig. 19j, k) show angularity. Both of these are small, moderately asymmetrical, and their bases show some widening.

The hook illustrated in Fig. 19k is of particular interest inasmuch as it was found in Vaiohu'a (ScMf 3) in association with the earth oven for which a carbon date was obtained (p. 180). The date of this hook has, therefore, been placed between the middle of the fourteenth century and the end of the fifteenth century. Unfortunately, the line attachment and upper portion of the shank of this small hook are missing, so that its original over-all length cannot be ascertained. However, the length from the point tip to the bottom of the base is 15 mm. If a comparison to somewhat similar hooks illustrated by Beasley (1928, Pl. 60) is

valid, this may be a close approximation to its total length. (The shanks in the illustrations are only slightly longer than the point legs. These shanks, incidentally, taper to points, and there are no projections in the line-attachment area.)

This comparison may not be valid. Its resemblance to hooks illustrated by Beasley rests essentially upon the marked angularity of the shank-base juncture. In point form and cross-section it is dissimilar. All the Beasley examples have sharply incurving points, but this hook has an almost straight point leg. The cross-sections of the Beasley hooks are all round; the hook under consideration (Fig. 19k) has a flattened, rectangular cross-section. Further, as is stated above, this hook is between 450 and 600 years old. In contrast, the hooks illustrated in Beasley, part of a full kit, all with snoods intact, were presumably in use at the beginning of the contact period. The manufacture of these hooks, therefore, is separated by some hundreds of years. Emory and Sinoto (1965, 88), on the basis of their data, believe that they are not even Tahitian but came from Nukuoro and have been incorrectly attributed to Tahiti.

Openness of the angle between point leg and shank is clearly observable in six specimens. On two hooks the shank and point legs seem to be almost parallel; in one hook these seem to be very slightly incurving or closed. On three the angle seems to be slightly open, that is, the point leg is directed slightly away from the shank. There seems to be no correlation between degree of openness and other characteristics of these specimens.

**WIDENING:** As has been mentioned above, one specimen (Fig. 19h) shows extreme widening, achieving a width of 10 mm. at the center of its base; at the juncture of its base and shank it is 5 mm. wide. This exaggeration of base width has been observed in Green's Mangarevan material. The hooks from New Zealand in a variety of materials, and the bone hooks from Hawaii illustrated by Beasley (1928, Pl. 78), show some exaggeration of the base width.

In five other specimens the bases are moderately widened, but in seven there is no widening.

There seems, reasonably enough, to be some correlation between a widening shank and a widened base. In examples in which enough of the specimen is preserved to allow the observa-

tion, the widened base seems to represent a continuation of the widening of the shank in the direction away from the head. In the four specimens with straight, non-widening shanks, there is no expansion of width in the base.

**POINT LEGS AND POINT TIPS:** There are few point legs and point tips in the Mo'orean collection—no doubt a reflection of the simple fact that these are the parts most likely to be lost in any fishing expedition. Only four were recovered. Because they differed from one another, except in being made of pearl shell, they are discussed singly.

Specimen 85-2140 is from a moderate-sized hook. Its over-all length, measured from the bottom of the base, is 21 mm., but the tip is broken. The total length when complete can be assumed to be 22 mm. to 25 mm. The leg is light, narrowing gradually from 2½ cm. at the juncture at the base. The tip, although missing, was probably a continuation of the straight point leg. It is not possible to determine the relationship of the point leg to the shank. In cross-section the specimen is round, which is a rarity in the collection as a whole. (This feature is discussed separately, under Cross-Sections.)

Figure 19b illustrates a portion of a small, very lightly constructed hook. Its total length is 19 mm.; it is 2 mm. wide at the bottom. It is impossible to say whether this represents the entire point leg. The leg is perfectly straight, narrowing very slightly in the direction of the tip. The tip is preserved, being a point projecting inward 7 mm. perpendicularly from the end of the leg. The exterior of the junction of the point tip and point leg is curved. As with Specimen 85-2140, it is not possible to determine the relation of the point leg to the shank. The cross-section of this point leg is also rounded.

Figure 19c resembles the hook illustrated in Fig. 19b, in that the point tip projects inward from the point leg, in this instance 9 mm. In other respects, however, these two specimens differ. In Fig. 19c the point leg curves gently outward from its junction with the base; the exterior junction of the point tip and point leg is angular. The point leg is wide, 5 mm. at the bottom of the fragment, narrowing to 3.5 mm. directly below the point tip. The cross-section is a flattened rectangle. The over-all length of the fragment is 21 mm.

The specimen shown in Fig. 19k is described

above (p. 190). We add here that the point leg narrows sharply toward the straight tip. It is considerably narrower, even at the junction with the base, than is the shank, and is directed slightly inward.

**CROSS-SECTIONS:** Of the total sample of 36 fragments of one-piece hooks, 33 have rectangular cross-sections. Twenty-eight of these are considerably flattened; five are more square. Three have rounded cross-sections, two of these being point legs and one being the very small shank and base (Fig. 19l).

If one can judge by this sampling, the rounded cross-section is rare in Mo'orea. That such may also be true of the Society Islands is supported by Beasley's (1928, 42) contention to this effect. It is further supported, if one rejects Beasley's kit, mentioned above, which probably represents hooks from Nukuoro and contains a majority of hooks with round cross-sections.

Pearl-shell hooks with round cross-section appear early in the Mangarevan sequence.

**SIZE:** The size of the one-piece hooks varies considerably. The larger hooks are well within the expected range, but we believe that the two smallest samples are extremely unusual.

Figure 19l is mentioned above in several contexts. This fragment, which has a rather open base, an outcurving shank, and a portion of a still further outcurving line attachment, has an over-all length of 10 mm., and could not have been more than 1 mm. or 2 mm. longer when complete. It is scarcely more than 1 mm. in width.

A hook made of *Turbo* shell (Fig. 19m) includes the base and a portion of the shank. The over-all length of this fragment is 8 mm.; the complete hook was probably little more than 10 mm. or 12 mm. long. The width of the base at the center is 2 mm.

Some slight evidence suggests that the manufacture of minute hooks from *Turbo* shell was traditional; one tiny tab in this material was recovered from Mata'i Taria, the site that also yielded the specimen illustrated in Fig. 19m. Others have since been recovered by the archeologists of the Bernice P. Bishop Museum (Emory, 1962, 119; Emory and Sinoto, 1965, 88).

Unfortunately these specimens lack both line attachments and points, for one wonders how lines were fastened to such tiny hooks and

how game was taken with implements of such delicate manufacture.

#### BONITO LURE SHANKS

Bonito lures are represented by 11 fragments, seven of which were discovered on the surface. Three of the remainder were taken from very disturbed sites. The remaining specimen was taken from Level A, the highest level in the stratified Vaiohu'a Site (ScMf 3), and on stratigraphic evidence is, therefore, very recent. This is borne out by the strong possibility that this bonito lure is steel cut. Three other specimens, one from high up in the Te Amaama deposit, the other two from the surface, were also fashioned with steel tools.

Considering, then, the situations in which these specimens were found, we cannot discuss their chronology, so that, with two exceptions, we are confined to descriptions of them.

Heads are represented in six specimens. With one exception these display the thickened triangular head that seems to characterize Polynesian lures in general (Fig. 20c). Three specimens, two of them steel cut, are pierced laterally for line attachment. Another resembles these

three in head form, but is not pierced. It was probably either broken or lost before it was pierced. The specimen shown in Fig. 20i differs somewhat from the latter four. The head is slightly thicker than the body of the shank, and, instead of being pierced, a lateral groove dropped about 10 mm. below the tip serves for a line attachment.

The distribution of the pierced, triangular-headed bonito lure throughout Polynesia requires little comment. We know, of course, that its use continues to the present day and that it is a direct continuation of the very late, contact, pre-steel-manufactured forms overwhelmingly represented in the ethnographic collections. In the light of this knowledge, the specimen illustrated in Fig. 20i, which has a single groove rather than a pierced attachment in a head thickened much less than usual, is interesting. Not represented in museum collections, this form is not now in use. It is perhaps, then, an early form, as it is certainly known to be early in Hauraki Gulf sites of the North Island of New Zealand. Although this fragment was taken from the bottom of the Hauiti excavations, this deposit was disturbed by land crabs

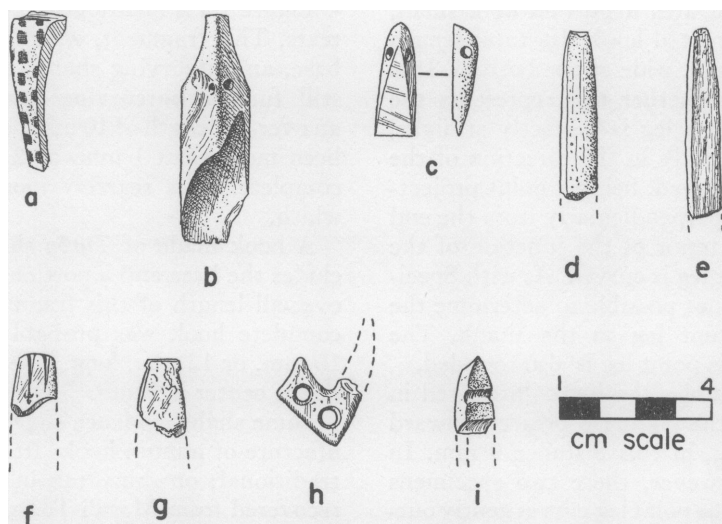


FIG. 20. Lure shanks and point. a. *Conus* lure shank with line attachment, from side and top of shell. b. Unusual head form for shank of bonito lure. c. Typical bonito lure shank with line attachment. d. Distal end of lure shank in *Tridacna*(?). e. *Conus* lure shank with a battered line attachment. f. Base of lure shank with double grooves for hackle. g. Base of lure shank with broad notching on sides. h. Lure point with dual perforation in proximal prolongation of point base. i. Head of lure shank with transverse groove for line attachment. b, c, f-i. Of pearl shell.

so as to render unreliable any inference from its situation. We cannot, therefore, present archeological evidence to substantiate our suggestion.

Another unusual head form (Fig. 20b) is a fragment from an extremely heavy lure (nearly 20 mm. wide). The head is formed by the bilateral contraction of the shank in two concave curves that break markedly with the parallel sides of the shank body. The tip is not formed by the conjunction of these two concave curves, but is rather a flattened area 6 mm. wide. This head is fashioned from the hinge area of the shell, which may have influenced its form, although this is unlikely.

Bases are represented by four specimens, one of which, found on the surface, is steel cut and totally unremarkable. The base (Fig. 20f) was also found on the surface. Two grooves, resembling elongated V's, begin at the base and run parallel to the general axis of the shank for a distance of about 7 mm. These are presumably for the hackle. There are also tiny lashing grooves on the sides, about 2 mm. from the bottom. This specimen shows immediate lateral expansion from the base toward the upper portion of the shank.

Specimen 85-2096 has been tentatively catalogued as a bonito lure base. Very light, the sides do not expand as they proceed upward from the base. The sides, although parallel, are not perpendicular to the base, but rather are slightly tilted to one side. Two very shallow grooves on one side are not matched by a pair on the other. Because these grooves could certainly have served as lashing for the point attachments, the absence of corresponding grooves opposite these may indicate that the hook shank was not completed. It is possible, however, that this fragment is not part of a bonito lure, but the head of an uncompleted, one-piece hook shank. Its lightness and narrowness (7 mm. wide), its parallel sides, and its tilted quality suggest such a possibility. The grooves may represent the first step in fashioning the line attachment on the otherwise fully formed shank.

A rather unusual fragment (Fig. 20g) is bilaterally notched 3 mm. above the base. From these notches the sides of the shank proceed upward in a markedly expanding convex curve. We do not find clear representation of this form in the ethnographic collections illustrated by either Beasley or Anell. Although the sides

show the sharp, squared quality that characterizes steel cutting, the specimen has peeled considerably, losing much of its original thickness, and we hesitate, therefore, to comment on such fine features. It does not resemble any of the modern bonito lures that we have seen.

This specimen was taken from the earth oven in Square 2 in the Te Amaama Site (ScMf 5), from which a carbon date was obtained (p. 182). If its deposition were in definite association with this earth oven, a date in the twelfth century or one in the thirteenth century could be assigned to it. As we point out, however, Te Amaama is an extremely disturbed deposit, and the situation of small artifacts within it cannot be regarded as a reliable index of either sequence or chronology.

#### LURE SHANKS

Four fragments of lure shanks in shell other than pearl were collected. Two of these (Fig. 20a, e) are quite clearly of *Conus*, and No. 85-2185 is probably made of that shell; one specimen (Fig. 20d) is perhaps made of *Tridacna*. As is mentioned above, all these specimens are considerably narrower than the pearl-shell bonito lures. The shank illustrated in Fig. 20d achieves a width, at what was probably close to its center, of 8 mm., narrowing toward the end (probably the base) to 4 mm. This is considerably narrower than the narrowest of the pearl-shell specimens, with one exception which may not be from a bonito lure. The specimen (Fig. 20a) is 16 mm. wide across its flat head. Its concave sides narrow very quickly, the width of the shank diminishing, along 37 mm. of its length, to 6 mm.

Although it is not possible, in the absence of complete specimens, to infer the over-all length of these artifacts with complete assurance, two of them (Fig. 20a and Specimen 85-2185) seem to have been considerably shorter than the pearl-shell bonito lures.

With the exception of an extremely small specimen (85-2185), these lure shanks of *Conus* and *Tridacna* are as thick as those of pearl shell.

The outlines of the specimens illustrated in Fig. 20d and e seem to have been similar to those portions of bonito lures to which they are comparable, widening toward the center, although they are somewhat narrower and therefore more elongated in appearance than the

pearl-shell examples. Figure 20e includes a portion of the head, unfortunately battered to such an extent that it is not possible to determine whether the line attachment was fashioned by piercing, grooving, or stepping down from the face or interior of the head. As in the pearl-shell bonito lures, the head is thickened, but the expansion is very moderate, recalling the dimensions of the groove-headed, pearl-shell specimen.

The outlines of Specimen 85-2126 and Fig. 20a differed considerably from those of bonito lures. Specimen 85-2126 is too fragmentary to merit discussion; the specimen shown in Fig. 20a is widest across the head, which is formed by the juncture of the side and top of the shell, its concave sides narrowing below the head. The over-all length of this lure when complete was probably not much greater than that of the present fragment.

It is important to point out here that there is direct evidence of the existence of large lure shanks made of shells other than pearl. The *Tridacna* object (probably a lure shank) collected by Emory (p. 185) on the Mo'orean coastal flats compares in size with the larger pearl-shell bonito lures found on that island.

Of the four lure shanks collected, it is unfortunate that only the very fragmentary specimen (85-2126) was taken from a stratified deposit. It was found in Layer A of Vaiohu'a, which places it some time later than the underlying carbon-dated Layer C (p. 180).

Since the above section identifying these objects as lure shanks was written, four years ago, one of the authors (Green) has had an opportunity to see the shell chisels found in Society Island sites by the Bernice P. Bishop Museum personnel (Emory and Sinoto, 1965, 55, 86). He also collected an unmistakable *Conus*-shell chisel from the surface of the Hauiti Site during the 1962 expedition. At this stage he is now convinced that perhaps two, but not all four, of the identifications of these objects as lure shanks may be in error and that they may equally well be fragments from shell chisels. However, given his Samoan experience in which all pearl-shell lures from that island group have proved to be recent and the pre-European examples made in other shell or stone because pearl shell was lacking, he believes it wise to retain the lure shank category and the discussion based on it in this report, because this tradition

reasserts itself in localities where pearl shell is in limited supply as in Mo'orea.

### POINTS

Lure or two-piece hook points are represented by four fragments and one uncompleted specimen. One specimen (Fig. 20h) is of special interest inasmuch as it is a fragment of a light, two-hole point without downward prolongation of the base. This is in direct violation of Anell's distinctions between, first, Tahitian and Marquesan forms, and, second, Eastern and Western Polynesian forms:

The Eastern Polynesian spinner [two-piece lure hook] differs from the Western Polynesian type in having the point base prolonged downwards. Two kinds of this eastern type spinner may be distinguished: the Tahitian and the Marquesan. The difference between them is that whereas the points from Tahiti have one hole and the lower lashing is secured by a protuberance at the bottom of the distal point base, the Marquesan point base has two holes (Anell, 1955, 174).

The recent accumulation of archeological evidence serves to invalidate quite completely Anell's distinctions. "Western Polynesian" points have recently been recovered in the Marquesas (Suggs, 1961b, 83), from the earliest levels in Hawaii, from New Zealand, and from the Society Islands. It would seem, therefore, that this form has wide, if not close to pan-Polynesian, distribution. Moreover its position in the Hawaiian deposits supports the notion that it is an extremely early form (Emory, Sinoto, and Bonk, 1959, 42), an idea presented by Duff (1956, 204) before there was substantiating archeological evidence. Unfortunately, chronological position cannot be read from the contexts in which the Mo'orean examples were found. It is not possible, moreover, to speculate about the point leg and tip, inasmuch as these are missing.

Specimens 85-2106 and 85-2120 are fragmentary. Considerably thicker than the two-hole examples, their bases are totally featureless; there are no notches, knobs, or perforations for the accommodation of lashing. It is quite probable that neither of these specimens was completed. They resemble each other in that in each the line formed by the extension of the point leg and base is straight. They differ in that the line formed by the interior, or upper edge, of Specimen 85-2120 is highly curved,

whereas that in 85-2106 is only slightly curved. They differ further in that 85-2106 is of pearl shell, and 85-2120 is of an unidentified shell material, quite possibly *Tridacna*.

Specimen 85-2201 is a large (over-all length, 65 mm.), thick, uncompleted point. The point leg has been only roughly shaped, but two of the base edges, cut straight, probably have been brought close to final form. Its general size suggests that it may have been intended for use on an octopus rig. This suggestion is partially substantiated by the openness of the angle it would have formed with a shank if the lower of the two straight edges were the articulating surface. However, if the upper straight edge articulated with the shank, a very closed angle would have been formed, and, with further shaping of the point leg and the exterior of the base, a two-piece or lure point could have been obtained. There is no indication as to which of these two edges was intended to articulate with the shank, inasmuch as no accommodation for lashing had yet been fashioned.

The usual order of manufacturing operations seems to have been ignored in this specimen. Although the hook seems to have been at least partially shaped, the outer surface has not been entirely cleaned; rough epidermal shell still covers parts of it.

This specimen was found at Te Mao'ae (ScMf 1).

#### OCTOPUS LURE

Tahitian octopus lures were of two types, according to Beasley (1921, 107-111). In one, a cluster of cowrie backs was arranged on a soft woven shank; in the second type, one whole cowrie and a number of cowrie backs were attached to a bone or wooden shank.

Specimen 85-2202 may be one piece of an octopus rig. Made from the back, or top, of a medium-sized cowrie, it is cut straight across one end, and has a perforation on the midline 2 mm. below the cut edge. As was Specimen 85-2201, which, it has been suggested, may be an octopus hook, this specimen was found on the surface of the land of Te Mao'ae (ScMf 1) in the village of Papeto'ai.

#### BAIT SINKER

One vesicular basalt bait sinker (85-2302) was collected from the surface of the Hauiti Site. Like most bait sinkers, it is an extremely

rough object; the only modification of the original pebble is the line-attachment groove around the middle. Its over-all length is 140 mm.; its maximum width is 94 mm. The line attachment groove is broad (up to 15 mm.) and shallow.

#### CUTTING, SCRAPING, AND FILING TOOLS

##### ROUGH OR UNMODIFIED TOOLS

##### BASALT TOOLS

The Society Islanders made use of unmodified or slightly modified basalt flakes for a variety of tasks involving cutting, drilling, and scraping. Some textual evidence is cited above (p. 186), and reports from the Marquesas, Mangareva, and Hawaii indicate that the use of such implements was common in Eastern Polynesia. In all three of these groups, as in Mo'orea, quantities of basalt flakes, either naturally fractured or struck off dike stones, have been found. That these objects were used in the shell industry is indicated in a number of ways: (1) the textual evidence provided by such early observers as Banks (Beaglehole, 1962, 363); (2) in Mo'orea, shells have been collected with marks probably produced by the use of such implements; (3) such flakes have been collected from archeological contexts that have also produced fishhook blanks; (4) experiment indicates that they are well suited to shell cutting; and (5) some of these flakes show some signs of wear.

Because they were generally used without undergoing secondary chipping, it is hard to demonstrate conclusively that they were in fact used in the shell industry. However, this suggestion is supported to some extent by the frequent occurrence of flakes that do not differ from these rough basalt flakes in either roughness of form or outline, but do have one or more polished surfaces. These flakes were evidently struck off finished adzes, doubtless previously broken. These broken adze flakes are also found in contexts with fishing gear in Mangareva and the Marquesas, and concentrations have been noted in Hawaii as well. Such finds suggest that the preferred tool for cutting shell was probably a flake taken from an already broken or damaged adze. In the absence of such an implement, any sharp basalt flakes (either natural or struck off a boulder) would be employed, and, in fact, would be as efficient.

Negative evidence also provides some support for the idea that these flakes were used to cut pearl; no more carefully worked tools suited to this purpose were found.

Basalt flakes such as these were used as food scrapers in Hawaii and the Marquesas. There is no reason to believe that they were not similarly employed in the Societies.

#### CORAL FILES

We believe that unmodified fragments of branch coral (*Acropora*) were used to file shell. Although the block coral (*Porites*) used for the shaped coral files characteristic of Hawaii and the Marquesas is present, no shaped coral files were found. It is certainly possible that further excavation may yield shaped coral files of *Porites*, but it is suggested that, where the supply of branch coral is large, it would be employed in preference to and perhaps to the exclusion of block coral. The reason is simple. A piece of branch coral may be used without being shaped, but block coral requires considerable shaping before it can be employed.

Positive archeological evidence for this contention is tenuous. A file was most useful when it was freshest and roughest. As soon as it showed a little wear, it would be discarded and another piece picked up. The highly worn piece was useful only for finishing purposes. Neither is easily recognizable in middens to which contributions have been made by the sea, as in coastal Mo'orea. Therefore only two pieces of branch coral were collected, which, showing differential wear in various parts, can be pointed to as files with any degree of assurance.

In Mangareva, however, where excavations were undertaken in a more protected site that contained middens safe from depositions by the sea, 253 branch-coral files in all stages of wear were recovered. It is interesting to note that few of these showed the shouldered effect common in block-coral files. They were evidently discarded before being subjected to great wear.

#### FILES OF SEA-URCHIN SPINES

The occurrence of files of unmodified sea-urchin spines is rare in Mo'orea. Only two specimens of such spines showing wear were found, which is not surprising in the light of the contents of the remainder of the collection. The use of the sea-urchin spine as a file is connected

with bone working. In Hawaii, where bone hooks predominate, spine files are found by the thousands (Emory, Sinoto, and Bonk, 1959, 19). In the Marquesas, Suggs (1961b, 119) collected only 23; he found only three bone fish-hooks. In Mangareva, Green (MS) found two spine files; his collection included three pieces of worked bone. The absence of spine files suggests the unimportance of bone working.

#### *Tridacna* SHELL SCRAPERS

Possibly, in keeping with a tradition of using unmodified shell for a variety of purposes, *Tridacna* shells were used as food scrapers. A number of these shells showing wear along one or more edges were taken from various midden deposits.

#### FORMED TOOLS

##### FOOD SCRAPERS

**PEARL-SHELL GRATERS:** Three fragments of coconut graters made of pearl shell (85-2275, Fig. 21e, and 85-2317) were recovered from the Te Amaama Site (ScMf 5). The almost complete specimen (Fig. 21e), lacking only a small portion of the upper end, was found in association with the earth oven in Square 2. Because of its size (over-all length, 112 mm.) it is unlikely that it was subject to movement by land crabs, and it can therefore be dated by the earth oven with some assurance. Consequently it can be placed in the twelfth or thirteenth century (p. 182). Thus, if these objects are indeed coconut graters, we can state with some assurance that the coconut was established in the Society Islands by the twelfth or thirteenth century.

The grip which has a somewhat flattened base includes a portion of the shell hinge. The cutting edge was rounded. There are no serrations on the cutting edge, probably because of wear. However, Buck reported an unserrated example from Manihiki-Rakahanga (Buck, 1932, 89, Fig. 20). Green also found similar graters in the Mangarevan excavations (Green, MS). Its general outline is very much like that of a shoehorn. Buck called it a hand grater.

Suggs (1961b, 104), however, who has reported similar graters in the Marquesas, contended that this form was mounted, the thick hinge portion serving as a lashing area. The hinge, although it could certainly have accommodated a lashing, also makes a comfortable hand grip, and, further, the ethnographic



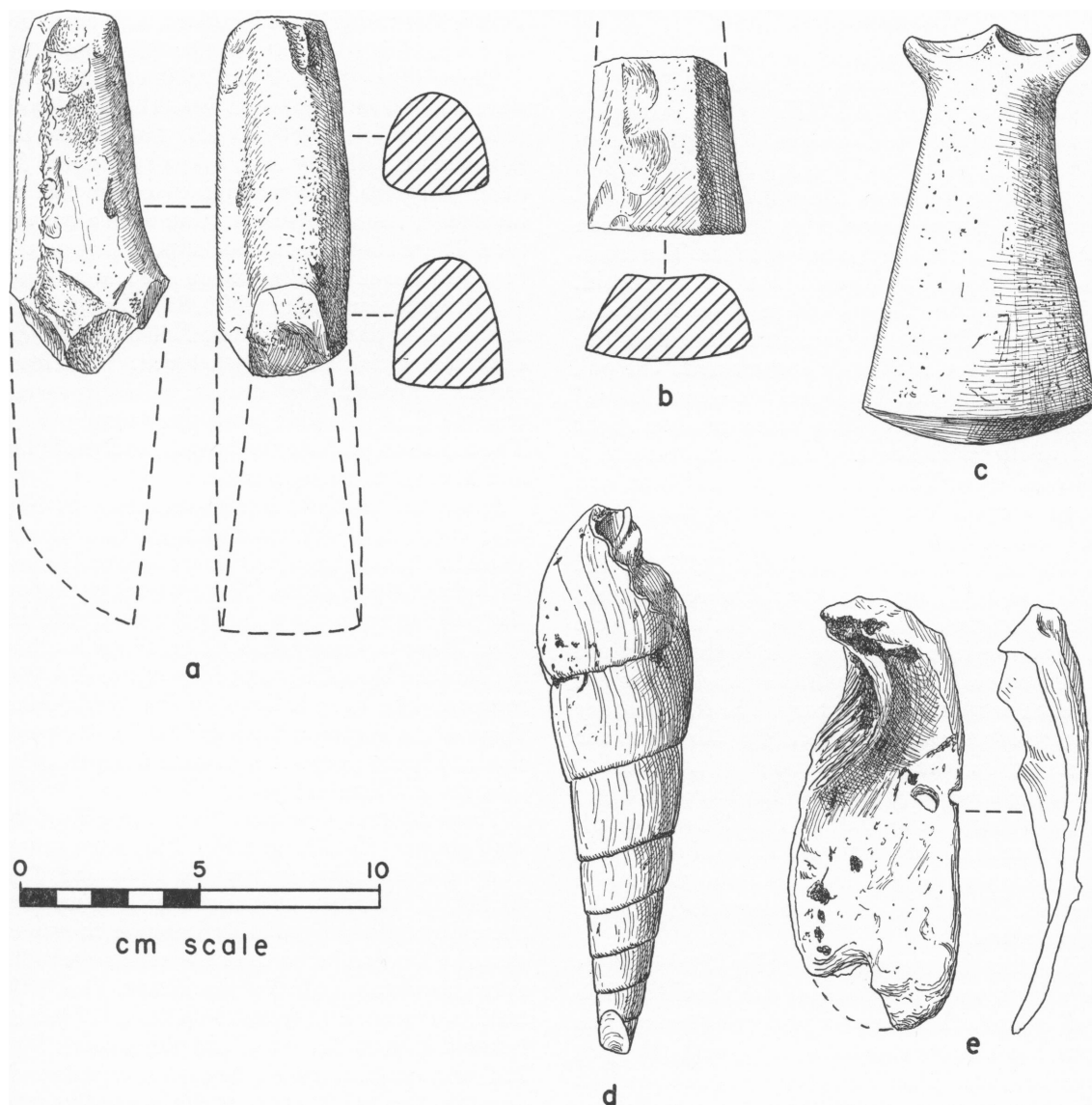


FIG. 21. Woodworking tools, pounder, and coconut grater. a. Butt portion of tanged adze in style related to Duff Type 4A. b. Base view of adze, fragment, quadrangular, with base narrower than face. c. Stone pounder. d. *Terebra*-shell gouge. e. Pearl-shell grater (hand coconut type).

literature suggests that coral was generally used for stand graters.

**COWRIE-SHELL SCRAPERS:** One cowrie-shell scraper (85-2207) was collected from the surface of the Ta'auaoa Site (ScMf 4). From its position on the surface of a post-contact site, and because there is considerable preservation of color, it is assumed that the artifact is of quite recent manufacture. It was fashioned by the very neat removal of about one third of the

length of the shell. The very straight cut served as the scraping edge, after being further modified by being beveled, probably with a coral file. In form it is similar to that illustrated by Buck (1938, Fig. 10a) from Mangareva. It is, however, markedly different from scrapers reported by Suggs (1961b, 128) from the Marquesas, the cutting edge of which is not formed by the removal of one end of the shell but by the excision of a large portion of the top of the shell.

## WOODWORKING TOOLS

**CHISELS:** One basalt chisel (85-2289) was recovered from the bottom of Square V54 at the Hauiti Site (ScMf 2). This is an extremely small example, with an over-all length of only 52 mm. It is virtually complete; only a few chips are broken from the poll. The base is rectangular. There is a subtriangular cross-section at the poll, with the apex on the face. The cross-section broadens forward into a trapezoid. Throughout its length there is considerable rounding off from the face into the sides. The base, however, is sharply demarcated. The poll is remarkably flat. The bevel is a short (9 mm.) concave surface providing transversely a slight gouge effect. The cutting edge is straight and is 18 mm. wide. The face, sides of the blade, and bevel are polished, but the base and the sides of the butt are not.

**ADZES:** Five adze specimens (85-2288, 85-2300, 85-2291, and Fig. 21a, b) were collected. The specimens shown in Fig. 21a and b were taken from the earth oven in Square 2 at the Te Amaama Site, and can thus be dated in the twelfth or thirteenth century. The fragmentary nature of the adze shown in Fig. 21b limits our description: the cross-section is trapezoidal, with the base narrower than the face; the edges are not sharp, being, rather, rounded or faceted. The face is slightly convex. It is unlikely that this adze was tanged, but it is impossible to be certain. The blade and butt seem to lie in the same plane.

Another fragmentary adze (Fig. 21a) consists of a butt with a portion of the shoulder. The poll lacks both a lug or a projecting point. The tang has a subtriangular section, with the apex to the face. The remaining portion of the shoulder suggests that it has the same cross-section.

Noticeable grinding on the face of the tang produces a rounded gripping surface rather than the more usual medial line. The remaining surfaces of the tang (the base and sides) are polished. The length of the fragment is 71 mm.

Again, it is not possible to be certain as to the conformation of the missing portion. The general character of the portion extant, however, is similar to entire adzes that have flat bases and subtriangular faces sloping downward from the shoulder. Although similar to Duff's Type 4A (Duff, 1956, 178), this adze does not belong to the styles he illustrated. The

base is flat rather than incurved, and there are no projecting points at the shoulder and butt.

Three adzes (85-2288, 85-2300, and 85-2291) were taken from the Hauiti Site. The adze blank (85-2300) was a surface find. Badly scarred, flakes have probably been taken off from it for other purposes. The remaining portion has an inverted triangular cross-section with a convex face. There is some evidence of polishing on the face and bevel. The fragment is 81 mm. long.

A fragmentary adze (85-2288), found at 29 inches below datum in Square X50 of the Hauiti excavations, is also badly scarred. The cross-section through the center is an inverted triangle. The base and bevel show some polish. The adze was probably untanged, and the blade and butt lay in a single plane.

Specimen 85-2291, like that shown in Fig. 21a, consists of a butt and a portion of the shoulder. It was found in Square X50 at Hauiti, 25 inches below datum. There is a single lug on the poll, and the tang shows the usual medial line. There is some polishing on the sides, but little on the base. Only a portion of the shoulder remains. The tang belongs to Duff's Tahitian Type 4A, a common form in Tahiti. Its position at Hauiti suggests a historical depth of at least several hundred years.

**Terebra-SHELL GOUGES:** Two large *Terebra*-shell gouges (85-2205 and Fig. 21d) were taken from the deposits at the Te Amaama Site (ScMf 5). Because of their size and weight, these objects were probably immune to movement by land crabs, so their situations are to be taken as chronologically significant. One (85-2205) was recovered from 25 inches to 27 inches below datum in Square 1, and the second (Fig. 21d) was associated with the carbon-dated earth oven in Square 2 and can be placed in the twelfth or thirteenth century.

Both specimens are very similar. The shell gouge shown in Fig. 21d has an over-all length of 148 mm.; Specimen 85-2205 is 139 mm. long. The natural shell has been modified only on the gouging surfaces or bevels, both of which are ovate, set at an angle of about 45 degrees to the long axis of the shell, and quite small; in Fig. 21d, 8 mm. by 15 mm., and in 85-2205, 7 by 15 mm.

Suggs found a *Terebra*-shell gouge in his earliest Marquesan site. It differs in several particulars from the Mo'orean examples: it has bifacial facets, rather than the unifacial bevel of

the Mo'orean example, and the last whorl of shell was removed, probably to facilitate hafting. The Marquesan specimen, with an over-all length of 81 mm., was considerably shorter than the Mo'orean examples (Suggs, 1961b, 133). In addition, Suggs (1961b, 130) stated that two species of *Terebra* (*maculata* and *crenulata*) were used as drills in the Marquesas.

## MISCELLANEOUS ARTIFACTS

### POUNDERS

*Penu* TYPE: Two pounders of *penu* type (Fig. 21c and 85-2272) were recovered from the Mo'orean coastal excavations. The latter (85-2272) is fragmentary, but the former (Fig. 21c) is complete and was recovered from the excavations in the Te Amaama Site. It was found in Square 1 at a depth of 20 inches, among rocks that at one time seemed to have formed a stream bed.

In Polynesia it is extremely unusual to find pounders, either on the surface or in excavations, for these objects are still in everyday use. Those not in use are, nevertheless, highly prized and are therefore generally unobtainable. When, in the course of digging or cultivating, a *penu* is found, it is usually put back into service. The recent excavation in Mo'orea of a circum-island trench for the accommodation of a water main uncovered a number of *penu* pounders, all or nearly all of which are again in use.

The specimen shown in Fig. 21c is 119 cm. high and has a maximum diameter of 67 mm. at what Buck (1944, 31) called "the circumferential edge," that is, the edge separating the body from the inferior basal surface. The head has three ridges, the exterior two showing considerable lateral projection. Each ridge has a uniform, moderate height, and each is separated from the next by a shallow convexity. The head is oval in cross-section. The large dimension is 52 mm.; the small dimension, 20 mm. The oval cross-section continues into the neck; here the maximum dimension contracts to 35 mm., and the smaller dimension expands slightly to 22 mm.

The body, which is slightly concave, flares only moderately from neck to base, attaining a diameter of 67 mm. at the circumferential base. The cross-section at this point is roughly circular. The distance from neck to circumferential edge is about 90 mm. The inferior base is moderately convex, showing a height (vertical

distance from the lowest point on the surface to the circumferential edge) of 12 mm. The surface of the *penu* is rather finely ground throughout; its total weight is 516 grams.

Although Buck (1944, 31) saw Society Island *penu* as generally with a greater flare and deeper convexity than the present example, two others of the same general shape, also with triple-ridged heads, have been found in the same general vicinity by local residents.

UNSHAPED POUNDERS: A large (length, 235 mm., maximum width, 130 mm., thickness, 90 mm.), unshaped, or only rudimentarily shaped, fairly coarse-grained, basalt object (85-2301) was recovered from Bed 2 in Square C1 of the Mata'iri'i Site. Its outline is roughly that of an elongated triangle with highly rounded apices. Its large and small ends are pitted beyond the normal expectation from natural causes in this variety of basalt. The pitting probably results from its use as a hammerstone or pounder. Additional pitting on other surfaces suggests that it may also have been used as an anvil stone.

### *Terebra*-SHELL BOTTLE STOPPER

An artifact (85-2203) fashioned from an entire, moderate-sized *Terebra* shell (length, 85 mm.) was recovered from the disturbed Te Amaama deposit. A rough perforation in the first whorl suggests its close correspondence to objects from Hawaii classified as gourd or bottle stoppers by Buck (1957, 64).

### OBSIDIAN OBJECTS

Three obsidian flakes (85-2332, 85-2307, and 85-2218) were recovered from the Hauiti Site. One flake (85-2218) shows clear signs of chipping. Although the use of obsidian has been reported for Hawaii, Pitcairn, Samoa, and, of course, Easter Island and New Zealand, it has not previously been reported in the Society Islands. Despite the fact that the Societies are volcanic in origin, the natural occurrence of obsidian has not been noted, which may mean, however, not that it does not occur, but simply that its occurrence is very rare. If so, we need not postulate an exotic origin for these objects and may occasionally expect to find artifacts fashioned from this volcanic glass.

### CHERT

In addition, two chert objects were also discovered (85-2318 and 85-2154), one in the

Hauti Site, the other in the Mata'i Taria Site. These are possibly chipped. Like obsidian, chert has not been reported as occurring naturally in Mo'orea. Suggs (1961b, 126) stated that the conditions necessary for the formation of chert are present in the Marquesas. This geological situation may also be present in the Society Islands, in which case it may not be necessary to postulate an exotic provenience for these chert objects either.

#### TOGGLE

A small, biconical, quartz artifact (85-2176) was found deep in the Hauti deposit. A drilled perforation that extends from its equator to a point a little less than halfway up one of its cones was perhaps designed to accommodate stitching that would serve to attach the object to an article of wearing apparel, such as a cloak. Accordingly, it has been very tentatively identified as a toggle.

#### OBJECT IN WORKED *Tridacna*

A thick chunk of *Tridacna* shell with definite marks of working, evidently from an animal larger than is usual in the Society Islands, was recovered from the Mata'iri'i Site (85-2312a-c). Only a fragment, one face, has been carefully polished, and has an evenly beveled groove. The object was at one time exposed to fire. It is not possible to assign a function to it.

#### EUROPEAN ARTIFACTS

Objects of European manufacture were found throughout the unstratified deposits. Most common were a variety of clay pipestems and the remains of glass bottles. In addition, two gun flints were recovered. In the completely post-contact Ta'auroa Site, three coins were

found; these were French, South American, and Vatican in origin.

A number of what appeared to us to be attempts to imitate European pearl-shell buttons, and were so classed, have been identified by Emory and Sinoto (1965, 91) as ornaments from dancers' costumes. These were from their excavations, where they were found in secure prehistoric contexts. If so, some of our buttons are of the European-inspired type, but others that are plain and with only two holes may be of prehistoric date.

Although not necessarily of European manufacture, a characteristic of European or post-contact occupation is the occurrence of lime plaster which was abundant in the Ta'auroa deposit.

#### CANOE BURIAL

The location of the canoe burial is described in a previous section of this report (Mata'i Taria). It was first encountered 3 inches directly below a large, rectangular, dressed, upright stone, and the bottom rested at 47 inches below datum. As was to be expected, those portions of the canoe that may have originally rested above the high-water mark at 38 inches below datum had rotted away, leaving no trace. The canoe was discovered during the last two days available for excavation. It was therefore possible to uncover only the forward 62 inches. The maximum width in the uncovered portion was 14 inches. A fragment was removed for radiocarbon testing but has not yet been submitted for analysis. There was no sign of decoration on the canoe. A number of human bones were removed from the vicinity of the canoe. These are listed elsewhere in this report (p. 183).

# ANALYSIS OF COASTAL DEPOSITS FOR MIDDEN CONTENT

ROY A. RAPPAPORT AND ANN RAPPAPORT

## MIDDEN COLLECTION AND ANALYSIS

DESPITE THE DISTURBANCE due to the churning of the soil by land crabs, midden material was collected from all squares in most of the sites excavated. Where stratigraphy was present, midden material was bagged by arbitrary levels within the stratigraphic layers. Where stratigraphy was not observable, midden material was collected by 6-inch digging levels wherever it was possible to maintain these levels, and by varied recorded levels as dictated by the nature of the base sand or ephemeral layering. After screening, all discernible shell, bone, and other cultural material was removed for analysis. In the heavily disturbed seacoast sites, column samples, 1 foot by 1 foot, were also taken, and, after the earth and sand were screened through a  $\frac{1}{4}$ -inch screen, the entire residue, including stone and coral, was bagged by 6-inch levels. Where stratification was present, in Vaiohu'a and Ta'auroa, no column samples were taken. As there was comparatively little midden material, all of it was preserved.

As much of the material was analyzed in the

laboratory as time permitted. The material was separated into type, and it was either weighed (as in the case of the columns and stratified midden) or its presence was charted by square and level. Table 5 gives a list of the sites so analyzed.

The categories of material were identified by American Museum specialists. Where possible, shells were identified to the specific level, but their condition was frequently too poor to permit identification below the generic level. Bone fragments were even less rewarding, permitting separation into gross categories such as fish, dog, human, and others.

## MIDDEN COMPOSITION

The general percentage composition by weight of each site as predicted by columns is shown in Table 7 and is discussed together with the site descriptions. The character of the sites is reflected in the varying proportions of bone, shell, stone, and coral refuse. The close proximity to the lagoon is clearly demonstrated in Hauiti and Mata'i Taria by the presence of the

TABLE 5  
ANALYSIS OF MIDDEN COLLECTION

Site and Square	Presence and Absence Noted		Weight Charted
Mata'iri'i			
C1	Total square		
Hauiti			
R48	Northeast quadrant	Column	
X50	Northeast quadrant	Column	
Y50	Northeast quadrant	Column	
V54	Total square		Column
Vaiohu'a	—		Entire square
Ta'auroa	—		Entire square
Te Amaama			
No. 1	Total square	Column, southeast quadrant, 6-12 inches below surface	
No. 2	Total square	Column	
Mata'i Taria			
B2	Total square	Column	
A1	Total square	Column	
Z1	Total square	24-36 inches below surface, entire square	

TABLE 6  
RATIOS OF MIDDEN TO STONE AND CORAL BY LEVEL (IN INCHES) FROM COLUMN SAMPLES  
MEASURING 1 FOOT BY 1 FOOT

Site and Level	Total Midden Weight (in Grams)	Per Cent	Total Stone and Coral Weight (in Grams)	Per Cent	Total Weight (in Grams)	Per Cent
Hauiti						
R48						
0-6	90	5.1	1670	94.9	1760	100.0
6-12	154	8.0	1780	92.0	1934	100.0
12-18	45	3.7	1165	96.3	1210	100.0
X50						
0-6	71	3.3	2111	96.7	2182	100.0
6-12	53	2.2	2344	97.8	2397	100.0
12-18	200	—	—	—	—	—
21-26	109	4.4	2380	95.6	2489	100.0
26-30	279	13.6	1770	86.4	2049	100.0
30-42	140	3.9	3456	96.1	3596	100.0
Y50						
0-8	180	5.9	2877	94.1	3057	100.0
8-14	146	9.9	1335	90.1	1481	100.0
14-20	40 <sup>a</sup>	5.1	743	94.9	783	100.0
20-26	166	5.7	2743	94.3	2909	100.0
26-32	172	5.8	2797	94.2	2969	100.0
V54						
0-12 <sup>b</sup>	173	13.0	1156	87.0	1329	100.0
6-12 <sup>c</sup>	69	10.9	563	89.1	632	100.0
Te Amaama						
No. 1						
0-6	41	31.5	89	68.5	130	100.0
6-12	37	45.1	45	54.9	82	100.0
12-18	11	29.7	26	70.3	37	100.0
18-24	4	12.9	27	87.1	31	100.0
24-30	9	14.1	55	85.9	64	100.0
No. 2						
0-6	18	24.7	55	75.3	73	100.0
6-12	380	70.7	157	29.3	537	100.0
12-18	169	33.8	331	66.2	500	100.0
18-24	65	39.9	98	60.1	163	100.0
24-30	56	35.7	101	64.3	157	100.0
30-36	102	40.5	150	59.5	252	100.0
Mata'i Taria						
A1						
0-6	28	2.4	1150	97.6	1178	100.0
6-12	—	—	—	—	—	—
12-18	23	2.3	968	97.7	991	100.0
18-24	45	4.6	925	95.4	970	100.0
24-30	86	4.7	1732	95.3	1818	100.0
30-36	11	1.2	927	98.8	938	100.0

TABLE 6—(Continued)

Site and Level	Total Midden		Total Stone and Coral		Total	
	Weight (in Grams)	Per Cent	Weight (in Grams)	Per Cent	Weight (in Grams)	Per Cent
B2						
0-6	59	4.5	1264	95.5	1323	100.0
6-12	71	5.8	1155	94.2	1226	100.0
12-18	117	8.1	1335	91.9	1452	100.0
18-24	19	1.9	970	98.1	989	100.0
24-30	100	5.8	1615	94.2	1715	100.0
30-36	20	2.9	665	97.1	685	100.0

\* Damaged midden bag; full weight not represented.

<sup>b</sup> Black layer.

<sup>c</sup> White layer.

large quantity of stone and coral. Te Amaama also was not far from the sea, but its position near and over the activity of fresh-water streams may explain the smaller proportions of coral refuse. The remaining shore site, Mata'iri'i, was not considered rich enough to warrant column sampling; therefore figures for stone and coral are lacking.

We can consider the sites as combinations of four variables: the cultural composition of each site as it was laid down through time; the introduction and mixing of material by sea activity; the activity of land crabs; and the occurrence of other natural processes, such as the activity of fresh-water streams. The composition and character of the midden in stratified sites were primarily subject to cultural deposition. The Hauiti, Mata'i Taria, and Mata'iri'i middens were formed not only by cultural deposition, but by invasion of the midden area by sea wash during heavy storms and by the continuing activity of land crabs which not only churned the material present but also may have introduced shell and coral and other material into the sites. The Te Amaama excavations were subject to land-crab activity, but much of the additional disturbance probably originated in land water rather than sea wash, though the latter is perhaps also a factor.

#### COLUMN RELIABILITY

Although time did not permit collection and analysis of all the materials from several square levels as a check of column reliability, the material that was collected by hand, as work progressed, was in two instances weighed as a

general check against the accuracy of column-weight prediction. Thus, in two instances we were able to compare results from the columns, from which total material had been collected, and the squares, from which samples were gathered from the screen by inspection (see Table 8).

The results shown in Table 8 indicate that, weight for weight, column contents do not accurately reflect square contents; in fact, the discrepancy should be greater, because we cannot assume that the square samples were chosen at random. Therefore, statements made on the basis of column weight should be considered in the light of this discrepancy.

The range of shells found in the squares is up to 100 per cent greater than the range found in the columns. "Common shells" show less differential occurrence between column and square. At Hauiti, in fact, the column range of "common shells" is equal to or (in the case of Square V54) slightly greater than the square range.

#### MIDDEN MATERIAL

**BONE:** All the bone uncovered was collected. All mammalian remains were grossly identified, where possible (Table 9). The finds of human bone were limited to the area immediately surrounding the canoe burial at Mata'i Taria and are therefore assumed to belong to one individual. The scattered distribution, both in depth and horizontally, of the bones in this burial, especially the small bones and teeth, bears vivid testimony to the vigorous activity of the land crabs.

Pig and fish bones were the most common

TABLE 7

BREAKDOWN OF MIDDEN COMPOSITION BY WEIGHT<sup>a</sup> AND PERCENTAGE OF COMMON SHELL, OTHER SHELL, BONE, AND MODERN MATERIAL

Site	<i>Turbo</i>	<i>Tri- dacna</i>	<i>Echi- noid</i>	<i>Cypraea</i>	<i>Cy- m-</i>	<i>Va- sum</i> <sup>c</sup>	<i>My- tilus</i>	<i>Tere- bra</i> <sup>d</sup>	<i>Conus</i>	<i>Strom- bus</i>	Other	Bone	Modern	Total
MATA'IRI <sup>1</sup>														
Square A1														
Level B														
Grams	496	—	240	7	2	—	59	32	—	—	21	—	—	857
Per cent	57.9	—	28.0	0.8	0.2	—	6.9	3.7	—	—	2.5	—	—	100.0
Level C														
Grams	1111	69	344	17	—	17	63	49	126	4	149	—	—	1949
Per cent	57.0	3.5	17.7	0.9	—	0.9	3.2	2.5	6.5	0.2	7.6	—	—	100.0
Level D														
Grams	509	1	111	14	—	—	158	—	44	4	86	—	—	927
Per cent	54.9	0.1	12.0	1.5	—	—	17.0	—	4.8	0.4	9.3	—	—	100.0
HAU'IRI														
Column R48														
0-6 <sup>e</sup>														
Grams	44	—	5	11	2	1	—	—	9	2	5	—	11	90
Per cent	48.9	—	5.6	12.2	2.2	1.1	—	—	10.0	2.2	5.6	—	12.2	100.0
6-12														
Grams	35	86	1	16	—	—	—	—	5	1	10	—	—	154
Per cent	22.7	55.8	0.7	10.4	—	—	—	—	3.2	0.7	6.5	—	—	100.0
12-18														
Grams	16	—	—	3	—	4	—	—	—	1	21	—	—	45
Per cent	35.5	—	—	6.7	—	8.9	—	—	—	2.2	46.7	—	—	100.0
Column X50														
0-6 <sup>e</sup>														
Grams	25	16	1	5	—	—	—	—	2	—	13	1	8	71
Per cent	35.2	22.6	1.4	7.0	—	—	—	—	2.8	—	18.3	1.4	11.3	100.0
6-12														
Grams	19	—	10	11	—	—	4	—	4	—	5	—	—	53
Per cent	35.8	—	18.9	20.7	—	—	7.6	—	7.6	—	9.4	—	—	100.0
12-18														
Grams	82	2	26	25	2	1	8	2	19	—	17	16	—	200
Per cent	41.0	1.0	13.0	12.5	1.0	0.5	4.0	1.0	9.5	—	8.5	8.0	—	100.0
21-26														
Grams	27	—	19	18	1	10	11	—	5	—	15	3	—	109
Per cent	24.8	—	17.4	16.5	0.9	9.2	10.1	—	4.6	—	13.8	2.7	—	100.0



TABLE 7—(Continued)

Site	<i>Turbo</i>	<i>Tri-dacna</i>	Echi- noid	<i>Cypraea</i>	<i>Cy-ma-</i> <i>tium</i>	<i>Va-</i> <i>sum</i>	<i>My-</i> <i>tilus</i>	<i>Tere-</i> <i>bra</i>	<i>Conus</i>	<i>Strom-</i> <i>bus</i>	Other	Bone	Modern	Total
26-30														
Grams	49	182	5	17	2	1	4	—	3	1	13	2	—	279
Per cent	17.5	65.2	1.8	6.1	0.7	0.4	1.4	—	1.1	0.4	4.7	0.7	—	100.0
30-42														
Grams	41	1	13	36	1	—	13	—	13	4	13	5	—	140
Per cent	29.3	0.7	9.3	25.7	0.7	—	9.3	—	9.3	2.9	9.3	3.5	—	100.0
Column Y50/ 0-8*														
Grams	39	3	19	44	5	1	9	1	15	5	26	6	7	180
Per cent	21.6	1.7	10.6	24.4	2.8	0.6	5.0	0.6	8.3	2.8	14.4	3.3	3.9	100.0
8-14														
Grams	67	—	13	26	1	1	8	1	6	1	14	8	—	146
Per cent	45.9	—	8.9	17.8	0.7	0.7	5.5	0.7	4.1	0.7	9.6	5.4	—	100.0
14-20														
Grams <sup>g</sup>	13	—	8	7	—	1	2	—	4	1	3	1	—	40
Per cent	32.5	—	20.0	17.5	—	2.5	5.0	—	10.0	2.5	7.5	2.5	—	100.0
20-26														
Grams	36	—	28	42	—	3	22	—	8	4	21	2	—	166
Per cent	21.7	—	16.8	25.3	—	1.8	13.3	—	4.8	2.4	12.7	1.2	—	100.0
26-32														
Grams	56	—	23	45	1	3	6	—	14	2	18	3	1	172
Per cent	32.5	—	13.4	26.2	0.6	1.7	3.5	—	8.1	1.2	10.5	1.7	0.6	100.0
Column V54/ 6-12* (white)														
Grams	27	—	3	14	—	—	11	—	4	2	8	—	—	69
Per cent	39.1	—	4.4	20.3	—	—	15.9	—	5.8	2.9	11.6	—	—	100.0
0-12 (black)														
Grams	52	7	49	22	2	3	9	1	10	3	11	2	2	173
Per cent	30.1	4.0	28.3	12.7	1.2	1.7	5.2	0.6	5.8	1.7	6.4	1.2	1.2	100.0
Northwest quadrant <sup>i</sup> A6-12*														
Grams	334	11	—	26	—	—	—	—	16	19	21	11	18	456
Per cent	73.3	2.4	—	5.7	—	—	—	—	3.5	4.2	4.6	2.4	3.9	100.0
A12-18														
Grams	192	106	—	29	—	104	1	—	1	—	28	3	—	464
Per cent	41.4	22.8	—	6.3	—	22.4	0.2	—	0.2	—	6.0	0.7	—	100.0

TABLE 7—(Continued)

Site	<i>Turbo</i>	<i>Tri- dacna</i>	<i>Echi- noid</i>	<i>Cypraea</i>	<i>Cyma- tium</i>	<i>Va- sum</i>	<i>My- tilus</i>	<i>Tere- bra</i>	<i>Conus</i>	<i>Strom- bus</i>	Other	Bone	Modern	Total
B17-24														
Grams	228	15	—	24	—	—	—	—	17	—	19	—	—	303
Per cent	75.2	5.0	—	7.9	—	—	—	—	5.6	—	6.3	—	—	100.0
B24-28														
Grams	84	—	—	24	—	—	1	—	—	1	51	—	—	161
Per cent	52.2	—	—	14.9	—	—	0.6	—	—	0.6	31.7	—	—	100.0
C27-30														
Grams	2	—	—	3	—	9	1	—	9	—	—	—	—	24
Per cent	8.3	—	—	12.5	—	37.5	4.2	—	37.5	—	—	—	—	100.0
Southwest quadrant														
A12-18*														
Grams	325	96	—	60	6	68	8	—	46	—	23	—	—	632
Per cent	51.4	15.2	—	9.5	0.9	10.8	1.3	—	7.3	—	3.6	—	—	100.0
B19-24														
Grams	275	104	—	10	—	7	5	—	24	—	44	—	—	469
Per cent	58.6	22.2	—	2.1	—	1.5	1.1	—	5.1	—	9.4	—	—	100.0
B24-30														
Grams	83	12	—	12	—	—	6	—	63	—	7	—	—	183
Per cent	45.3	6.6	—	6.6	—	—	3.3	—	34.4	—	3.8	—	—	100.0
C30-36														
Grams	10	—	1	—	—	—	2	—	3	—	2	—	—	18
Per cent	55.5	—	5.6	—	—	—	11.1	—	16.7	—	11.1	—	—	100.0
Southwest quadrant, west balk														
A5-12*														
Grams	203	60	—	29	—	19	—	—	38	—	11	—	—	360
Per cent	56.4	16.7	—	8.0	—	5.3	—	—	10.5	—	3.1	—	—	100.0
B12-15														
Grams	115	19	—	15	6	19	1	—	71	—	1	—	—	247
Per cent	46.6	7.7	—	6.1	2.4	7.7	0.4	—	28.7	—	0.4	—	—	100.0
B15-28														
Grams	323	156	—	59	9	3	20	—	77	—	4	4	—	655
Per cent	49.3	23.8	—	9.0	1.4	0.5	3.1	—	11.7	—	0.6	0.6	—	100.0
Southwest quadrant, east balk														
A5-11*														
Grams	105	41	—	4	—	—	—	—	30	—	—	—	—	180
Per cent	58.3	22.9	—	2.2	—	—	—	—	16.6	—	—	—	—	100.0

TABLE 7—(Continued)

Site	Turbo	Tri- dacna	Echi- noid	Cypraea	Cyma- tium	Va- sum	My- tilus	Tere- bra	Conus	Strom- bus	Other	Bone	Modern	Total
11-13														
Grams	92	48	—	18	10	—	3	—	7	—	—	—	2	180
Per cent	51.1	26.7	—	10.0	5.5	—	1.7	—	3.9	—	—	—	1.1	100.0
B <sup>1</sup> 13-16														
Grams	60	17	—	20	8	—	1	—	17	—	4	—	—	127
Per cent	47.2	13.4	—	15.8	6.3	—	0.8	—	13.4	—	3.1	—	—	100.0
B <sup>2</sup> 16-27														
Grams	45	—	—	22	2	1	7	—	34	1	3	—	—	115
Per cent	39.1	—	—	19.1	1.7	0.9	6.1	—	29.6	0.9	2.6	—	—	100.0
18-22 (around stones)														
Grams	5	—	—	1	—	—	3	—	—	—	1	—	—	10
Per cent	50.0	—	—	10.0	—	—	30.0	—	—	—	10.0	—	—	100.0
28-35 (around earth oven)														
Grams	9	—	—	7	1	—	3	—	5	—	1	6	3 <sup>j</sup>	35
Per cent	25.7	—	—	20.0	2.8	—	8.6	—	14.3	—	2.9	17.1	8.6	100.0
T <sub>A</sub> ' AAUROA <sup>k</sup>														
Square C10														
4-10 <sup>e</sup>														
Grams	56	—	—	—	—	—	—	—	—	—	—	3	54	113
Per cent	49.6	—	—	—	—	—	—	—	—	—	—	2.6	47.8	100.0
10-14														
Grams	39	—	—	14	—	—	—	—	—	—	—	26	—	79
Per cent	49.4	—	—	17.7	—	—	—	—	—	—	—	32.9	—	100.0
14-17														
Grams	31	—	—	—	—	—	—	—	—	—	—	1	—	32
Per cent	92.9	—	—	—	—	—	—	—	—	—	—	3.1	—	100.0
Square D 10														
2-8 <sup>e</sup>														
Grams	124	—	—	1	—	—	1	—	—	—	20	48	422	616
Per cent	20.1	—	—	0.2	—	—	0.2	—	—	—	3.2	7.8	68.5	100.0
8-14														
Grams	140	—	—	—	—	—	—	—	—	—	—	2	9	151
Per cent	92.7	—	—	—	—	—	—	—	—	—	—	1.3	6.0	100.0
T <sub>E</sub> AMAAMA														
Column from Square 1														
0-6 <sup>e</sup>														
Grams	15	—	1	4	—	—	—	—	19	—	2	—	—	41
Per cent	36.6	—	2.4	9.8	—	—	—	—	46.3	—	4.9	—	—	100.0

TABLE 7—(Continued)

Site	<i>Turbo</i>	<i>Tri- dacna</i>	Echi- noid	<i>Cypraea</i>	<i>Cyma- tium</i>	<i>Va- sum</i>	<i>My- tilus</i>	<i>Tere- bra</i>	<i>Conus</i>	<i>Strom- bus</i>	Other	Bone	Modern	Total
6-12														
Grams	16	—	—	3	—	—	—	—	11	4	1	2	—	37
Per cent	43.3	—	—	8.1	—	—	—	—	29.7	10.8	2.7	5.4	—	100.0
12-18														
Grams	8	—	—	2	—	—	—	—	—	—	1	—	—	11
Per cent	72.7	—	—	18.2	—	—	—	—	—	—	9.1	—	—	100.0
18-24														
Grams	—	—	1	1	—	1	—	—	—	—	1	—	—	4
Per cent	—	—	25.0	25.0	—	25.0	—	—	—	—	25.0	—	—	100.0
24-30														
Grams	4	—	—	2	—	1	—	—	—	—	2	—	—	9
Per cent	44.5	—	—	22.2	—	11.1	—	—	—	—	22.2	—	—	100.0
Column from Square 2														
0-6*														
Grams	9	—	—	—	—	—	—	—	3	—	—	—	6	18
Per cent	50.0	—	—	—	—	—	—	—	16.7	—	—	—	33.3	100.0
6-12														
Grams	308	—	4	1	—	—	—	—	5	—	6	46	10	380
Per cent	81.0	—	1.1	0.3	—	—	—	—	1.3	—	1.6	12.1	2.6	100.0
12-18														
Grams	108	29	5	7	—	—	1	—	11	—	5	1	2	169
Per cent	63.9	17.1	3.0	4.1	—	—	0.6	—	6.5	—	3.0	0.6	1.2	100.0
18-24														
Grams	58	—	—	—	—	—	—	—	4	—	—	3	—	65
Per cent	89.2	—	—	—	—	—	—	—	6.2	—	—	4.6	—	100.0
24-30														
Grams	39	9	—	1	—	—	1	—	—	—	5	1	—	56
Per cent	69.6	16.1	—	1.8	—	—	1.8	—	—	—	8.9	1.8	—	100.0
30-36														
Grams	34	59	1	—	—	—	2	—	2	—	3	1	—	102
Per cent	33.2	57.8	1.0	—	—	—	2.0	—	2.0	—	3.0	1.0	—	100.0
Square 1, Southeast quadrant														
6-12*														
Grams	751	397	8	54	2	10	2	14	190	2	57	3	—	1490
Per cent	50.4	26.6	0.6	3.6	0.1	0.7	0.1	0.9	12.8	0.1	3.9	0.2	—	100.0

TABLE 7—(Continued)

Site	Turbo	Tri- dacna	Echi- noid	Cyprea Cyprea	Cyma- tum	Yal- sum	My- tilus	Tere- bra	Conus	Strom- bus	Other	Bone	Modern	Total
MATA' I TARIA														
Column B2														
0-6°														
Grams	25	—	17	2	—	—	5	—	2	—	5	2	1	59
Per cent	42.3	—	28.8	3.4	—	—	8.5	—	3.4	—	8.5	3.4	1.7	100.0
6-12														
Grams	33	—	14	6	1	—	2	—	—	7	7	1	—	71
Per cent	46.5	—	19.7	8.5	1.4	—	2.8	—	—	9.8	9.9	1.4	—	100.0
12-18														
Grams	65	22	17	6	—	—	—	—	2	1	2	2	—	117
Per cent	55.6	18.8	14.5	5.1	—	—	—	—	1.7	.9	1.7	1.7	—	100.0
18-24														
Grams	1	9	4	1	—	—	2	—	2	—	—	—	—	19
Per cent	5.3	47.3	21.1	5.3	—	—	10.5	—	10.5	—	—	—	—	100.0
24-30														
Grams	1	—	18	67	1	—	1	—	11	—	1	—	—	100
Per cent	1.0	—	18.0	67.0	1.0	—	1.0	—	11.0	—	1.0	—	—	100.0
30-36														
Grams	13	—	4	2	—	—	1	—	—	—	—	—	—	20
Per cent	65.0	—	20.0	10.0	—	—	5.0	—	—	—	—	—	—	100.0
Column A1														
0-6°														
Grams	9	—	9	5	—	—	1	—	1	—	3	—	—	28
Per cent	32.1	—	32.1	17.9	—	—	3.6	—	3.6	—	10.7	—	—	100.0
6-12														
Grams	—	—	—	—	—	—	—	—	—	—	—	—	—	—
12-18														
Grams	6	—	9	3	1	—	1	—	—	1	2	—	—	23
Per cent	26.1	—	39.0	13.0	4.4	—	4.4	—	—	4.4	8.7	—	—	100.0
18-24														
Grams	5	—	18	6	4	—	3	—	4	—	2	1	2	45
Per cent	11.1	—	40.0	13.4	8.9	—	6.7	—	8.9	—	4.4	2.2	4.4	100.0
24-30														
Grams	13	24	6	10	1	—	7	—	1	—	24	—	—	86
Per cent	15.1	27.9	7.0	11.6	1.2	—	8.1	—	1.2	—	27.9	—	—	100.0
30-36														
Grams	3	—	3	1	—	—	2	—	2	—	—	—	—	11
Per cent	27.3	—	27.2	9.1	—	—	18.2	—	18.2	—	—	—	—	100.0

TABLE 7—(Continued)

Site	<i>Turbo</i>	<i>Tri- dacna</i>	Echi- noid	<i>Cypraea</i>	<i>Cyma- tium</i>	<i>Va- sum</i>	<i>My- tilus</i>	<i>Tere- bra</i>	<i>Conus</i>	<i>Strom- bus</i>	Other	Bone	Modern	Total
Square A1 <sup>b</sup>														
24-30 <sup>c</sup>														
Grams	3533	1430	487	209	2	—	77	119	103	17	100	143	3	6223
Per cent	56.8	23.0	7.8	3.4	0.0	—	1.2	1.9	1.7	0.3	1.6	2.3	0.0	100.0
30-36														
Grams	1522	431	369	107	5	2	73	1	98	31	131	69	—	2839
Per cent	53.6	15.2	13.0	3.8	0.2	0.1	2.6	0.0	3.4	1.1	4.6	2.4	—	100.0

<sup>a</sup> The indication of 1 gram means 1 gram or less.<sup>b</sup> *Cymatium* includes *Bursa*.<sup>c</sup> *Vasum* includes *Thais* and *Drupa*.<sup>d</sup> *Terebra* includes *Pyramidella* and sporadic *Mitra*.<sup>e</sup> Depths are given throughout in inches.<sup>f</sup> Although column samples were collected with an  $\frac{1}{8}$ -inch screen, they were analyzed with a  $\frac{1}{4}$ -inch screen.<sup>g</sup> Represents proper proportionate weight but not full weight.<sup>h</sup> All depths are below datum.<sup>i</sup> Earth with echinoid spines; each spine was approximately  $\frac{3}{8}$ -inch in length.<sup>j</sup> Thought to be recently intruded during the excavation process.<sup>k</sup> The southeast quadrant is divided: 24-33 inches and 33-36 inches.

TABLE 8  
RELATIVE SHELL WEIGHTS (IN GRAMS PER CUBIC FOOT)

Sample	Column		Square	
	Total Shell	"Common Shell"	Total Shell	"Common Shell"
Mata'iri'i, A1, 24-36 inches below surface	97	76	109	108
Te Amaama, Square No. 1, Southeast Quadrant, 6-12 inches below surface	70	70	147	145

types found. Sporadically, we found other types which included dog and, even more rarely, bird bones, a few horse or ox bones, and single rat and sea-mammal bones. At Mata'iri'i and Square R48 of Hauiti we found only single instances of bone, and these sites were concomitantly poor in artifactual material. Of the stratified sites, Vaiohu'a contained little bone, but here more fish than mammal bone was recovered except in the area around the earth oven. Unfortunately, the bones were too fragmentary to permit identification.

Ta'auaoa, only a few yards from Vaiohu'a, contained considerable quantities of both fish and mammal bone. If the increased proportion of bone is a function of the late occupation of the site, as indicated by the post-contact artifacts associated with the midden, this may reflect the change in diet following the European occupation, or changing settlement pattern involving movement to the coast, or both. We cannot, however, overlook the possibility that the site represents a European house, in which case the bones found may reflect a European diet.

The coastal excavations produced a considerable range of shells (Table 10). Their identification was preceded by separation into types by the investigators. The resulting types were later identified by Mr. William E. Old, Jr., of the American Museum. As indicated in Table 7, the types, in several instances, included several genera. Where this occurred, the genera included in the type must all be assumed to have occurred wherever the type was found. In fact, the presence of more than one genus usually stemmed from the inclusion of fragments of other genera that closely resembled the main genus around which the type was constructed.

As a result of charting the occurrence of types of shell, it was found that certain types not only had a greater frequency than others but were

present in nearly every site. Some of these types are still used by the Polynesians and are assumed to have been used in the past. Others are not positively used by the present population, and may not have been previously, but cannot be ignored as they occur very frequently. Both useful shells and frequent shells of uncertain utility are grouped under the heading "Common Shell" (Table 8).

The animals from some of the common shells doubtless formed part of the diet of the Mo'oreans.

*Turbo*: This is the only genus that occurred not only throughout the coastal excavations and the inland site (ScMo 4) but in greater quantity than any other shell. Frequently whole shells were encountered; in many, a chip was characteristically missing from the outer lip, indicating that the shells had been broken open. This method of opening the shell was observed in modern Polynesia by one of the investigators. In addition, large numbers of "cat's eyes," or hemispherical buttons used to close the outer lip by the live animal, were found. These mollusks, now in great favor in Polynesia, are gathered outside the barrier reef in quantity. This modern ethnographic fact and the presence of so large a quantity of large broken shells in the midden give us some confidence in assigning this animal to the diet of the pre-contact Polynesians. In addition, at Vaiohu'a where stratigraphy was present, the proportion of *Turbo* to other types of shell remains consistently large.

*Tridacna*: Shells of this genus also occurred with great frequency, and the animals are also eaten in the area at the present time. A number of the specimens were whole or partial shells of large animals. Since *Tridacna* comes from the lagoon, the smaller specimens may have been washed ashore. However, the live animals wedge themselves deeply into coral heads, and

TABLE 9  
BONE FRAGMENTS BY SITE AND LEVEL (IN INCHES) RECOVERED FROM COASTAL EXCAVATIONS

Site and Level	Pig	Human	Bird	Fish	Unidentified Mammal	Other
<b>Mata'iri'i<sup>a</sup></b>						
Surface	—	—	—	—	—	—
Level B	x	—	—	—	x	—
Level C	—	—	—	—	—	—
Level D	—	—	—	—	—	—
<b>Hauti</b>						
<b>X50</b>						
Surface	—	—	—	—	—	—
0–6	—	—	—	x	x	—
6–12	x <sup>b</sup>	—	—	x	x	—
12–18	x <sup>c</sup>	—	—	x	x	—
18–30	—	—	—	x	x	x <sup>d</sup>
30–42	x	—	—	x	x	x <sup>e</sup>
<b>Y50</b>						
Surface	—	—	—	—	—	—
0–6	—	—	—	x	x	—
6–12	—	—	—	x	x	—
12–18	x <sup>f</sup>	—	—	x	x	—
18–24	x	—	—	x	x	—
24–30	x <sup>b</sup>	—	x <sup>c</sup>	x	x	—
30–40 approx.	x	—	—	x	x	—
<b>R48</b>						
Surface	x	—	—	—	—	—
0–6	—	—	—	—	—	—
6–12	—	—	—	—	—	—
12–18	—	—	—	—	—	—
18–24	—	—	—	—	—	—
24–30	—	—	—	—	—	—
<b>V54</b>						
Surface	x	—	—	—	x	x <sup>d</sup>
0–12	x	—	—	x	x	—
12–24	x	—	—	x	x	—
24–40 <sup>g</sup>	—	—	—	x	x	—
<b>Vaiohu'a<sup>h</sup></b>						
Surface	—	—	—	—	—	—
Layer A	—	—	—	x	—	—
Layer B1	—	—	—	—	—	—
Layer B2	—	—	—	x	x	—
Layer C	—	—	—	—	—	—
Around oven (28–35)	—	—	—	—	x	—
<b>Ta'auroa</b>						
<b>C10</b>						
Surface	—	—	—	—	—	—
4–10	x	—	—	x	x	—
10–14	—	—	—	x	x	—
14–17	—	—	—	—	x	—
<b>D10</b>						
Surface	—	—	—	—	—	—
2–8	—	—	—	x	x	—
8–14	—	—	—	x	x	—
<b>Te Amaama</b>						
<b>No. 1</b>						
Surface	—	—	—	—	—	—



TABLE 9—(Continued)

Site and Level	Pig	Human	Bird	Fish	Unidentified Mammal	Other
0-6	x	—	x	x	x	x <sup>i</sup>
6-12	—	—	—	x	x	—
12-18	x	—	x	x	x	x <sup>j</sup>
18-24	—	—	—	x	x	—
24-30	—	—	—	x	x	—
30-54	—	—	—	—	x	—
No. 2						
Surface	—	—	—	—	—	—
0-6	x <sup>c</sup>	—	—	—	x	—
6-12	x	—	—	—	x	—
12-18	—	—	—	—	x	—
18-24	x	—	—	x	x	—
24-30	—	—	—	—	x	—
30-38	x <sup>k</sup>	—	—	x	x	—
Mata'i Taria						
B2						
Surface	—	—	—	—	—	—
Level I	x	—	—	x	x	—
Level II	x	x	—	—	x	—
Level III	x	—	—	x	x	—
Level IV	x <sup>l</sup>	—	—	x	x	—
Level V	x	—	—	x	x	—
Level VI	x	—	—	x	x	x <sup>i</sup>
Level VII	—	—	—	—	x	—
Z1						
Surface	—	—	—	—	—	—
Level I	x	—	—	—	x	—
Level II	x	x	—	—	x	—
Level III	x	x	—	—	x	—
Level IV	—	x	—	—	x	—
Level V	x	x	—	x	x	—
Level VI	—	—	—	—	x	—
Level VII	x <sup>m</sup>	—	—	—	x	—
A1	—	—	—	—	x	—
Surface	—	—	—	—	x	—
Level I	x	x	—	—	x	—
Level II	x <sup>n</sup>	x	—	x	x	x <sup>i</sup>
Level III	x	x	—	—	x	x <sup>d</sup>
Level IV	x	x	x	x	x	—
Level V	x	x	—	x	x	—
Level VI	x	x	—	x	x	—
Level VII	x	x	—	x	x	—

<sup>a</sup> Both squares.<sup>b</sup> Dog or pig.<sup>c</sup> Uncertain identification.<sup>d</sup> Dog.<sup>e</sup> Rat cranium.<sup>f</sup> Half of a pig mandible.<sup>g</sup> Storage pit.<sup>h</sup> Total square.<sup>i</sup> Ox or horse.<sup>j</sup> Sea-mammal vertebra.<sup>k</sup> Pig jaw and two other bones.<sup>l</sup> Large pig tusk.<sup>m</sup> Cut pig femur from canoe burial.<sup>n</sup> Half of a pig skull.

TABLE 10  
LIST OF SHELLS FOUND IN COASTAL EXCAVATIONS IN PAPETO'AI, MO'OREA

Echinoids	Univalves ( <i>continued</i> )
Sea urchins: no other identification possible	<i>Cypraea</i> species?
Land snails	<i>Cypraea annulus</i>
No further identification made	<i>Cypraea caput serpentis</i>
Bivalves	<i>Cypraea depressa</i>
<i>Arca</i>	<i>Cypraea erosa</i>
<i>Asaphis deflorata</i>	<i>Cypraea moneta</i>
<i>Barbatia</i>	<i>Cypraea obovata</i>
<i>Cardium</i>	<i>Cypraea tigris</i>
<i>Chama</i>	<i>Dollabella</i>
<i>Codakia</i>	<i>Drupa</i>
<i>Gafrarium</i>	<i>Fragum unedo</i>
<i>Lucina</i>	<i>Gastrochaenidae<sup>b</sup></i>
<i>Modiolus</i>	<i>Harpa</i>
<i>Mytilus</i>	<i>Helcioniscus</i>
<i>Ostrea</i>	<i>Hipponyx</i>
<i>Periglypta</i>	<i>Lambis</i>
<i>Pinna</i>	<i>Melampus</i>
<i>Pteria</i>	<i>Mitra</i> species?
<i>Quidnipagus</i>	<i>Mitra mitra</i>
<i>Tellina</i>	<i>Mitra stictica</i>
<i>Tridachna elongata</i>	<i>Mitra sphoerulata</i>
<i>Trochus</i>	<i>Nassarius</i>
Univalves	<i>Natica</i>
<i>Anadara</i>	<i>Nerita polita</i>
<i>Astraea</i>	<i>Neritina</i>
<i>Bulla</i>	<i>Oliva annulata</i>
<i>Bursa</i>	<i>Patella stellaeformis</i>
<i>Cantharus</i>	<i>Polinices</i>
<i>Cerithium</i>	<i>Pyramidella</i>
<i>Charonia tritonus</i>	<i>Pyrene</i>
<i>Chione<sup>a</sup></i>	<i>Spondylus</i>
<i>Conus</i> species?	<i>Strombus</i> species?
<i>Conus coronalis</i>	<i>Strombus gibberilus</i>
<i>Conus ebraeus</i>	<i>Strombus lentiginosus</i>
<i>Conus leoparsus</i>	<i>Strombus mutabilis</i>
<i>Conus litteratus</i>	<i>Terebra</i> species?
<i>Conus pulicarius</i>	<i>Terebra maculata</i>
<i>Conus quercinus</i>	<i>Thais hippocastaneum</i>
<i>Conus vexillum</i>	<i>Turbo setosus</i>
<i>Coralliophila</i>	<i>Vasum</i>
<i>Cymatium</i>	

<sup>a</sup> Subgenus.<sup>b</sup> Family.

it would be difficult to envision a storm severe enough to dislodge the larger animals from their resting places. We therefore conclude that this genus also formed part of the pre-contact diet.

ECHINOIDS: Sea urchins are eaten today, and we assume that they were in the past. Although some spines were probably washed ashore, we

believe that some echinoids must have been collected and eaten.

We have no direct evidence that the inhabitants of other shells collected, of common or sporadic occurrence, were eaten. However, if shell-gathering practices similar to those in modern Samoa and Mangareva existed in pre-

contact Mo'orea (that is, wading out in the lagoon and scooping up whatever shells lie on the bottom to bring to shore), we have an explanation for the range in type and size of the shell that we found. Nonetheless, we cannot omit the possibility, and in the shore sites the probability, that a considerable portion of our shell midden resulted from sea wash. Two sites (Mata'iri'i and Squares X50 and Y50 of Hauiti) are very close to the sea. Mata'iri'i is a wave-eroded occupation remnant, and, at Hauiti, Squares X50 and Y50 are no more than 30 feet from the water at their most inland points. In sum, then, we cannot say that the Polynesians *did* eat more than the few types mentioned above; we can say only that they *could* have done so.

Other types of shells were, however, very probably used for other artifacts. We found hooks and lures of *Conus*, *Pteria* (pearl), and *Turbo*; chisels and a gourd stopper of *Terebra*; and a worked piece of *Tridacna*. Echinoid spines were probably used as files, although only two were found that indicate such use. Cowries are widely used for decoration at the present

time; a large species (*Cypraea tigris linne*) is used as a breadfruit scraper. Large conch shells (*Strombus*) are known to have been used as horns, as they still are. Several *Conus* shells that were found were cracked quite neatly in the sagittal section, and the apical spiral was removed, but whether this separation was purposeful or is a function of natural shell fracture is uncertain. Finally, it is conceivable that other shells, particularly whole specimens, were collected for their attractive qualities, as they are today.

Unfortunately, time did not permit the exercise of close control on midden sampling and the collection of live specimens for comparison with midden shells. Inasmuch as so little stratigraphy was encountered, such an expenditure of labor seemed unwarranted. Should archeological work be continued in this area and should stratified sites be found, it would be possible to extract considerable information from the midden material, not only about the diet of the population but also about changing conditions in the adjacent lagoon and reef ecosystems.

## SUMMARY AND CONCLUSIONS

ROGER C. GREEN

WHEN THE FIRST SUMMARY and conclusions to the four original reports (three on the coastal excavations and one on the inland round-ended house at Amehiti) were drafted, the conclusions were fairly limited, partly because the volume of comparative material was so restricted and partly because our own data were not sufficiently substantial. Although these limitations still hold to some degree, the necessary excavations in *marae* and at the site of the round-ended house of the eastern portion of the 'Opunohu Valley have now been completed. Additional ethnohistoric evidence on the settlement in the valley has also recently come to light. This, together with the comparative materials provided by the preliminary reports published by Emory and Sinoto (1964; 1965), Garanger (1964), and Verin (1964), makes it necessary to recast and expand our original summary and conclusions. The discussion, however, must still be somewhat restricted, because only preliminary reports of other work presently exist, and all the data on the Society Islands itself do not as yet warrant broad conclusions that attempt to outline the cultural sequence or to place it in the context of Polynesian prehistory generally.

The data fall naturally into two groups: coastal and inland excavations. Our archeological control is greater over the latter. However, before discussing these two areas and their differences, we wish to point out what is involved in the differentiation between "inland" and "coastal" sites. First, we must reiterate that "deepest inland" in Mo'orea is no more than 5 kilometers from the sea. This distance applies to the 'Opunohu Valley only; other valleys are seldom more than 3 kilometers deep.

In the 'Opunohu Valley, structural remains are concentrated on rising ground of the flat valley floor; there are few remains in the 2 kilometers closest to the sea. In the smaller, narrower Fa'ato'ai Valley no sharp discontinuity in settlement is observable. House sites and religious structures appear to have been scattered throughout its length, with the center of population up to 1 kilometer or more from

the coast, although one known and published cluster of sites at Apo'ota'ata occurs farther inland (Emory, 1933, 108). Garanger (1964, 8), in his study of sites in the Tautira Valley of Tahiti, also recorded the absence of sites between those on the coastal plain and those some 2.5 kilometers inland, a situation comparable to that in the 'Opunohu Valley. These differences might be explained by the greater destruction of sites on the coast and in the intervening areas, but, as we can determine from ethnohistoric evidence for the 'Opunohu Valley, such an explanation is not necessarily correct. First, if we take into account the more disturbed nature of structures along the coast, it would still seem that as many or more structures were situated inland from this zone, either where the valley floor opened out onto the coastal flat, as in Fa'ato'ai, or well inland, as in the 'Opunohu and Tautira valleys. Second, artifacts relating to the fishing industry will most commonly be found in coastal sites. To date, parallel results supporting the latter point have been obtained by Emory and Sinoto (1965). Third, whereas coastal middens are composed mainly of shell which is preserved in the less acid soils, tests of the more acid inland soils reveal that bone and shell are not long preserved there. These tests (Tables 11 and 12) show, however, that on occupation sites the decomposition of such material tends to lower the acidity, suggesting the former presence, now indicated only by fragments, of some midden, although probably never so extensive as on the coast.

It may be inferred from this discussion that the bulk of the population on Mo'orea need not have been concentrated on the seashore along the coralline part of the coastal flat as it is at present, nor aggregated into villages. Rather, for a people who relied essentially on cultivable foods, the more scattered, homestead-like pattern of settlement described by the early European explorers, with focal concentrations in ecologically favorable zones inland, seems to be more understandable in terms of both the archeological record and the economic requirements of Tahitian food production. It is our

TABLE 11

SOIL ACIDITY OF NON-ARCHEOLOGICAL SAMPLES OF THE 'OPUNOHU VALLEY<sup>a</sup>

Context of Samples	pH	
	Surface	Depth
Hydromorphic alluvial soils in lower valley	6.0	6.4
Non-hydromorphic alluvial soils in lower valley	5.8	6.0
Alluvial soils at heads of valley	6.3	5.7
Colluvial soils at base of ridges	6.2	5.5
Debris soils on vegetation-covered ridges	6.1	5.3
Debris soils at base of slopes or foot of cliffs	5.5	5.3
Soils on sparsely covered ridges		
<i>Purau</i> and pandanus cover	5.4	4.8
Guava cover	5.0	4.8
Fern and guava cover	5.0	4.9
Fern cover	4.5	4.3

<sup>a</sup> Data from Société d'Équipement de Tahiti et des Îles (1962).

TABLE 12

SOIL ACIDITY OF SAMPLES FROM ARCHEOLOGICAL SITES IN THE 'OPUNOHU VALLEY<sup>a</sup>

Context of Samples	Surface	pH	
		Occupation	Sterile Subsoil
Site ScMo 103C	6.40	—	6.60
Period IIIb	—	6.45	—
Period II	—	6.35	—
Period I	—	6.15	—
Site ScMo 158D	5.95	—	6.00
Period II	—	6.20	—
Period I	—	6.25	—
Site ScMo 163	6.00	—	6.05
Layer 3	—	6.15	—
Layer 1	—	6.05	—
Site ScMo 167	5.30	—	—
Layer 1	—	5.95	—

<sup>a</sup> Analysis courtesy of Mr. M. G. Rowell.

belief, then, that the territorial base of political and social units in Mo'orea involved both "inland" and "coastal" zones. They comprised one or more valleys and their shorelines, according to the variations in the local ecology and the degree of social and political integration that had been achieved as a result of historical circumstances. Settlements, at least in Mo'orea, may not be divided into two qualitatively distinct types, coastal and inland. Instead, the settlement of each strip of coast and its associated interior valleys must be viewed as a unit, with situations differing according to the local ecology.

### COASTAL SITES

All the coastal sites excavated by us lay within or immediately adjoining the sandy, coralline-soil zone in which scant structural evidence was encountered. Radiocarbon dates from the coastal sites allow us to state that the materials we recovered all date to the twelfth or thirteenth century or more recently. The pig, the coconut (by inference from the presence of the coconut scraper), one variety of the Duff 4A Type of adze, and the *Terebra*-shell gouge were all present in the earliest part of this sequence. It is possible, in addition, to assign an age of some hundreds of years to the narrow type of

pounder. Inherent in this suggestion is the recency of the well-known flaring form.

The artifact collection, although small, yielded some unexpected results. The range of fishing gear is unlike that found in museum collections. Most of the specimens we excavated have counterparts in the published collections, but some are of types or materials that have not been previously reported. The occurrence of one-piece hooks in *Turbo* shell and of lure shanks and points and chisels in *Conus* and *Tridacna* was unexpected. Also it was impossible to predict the presence of minute one-piece hooks and the "Western Polynesian" two-hole lure point from the literature or from the known ethnographic collections. The presence of the latter was not surprising, however, in the light of its recent discovery in Hawaii and the Marquesas.

Surprising, by comparison with existing collections, was the total absence of bone from the inventory of fishing gear. Although we cannot be certain that bone fishing gear will not ultimately be found, we have as yet no archeological evidence to support such an expectation. In the light of our experience, the use of the bone fishing gear in museum collections as a basis for any speculation concerning the pre-contact inventory of fishing appliances is procedurally dubious, which is also borne out by Suggs's Marquesan experience.

In terms of the manufacture of fishing gear, the evidence generally substantiates Banks's description, although we believe stone flakes, rather than shell knives, were the principal cutting or sawing tools.

Other portions of the inventory also vary somewhat from the known range. It was expected that the adzes of the Duff Types 3A and 4A, as well as the small chisel, the narrow *penu*, and the coconut scraper, would be found in the excavations, but the occurrence of the *Terebra*-shell gouges, the "toggle," and the obsidian and chalcedony flakes could not have been anticipated.

Certain problems of a procedural nature became clear. These problems must be solved if adequate results are eventually to be attained. The most serious problem that confronts us is the instability of the coastline. Through a variety of natural processes, the relation of land and sea levels has been changing continually, mostly at the expense of the land. The twelfth-

or thirteenth-century floor at Site ScMf 5 (Te Amaama) is 14 inches below the present level of the sea. Deposits at other sites also accumulated below sea level. One of the most difficult problems confronting the archeologist is the identification of early coastal sites that have not been subjected to invasion by the sea. Related is the problem set by the extreme disturbance of the coastal sites by continued human and animal activity. The archeologists of the Bernice P. Bishop Museum (Emory, 1962) have encountered similar problems.

That these problems are not insoluble is demonstrated by the small excavation at ScMf 3 (Vaiohu'a). Here, 250 feet from the present shoreline, artifacts were recovered and features were recorded in a stratified site undisturbed by land crabs or human beings. That similar sites exist is substantiated by the yield of materials from the circum-island water-line excavation undertaken several years ago. Sites such as these are difficult to find, because they are marked by few surface indications and are generally covered by low vegetation. Perhaps it will be necessary to determine sites desirable for excavation by relying essentially upon micro-environmental evaluations of various locations. If so, results can be expected only after long and systematic test excavation has been undertaken.

Our initial results are most profitably compared with rather similar results achieved by the excavations of the Bernice P. Bishop Museum in a coastal site at Afareaitu, on the southeastern coast of Mo'orea (Emory and Sinoto, 1965, 50-61). One major but important difference in the site they described was the presence of structures which could be associated with the various portable artifacts and with datable materials. Thus four *marae*, one feasting platform, and one house foundation were surveyed and excavated in the process of recovering some 20 classifiable fishhooks, six adzes, human-bone and *Conus*-shell chisels, two sea-urchin and many coral files, and five *Tridacna*-shell sinkers. Other less important items are also listed in their Table 3. The oldest radiocarbon date indicates that the earliest occupation may have occurred as early as the tenth or eleventh century, but neither artifactual materials nor structures seem to be firmly associated with so early a period. The house foundation and the feasting platform are relatively recent, dated at about

1800 A.D., but a fire pit under *Marae* M5-3 fixes the occupation under that structure at some time between 1230 A.D. and 1710 A.D., when only one standard deviation is taken into account. Emory and Sinoto (1956, 57) concluded that the total evidence seems "to indicate that the whole complex of the Afareaitu site is characteristic of the late period of Tahitian prehistoric culture, some of which was retained into protohistoric time." The numerous parallels with their artifactual assemblage, particularly the fishhook forms and the comparable radiocarbon results, suggest that our material might well be summarized in the same way. Using these two assemblages and the additional artifacts from inland sites of the same age, it is possible to outline the nature of the archeological assemblage for the period probably dating after the thirteenth century that is particularly characteristics of the sixteenth century through the eighteenth century and persists into the early nineteenth century. But it is not now possible to identify the nature of any cultural changes during this period.

However, for the most part this assemblage stands in marked contrast to the earlier assemblage found in the Maupiti burial site, dating somewhere between the ninth and twelfth centuries on the best of the available radiocarbon estimates (Emory and Sinoto, 1965, 78). Even if the possibility be granted of a sloping cultural horizon, with Maupiti lagging behind, as it does today in cultural change, numerous developments from the single earlier assemblage to the several later ones may be inferred. Furthermore, these developments are not like those found in the thirteenth and fourteenth centuries in New Zealand, whereas the earlier sites in New Zealand have a great number of parallels with the earlier Maupiti burials. Therefore the implication is that Tahitian culture of the fourteenth century and later cannot have been the source of the so-called fleet or Classic Maori culture of New Zealand, as some theorists maintain. For the most part, these more recent Tahitian artifact forms do appear in the Cooks, the Australs, and the Tuamotus, but not in New Zealand, Mangareva, or the Marquesas, for instance. Others, such as the one-piece fishhook with the form-A shank head, are found in the Hawaiian Islands. A similar phenomenon and distribution can be observed with Tahitian stone structures with which these portable

artifacts are associated. Thus the impetus for these later changes, the exact point in time at which they occurred, or even the nature of the earlier cultural horizons in Mo'orea and Tahiti, all remain to be defined. But the later developments of Tahitian culture are definitely distant from those in many of the more marginal island groups of Eastern Polynesia, except for Hawaii, and are paralleled only to a degree in other parts of central-eastern Polynesia. To what degree they are independent innovations and to what degree they depend on outside stimulus remain to be determined. Both possibilities must remain open for the present.

### INLAND SITES

The results of the inland excavations merit more extended discussion because of better archeological control. To date, relatively little is known from empirical data of the physical pattern of settlement associated with Tahitian society at the time of early European contact. Emory (1933) has provided island-wide descriptive data on most structural types, particularly *marae*, and Handy (1932) has done the same for houses. This information was, however, not collected in a framework capable of close sociological or political interpretation. Emory and Sinoto (1965) have continued to accumulate island-wide data on religious and other structures, but Garanger (1964) and Verin (1964) have published the only useful locality studies made on the island of Tahiti. Their samples are, unfortunately, relatively restricted. Thus only in the 'Opunohu Valley have a significant quantity of data relating to a diverse range of structural types been mapped, recorded in detail, and analyzed typologically, and some of the most important types of structures been excavated. Up to this point, therefore, the sources for persons who attempt to describe Tahitian society have largely been restricted to eyewitness accounts, traditions, and comparative sociology.

An obvious, if neglected, possibility was to undertake a controlled archeological assessment of a single locality to recover the details of the settlement pattern at the time of European contact. Such an assessment would provide a baseline and point of comparison for students working with historical sources. A main requirement of such a study, however, would be a locality where conditions are not much dis-

turbed by later nineteenth- and twentieth-century settlements. Such conditions do not at the present time generally exist on the coast. Hence any suitable area for such a study was likely to be inland. Such a situation would obviously provide answers only for some but not all questions. Yet if a study were undertaken in an area where optimum ecological conditions existed for the full development of Tahitian society inland, it would provide guidelines for the interpretation of much historical data. In my view, such a situation obtained in the 'Opunohu Valley. From the beginning it has been exploited with such an objective in mind. It remains to summarize what appears to have been achieved.

Our major excavation projects were oriented in specific directions. One was concerned with round-ended houses and the function and interpretation of the more important of them. The second was concerned with the larger and better-preserved religious structures and their typology, function, and interpretation. In both projects ethnohistoric records and archeological data have been examined in some detail; more are considered here. They provide some fairly soundly based functional identifications of a number of structures, including archery platforms (Green, 1961b), raised assembly platforms (Green, 1961a, 172), and, in the present series of reports, rectangular sleeping houses, assembly or community houses that differ in their structural features from other round-ended houses, and *marae* of several types, one of which can be associated with the highest-ranking member of the settlement. Other structures, particularly other types of *marae* and round-ended houses, may be similarly identified (although less securely) with various functions, and the whole settlement pattern can then be assessed. First, however, consideration of the general ethnohistorical and traditional situation relating to the 'Opunohu Valley must be reviewed.

The final and major occupation of the 'Opunohu Valley can be fairly well bracketed in time by the ethnohistoric and archeological evidence. It relates to a period prior to the crumbling away of the traditional Tahitian society under the impact of conversion to Christianity. The latter event was closely associated with the final rise to power of Pomare II throughout the Society Island Group.

Archeologically, a radiocarbon date sets occupation as far back as the thirteenth century, although the sustained occupation appears, again on the basis of a number of radiocarbon dates, between the seventeenth and early nineteenth century. One cache of adzes from the long, fern-covered ridge in the eastern portion of the valley is distinctive. It consists of a tanged quadrangular or Type-IA adze and two tanged triangular adzes with apex to the front (Type 4A) but without the marked projections at the poll and shoulder or the long pronounced bevel shoulder at the juncture of the latter with the base. These forms are typologically intermediate between the earlier Maupiti types (Emory and Sinoto, 1964) and those we recovered from the excavations. They, too, suggest some occupation of this valley at a time prior to the manufacture of the large numbers of adzes of Types 4A and 3B, with projections at the polls and prominent bevel shoulders. These also are most common in our surface collections and excavations in the valley. Emory and Sinoto (1965, 85) have shown them to be the dominant later types in the Society Islands. Another earlier form of Type 4A was also recovered from the early thirteenth-century context in Site ScMo 4. But, aside from these and a few other early adze forms, the remaining portable artifacts from the surface, as well as those from the excavations, consisted of types that belong with the last phase of Tahitian culture, just as did a majority of the identifiable structures.

We turn now to the traditional and ethnohistoric evidence. The earliest people identified with the 'Opunohu are the Atiro'o, according to Ari'i Taimai (Adams, 1947, 163-164), or, less definitely, the Atitavae, according to Marau (Handy, 1930, 80). When the Atiro'o war occurred, probably about 250 years before 1900, no Mo'orean chief was dominant. None dared to take up the cause of the Ha'apiti chieftainess against the 'Opunohu (Adams, 1947, 165). Hero twins eventually did and crossed to the 'Opunohu, killing every Atiro'o, or at least a sufficient number, so that they were able to take possession of the district for Marama and divide it into two new districts, Tupauruuru and Amehiti (Adams, 1947, 167). A little later the same Marama is said to have established dominance over the entire island (Adams, 1947, 170-171). Even if at this point Ari'i Taimai was at-



tributing too great power to her ancestors (Gunsong, 1963, 415-417), Teuira Henry (1928, 92), writing from the Pomare side, concurred on the point that 'Opunohu was dominated by Ha'apiti. After naming its subdivisions, she remarked that it was said of them, "They are a bunch of Ha'apiti belonging to Marama." The Marama, chief of Ha'apiti at the time of initial conquest of the 'Opunohu, is said to have come over and built a *marae* in Amehiti. The next Marama was living there when he acquired that title (Adams, 1947, 168). The fleet preparing for war against Mo'orea, observed by Cook in 1774, was claimed by Ari'i Taimai to have been raised to attack not the whole island but only the district on the north that was the 'Opunohu led by Mahine (Adams, 1947, 5). This 1774 conflict involved a power struggle in Mo'orea between Teri'itapuni of Varari, Pomare I's wife's brother, and Mahine, Teri'i's uncle and one of the four fighting chiefs of Mo'orea under Marama (Adams, 1947, 5). Two Tahitian chiefs, Towha (Tahua or Te To'ofa) and Potatau, with reluctant support from Pomare I, sided with Teri'itapuni against Mahine. Nevertheless, Mahine seems to have won his cause in Mo'orea, for Cook, when he himself saw him while visiting the 'Opunohu Harbor in 1777, regarded him as principal chief of the island. Cook also reported in 1777 that the 1774 conflict between Mahine and Towha continued, still with reluctant backing by Pomare I, and that a fleet under Towha had again been raised to attack Mo'orea. "Mahine wisely called for a truce" (Newbury, 1961, xxxvii). Although Cook succeeded in patching up the developing conflict between Towha and Pomare I over the latter's lack of support, by 1788 it had fully erupted, with Towha, other Tahitian chiefs, and Mahine all opposed to Pomare (Beaglehole, 1959, xcii). Yet, with access to firearms and with the assistance of the "Bounty" mutineers and other Europeans, Pomare I eventually, in 1790, defeated his enemies in Tahiti, in a battle in which Mahine, who had joined them, was killed. With Tahiti safe in the hands of his young son, Pomare II, he returned to Mo'orea, where he exercised his authority through his niece who had come into the Ta'aroa ari'i title (p. 224). By 1791-1792, when Vancouver visited the Society Islands, Pomare was considered a paramount chief there (Adams, 1947, 107; Newbury, 1961, xxxvii-viii). In 1804

Pomare's son, Pomare II, already a chief over some districts in Tahiti, was proclaimed paramount chief of Mo'orea, the whole of the Pape-to'ai district having been laid under a food taboo, *rahui* (Newbury, 1961, 75), for this purpose. After successive defeats in Tahiti, Pomare II retreated to Mo'orea in 1808, when many of the missionaries departed, to return later. For the next decade, Mo'orea provided Pomare with a refuge (probably at Urufara, from contemporary descriptions of trips to his residence) until 1815 when he established his political authority over Tahiti as well.

It becomes necessary to summarize a complicated situation and its relevance for this study. Traditional accounts identify the 'Opunohu before 1774 as having been under the domination of Ha'apiti and the Marama line, with a populous area split into two districts and governed by a fighting chief of their own. Both traditional accounts and historical records identify the 'Opunohu between 1774 and 1790 as being strong enough to have successfully repulsed attacking groups from Tahiti. In the latter period the 'Opunohu seems to have been dominated by one of four Mo'orean fighting chiefs, Mahine. After 1790, the northern districts, Mo'orea particularly, came increasingly under the sway of the Pomares until the dominance of Pape-to'ai was established (Henry, 1928, 114). Therefore, the decline of the power and population in the 'Opunohu seems to date from the very end of the eighteenth century.

The abandonment of the area is closely related to the history of missionary success and the associated phenomenon, so often encountered in Polynesia in similar circumstances, of people moving from inland settlements to the coast. The population in the 'Opunohu first came to the attention of the missionaries in 1805, when Bicknell and Henry made a journey around Mo'orea (Eimeo) and, after having circled the island, left this account of their visit to the 'Opunohu on January 31 and February 1, 1805:

Jan. 31: Being informed that there were people living a long way inland at a place called Hue, a part of a tract between the mountains . . . we hired a boy for a comb to conduct us & set out for the place. We passed through a piece of low land at the head of the harbour of considerable extent, a complete wilderness growing thick with Purou, ratta & other trees; but no breadfruit. The land appeared very fruitful.

It is a well watered spot, being crossed in different directions, by a number of rivulets of different sizes, which all unite their streams within about 2 furlongs of the harbour, & constitute a river navigable for boats so far inland. In many places on the banks of these rivulets, & indeed all through this tract of ground, the tumerick & ginger is in great abundance. Getting out of the wood we soon began to ascend the rising ground, & began to have a fine prospect of the surrounding mountains & adjacent pleasant hills & vallies. And ascending these gently rising mountains covered with breadfruit, cocoanuts & apple trees &c. & here we found the houses & people: and from hence which appears to be an airy & healthy place we could see part of the harbour of Oboonuhu, the greater part of that of Paoupaou, & out to sea. The natives informed [us] that there were roads across the mountains from most parts of the island to this place.

February 1: Discoursed at our lodgings & at two other places in Hue some distance from it, to 20 persons in all. . . . Set out with our guide for a place near the western extremity of the opening abt. 2 or 3 miles distant where we were informed that there were a number of people residing, but . . . we found but 5 to preach to.

This trip was not the first around Mo'orea by the missionaries, but until 1805 the population in the 'Opunohu seems to have gone unnoticed. The first sermons were delivered in, and the first trip around Mo'orea took place at, the beginning of 1803. These were repeated at the beginning of 1804 (Newbury, 1961, 59, 67). Little that was remarkable or encouraging occurred during any of these three journeys (Newbury, 1961, 60, 67, 77). People gathered but listened with indifference or even ridicule. Handy (1930, 82) also recorded such indifference by these people toward Europeans from the time of contact in a song from Marau:

Come, oh come to your districts, Tupaururu and Amehiti,  
To see the big canoe without an outrigger.  
Its rowers are fair as white clouds!  
But Marama, the *ari'i* replied:  
"No, my children, no. I will not come. Take from me good counsel:  
Curiosity was ever a bad tempter,  
Fair clouds and dark clouds can never long agree.  
We have no better teacher than the storm."

Thus, in 1805, even though now under Pomare, the remaining population of 'Opunohu provided neither a large nor enthusiastic audience, but at least both the Hue and the Amehiti sides of the valley were still inhabited.

In 1810 and 1811, the missionaries began to meet with their first real success in preaching and teaching in Mo'orea and in particular in Papeto'ai. When Davies and Henry's son made another trip around Mo'orea in 1813, the people were more willing to listen. Davies (Newbury, 1961, 156) wrote: "Superstition and regard for the gods seemed to be decreasing, and the maraes and altars out of repair everywhere, and upon the whole he [Davies] thought there was an encouraging prospect of seeing better times."

The last chief to embrace Christianity resided at Varari. He succumbed by 1815 (Newbury, 1961, 195), so use of the *marae* in the 'Opunohu terminated before that date. Observance of the native religion and its associated social and religious customs seems to have dwindled early in the second decade of the nineteenth century. Up to 1818, missionary success was limited, but thereafter improved up to 1825, by which time most of the inhabitants had been baptized. At this time the main mission station was at Papeto'ai. Between 1812 and 1825 the station continued to attract the native population until it constituted a missionary village, complete with a chapel that was begun in 1824 and completed in 1829. Another village sprang up around Afareaitu, from 1817 onward the second most populous center.

In this context one may infer that the population in the 'Opunohu Valley rapidly declined at the beginning of the nineteenth century. With the rise of Christianity those people that remained in the valley abandoned their traditional religion. Probably unnoticed, it is assumed that they moved increasingly to the coast in and around Papeto'ai, because the missionaries made no further reference to a population within the valley. In 1817 when Hayward attempted to teach a few people who lived at the head of the 'Opunohu harbor to read, he abandoned the effort after only a few weeks (Newbury, 1961, 213). In September, 1818, when Gyles arrived to set up a sugar-cane press, a location in the lower flat of the 'Opunohu Valley at the junction of the two principal streams was chosen, and four men built houses there. Also a large tract was enclosed for growing cane. Again, no mention is made of a large native population living nearby; in the following year the project was abandoned (Newbury, 1961, 222-223). Finally, when Tyerman and Bennet (1831, Vol. 1, 107) visited

the valley in 1821, they recorded the ruins of the mill but did not comment on a local population inhabiting the amphitheater-like valley they described so vividly when they were taken to Varari to see a *marae* and community house.

To summarize, the historical evidence, as well as the evidence from tradition and archeology, places the abandonment of the inland portions of the valley, which contain no European period remains of the early nineteenth century, between 1805 and 1815. Later, the lower flat was used by Europeans. The major occupation with which we are concerned is, therefore, dated, in the interpretation presented in this paper, to the eighteenth century, terminating in the early nineteenth century, with an ever-smaller population than that from which the eighteenth-century one developed indicated for the previous 500 years. This earlier occupation is best represented in subsurface contexts and by structures that are no longer intact or that have been robbed. The terminal occupation phase of the early nineteenth century is reflected by Period IV at both Site ScMo 103C and Site ScMo 158D. One can, with some assurance, assign to the major occupation of the eighteenth century the three excavated community houses, the excavated or typologically late *marae*, and a majority of the remaining intact structures, particularly those with specialized functions that would have been restricted to ranking members of the settlement who would have occupied the dated community houses and *marae*. In the light of such an assignment, it is possible to make some assessment of the social and political situation or the community pattern (Chang, 1958, 299) reflected by these data.

The historical record of Bicknell and Henry (1805), which dates to the period when the valley was still occupied, supports all subsequent records, according to which the lower flat of the valley was covered by a dense tangle of vegetation. To judge from either the archeological or the historical record, it seems never to have maintained a substantial population. Native settlement, as Bicknell and Henry stated, did not begin until one reached rising ground farther inland. Positions in the eastern portion of the valley, whence they could have viewed both the 'Opunohu and Paopao bays, can be fairly well delimited. In my view, at this point they can have been in only the inland area that we

have called Tupaururu, and then only in the parts farthest from the coast. The best views of both bays are now from the higher parts of the open, fern-covered ridges, in particular the long ridge that leads directly to this settlement and a feasible route for them to have traveled. Bicknell and Henry described the occupied area, which lies largely to the east of this ridge, not as densely wooded in native trees and abounding in mosquitoes, as it is now, but as an open and airy place covered with breadfruit, coconut, apple, and other trees. All these trees still grow there in limited numbers, but the present dense, closed-canopy vegetation is dominated by *purau* (*Hibiscus tiliaceus*) and *mape* or Tahitian chestnut (*Inocarpus edulis*). Frequently, certain trees said to be associated with *marae* are also found. However, others, such as the *mara* on the *ahu* of ScMo 129, suggest that the larger trees in the close vegetative modern cover may be a product of the last 140 years. Although this huge tree, situated well up on the former steps of the *ahu*, may be a safe source for such an inference, one must in general come to such a conclusion with caution, because it is Tahitian practice to leave large trees growing in the courts of their *marae*. This practice is well illustrated by Tobin's drawings.

The broad-scale archeological evidence implies that there were two major settlements well inland in the valley. Such an implication is supported by traditional evidence that under Marama the population was split into two districts. It is also reinforced by the historical evidence of Bicknell and Henry, who, after visiting Hue and several other places in the eastern portion of the valley, journeyed "to a place 2 or 3 miles distant" to the west and remained in the valley, can have arrived only at Amehiti. Their description implied that the settlement at Hue in the eastern portion of the valley was more extensive than the smaller settlement in the western portion of Amehiti. This description is, of course, consistent with the archeological record.

The problem of names to be applied to these settlements and their traditional associations with various known political districts is more difficult. Any interpretation is open to some doubt. On the evidence of Ari'i Taimai (Adams, 1947, 167) rather than Marau (Handy, 1930, Fig. 4), I have placed Tupaururu in the 'Opunohu Valley in preference to assigning Amehiti to

the entire valley and Tupauruuru to Paopao. Our Tahitian informants, when questioned on possible places to which this name might refer, agreed that it did not apply to Paopao, but said it was a very, very old name for the eastern side of the valley. However, they never offered the name when I made a detailed record of all the place names known to them for the entire valley. But, then, many of the names they gave are obviously recent, as is implied by their meanings and the events they commemorate. Other names appear to be ancient. For example, everyone questioned consistently named Amehiti as applying only to the western portion of the valley. At present, the entire eastern portion is generally called Vaipohe ("dead water"), whereas Henry (1928, 92) gave Vaihere ("well-loved water") as the district name for both the entire 'Opunohu Valley and the eastern side of the coast along the bay itself, where, on the slopes leading up to Mt. Rotui, we also recorded extensive remains, including another community house. However, it is not unlikely that this coastal settlement, less extensive than that in the eastern portion of the valley, was related to the inland settlement, for, if our thesis is correct, that access to a part of the coast was a feature of any inland settlement, such would be the case.

Traditions, songs, and historical evidence all ascribe political dominance over the 'Opunohu settlement to Ha'apiti during and before the early European period, and until the 1790's when the Pomares established themselves as politically dominant in the districts of Te Aharoa and Papeto'ai by various means, including supporting successive holders of the Ta'aroa-ari'i title against their uncle, Mahine, until his defeat and death. Also, until Pomare II took the title of paramount chief over Mo'orea in 1804 (Newbury, 1961, 73), the Pomares maintained their dominance in Te Aharoa and thus in the 'Opunohu, first through the brother of the wife of Pomare I, Metuaro Mahau (Teri'itapunui), and then through his niece, who successively held the title of Ta'aroa-ari'i, chief of the Te Aharoa. By 1813 this title had passed on to the son of one of Pomare's supporters from Huahine, Puru (Newbury, 1961, 165). Orsmond's evidence, which Henry provided, came from Pomare II and from former priests, such as Mare of Mo'orea (Gunsen, 1963, 416). In my view it represents the

more recent state of affairs under the Pomares. Therefore, the Te Aharoa District, which Henry described with the divisions of Vaihere and Piha'ena on the 'Opunohu coast exercising domination over the 'Opunohu, was recent and short-lived. The old districts of Tupauruuru and Amehiti were superseded by a new political creation, Te Aharoa. Whatever its former state, Te Aharoa now included much of the northwestern portion of Mo'orea. Thus 'Opunohu became a subdivided fraction of a subdivision.

In this light it is no surprise that Henry (1928, 92), in describing the 'Opunohu, mentioned none of the older terms. Instead, she described the 'Opunohu as extending from 'Apu'u to Te Urutuiaitea'u, the latter a division that borders on Urufara, the seventh district of Te Aharoa. I have recorded Pu'uroa as the name for the main hill that marks the eastern boundary of the settlement, but none of the other names she mentioned. She gave seven subdivisions for the valley: Hue, Tahumate, Pina'i, Poa, Hitihiti, 'A'araeo, and Te Urutuiaitea'u. Of these, the last would refer to old Amehiti, and the first (Hue) was identified by Bicknell and Henry (1805) as part of the eastern portion of the valley. However, they also mentioned preaching in several other places some distance from Hue, before making the longer journey to the western portion of the valley, so it is more likely that other subdivisions mentioned by Henry refer to the eastern portion of the valley, where the archeological evidence implies such segmentation.

Taking the primary data from Green (1961a) with appropriate corrections, I have attempted in Table 13 to transform them into more sociological terms. Doubtless some points will need greater elaboration to gain support than there is space for here, but I believe that they are suitable for the general statements I wish to make. A more detailed analysis of all structures will be published in the future. The points are these:

Any comparison between the eastern and western portions of the valley, category by category, establishes clearly that specialized structures associated with the highest-ranking members in Tahitian society are either not well represented or not present in the Amehiti portion of the valley. Their numbers and the distribution of the sites among various categories and on the ground suggest that one maximal

TABLE 13

DATA ON SETTLEMENT PATTERNS THAT REFLECT THE RAMIFICATION AND STRATIFICATION IN TAHITIAN SOCIETY IN THE EIGHTEENTH CENTURY IN THE 'OPUNOHU VALLEY, MO'OREA<sup>a</sup>

Structural Type and Ethnohistoric Identification	Valley Divisions	
	Western	Eastern
<b>Specialized structures</b>		
Round-ended assembly houses (18-27 by 43-60 feet) with associated rectangular house and separate pavement	1	5
Large raised assembly platforms, Group IV B	—	5
Archery platforms, Group IV A	—	3
Small raised platforms, Group IV C	—	3
<b>Residence areas</b>		
Round-ended houses, larger than ordinary rectangular dwelling (15-20 by 35-43 feet), with small attached pavement	1	7
Round-ended houses, same size as rectangular dwelling and no attached pavement	3	4
Rectangular houses, ordinary dwellings, Group II B	13	25
House terraces, probable sites of additional dwellings, Group II C	35	62
<b>Religious structures</b>		
Stepped, worked-stone <i>marae</i> associated with ranking member of a maximal ramage, Group III B	—	1
Round-ended house associated with <i>marae</i> above, God house	—	1
<i>Marae</i> associated with ranking members of sub-lines ( <i>mata'eina'a</i> )		
Stepped <i>ahu</i> with coral-block facing, Group III D	—	1
Worked stone in unstepped <i>ahu</i> or enclosing wall, Group III C	1	3
Attached unstepped <i>ahu</i> with coral-block facing, Group III E	1	2
<i>Marae</i> associated with principal extended family groups ( <i>ti'i</i> )		
Detached <i>ahu</i> with banded facing, Group III F	—	8
Attached <i>ahu</i> with coral veneer, Group III G	—	5
Detached <i>ahu</i> with coral veneer, Group III H	—	12
Primary uprights and enclosing wall, no <i>ahu</i> , Group III I	4	12
Paved platform with <i>ahu</i> , no enclosing wall, Group III J	—	6
<i>Marae</i> associated with individuals or specialized activities		
Primary uprights on pavement, no enclosing wall, Group III K	9	15
Shrines, Group III A	20	36

<sup>a</sup> Selected data, transformed, with corrections from Green (1961a). This table does not include agricultural terraces, boundary walls, living flats, unclassified *marae*, and all functionally unassigned structures of Group V.

ramage (Firth, 1957, 6) was only just beginning to exhibit the first signs of segmentation. On the eastern side of the valley the five community houses, five assembly platforms, three archery platforms, six *marae* identified with people of intermediate rank, eight *marae* of Type III F interpreted as those of principal extended family groups, and seven round-ended houses identified with persons of intermediate rank, all seem to imply segmentation of the localized non-unilinear descent group or maximal ramage into five or more sub-lines. This figure coincides fairly well with the five or six divisions implied by the traditional evidence cited above from Henry. It seems also to be supported by the distribution and position of various boundary

walls within the area of settlement, but not around it.

My second point concerns the statements made by the Tahitians to Wilson (1799, 186) when he sought a basis for conducting his survey of the population to determine its size. The units within districts with which he worked were, he was told, called *mata'eina'a* and could be identified with the principal houses of each locality. Again, *mata'eina'a* seem to correspond to minimal ramage, and the principal houses correspond to the type we have identified as community or assembly houses. Many others, such as Handy (1930, 45-46) or Henry (1928, 70), argued that entire districts should be considered maximal ramage and should also be

called *mata'eina'a* or *va'a mata'eina'a*. The problem here, as Newbury (1961, xxxiv) warned in his discussion of this difficult question, is to avoid confusion over local place names, district names that correspond to maximal ramage, and divisions that do not, because they have arisen by conquest and extension of local district names to other politically allied districts along the coast. The few that Handy recognized and the great number of *mata'eina'a* given by Wilson, which Handy (1930, 46) failed to find comprehensible, seem to stem from just this situation. Given the archeological data of the 'Opunohu, I can only agree with Wilson that the identifiable units are these minimal ramage, or *mata'eina'a*, and that the over-all settlement pattern for any locality and the historical and traditional data will be the decisive elements for the identification of maximal non-unilinear descent groups or ramage in the Sahlins (1958, 140) sense of segmented and ranked sub-lines. For the 'Opunohu, I maintain that the data would lead one to conclude that the eastern valley, where the localized members of the descent group resided within a small area of the total available space and which was referred to as the *mata'eina'a*, Tupauruuru, is a district that is also a maximal ramage. However, since the traditions state that it was a district aligned to Ha'apiti by conquest and one often led by its own quite high-ranking fighting chief, I would not want to extend the kinship basis further but preferably would emphasize the political tie. Later, as the population reached its peak in the eighteenth century, it seems to have been divided into a number of sub-lines. Minimal *mata'eina'a* may now be identified by their association with principal houses, as Wilson (1799) has done; these, in turn, may be associated with the greater numbers of smaller round-ended houses belonging to the less important families and called by him *ti'i*. One could even proceed, on the basis outlined by Wilson, to estimate the population. Amehiti, on the other hand, is more like other districts recorded by Wilson, where maximal and minimal ramage coincide, so that only one principal house is recorded in a district. Henry, therefore, in listing the final subdivisions for the 'Opunohu in the very late eighteenth and early nineteenth century was, in my view, naming its minimal ramage or *mata'eina'a*. However, in describing the Te Aharoa District, she outlined

a political creation brought about by the Pomares, and only in each of the seven major subdivisions of Te Aharoa, if in those, is it likely that she was describing maximal ramage.

We may assign one *marae* on the eastern side of the valley which stands out from all the others to the highest-ranking member of the maximal lineage or non-unilinear descent group, if that is the preferred description. This is Site ScMo 129. It is here identified as the *marae* of the maximal ramage or local district and may imply, because nothing comparable to it occurs in Amehiti, that by the end of the major occupation of the valley the western division was dominated by the eastern portion or, less likely, that it was another sub-line of its maximal ramage.

My final point is this: There is ample evidence in the data for the development of all those rankings so often described for the population of coastal Tahitian society. It would be expected from the exposition above that such evidence appears in a favorable, if somewhat unique, inland situation on the eastern side of the valley. As an example of a type, this settlement might be taken to represent a stage comparable to that of Tahitian coastal society prior to the various eighteenth-century attempts by one coastal group to extend its political domination by conquest over neighboring areas. On the other hand, in the western portion we have an example of the more typical inland settlement, much like that described by Garanger (1964), which was either dominated by, or related in a subordinate way to, the eastern portion of the valley in this particular case but in others functioned as a sub-line of a coastal group. In the actual 'Opunohu situation, of course, all were in turn first subject to political domination by the chiefs of Ha'apiti through conquest and later by those of Te Aharoa by the same means. It is, therefore, on the coast of Mo'orea and Tahiti that the much larger *marae* of Type III M and much larger community houses occur and are most often described by the early European observers. In my view, they should be related to this phenomenon of prehistoric and historic attempts at political coalition. But these attempts were not fully successful until the introduction of firearms and the replacement of the old religion by a new one, Christianity, which supported these motives (Webb, 1965; Orsmond in Newbury, 1961, 350).

In the opinion of some students, I may have carried the interpretation of the inland data in this final section too far, but I have done so in order to make one point. Such data, when recovered from suitable contexts in Polynesia, in this case Mo'orea, provide a concrete means for interpreting much of the ethnohistoric evidence. Thus, for Tahitian society, in addition to the three sources of eye-witness accounts, Tahitian traditions, and comparative sociology cited by

the historian Gunson (1963), there is a fourth which he and others have ignored and which is quite as important as the first. This is the witness of the archeological record. From a combination of all such materials an adequate account of Tahitian society may yet be written. It is hoped that the present study provides another small but significant step in that direction.

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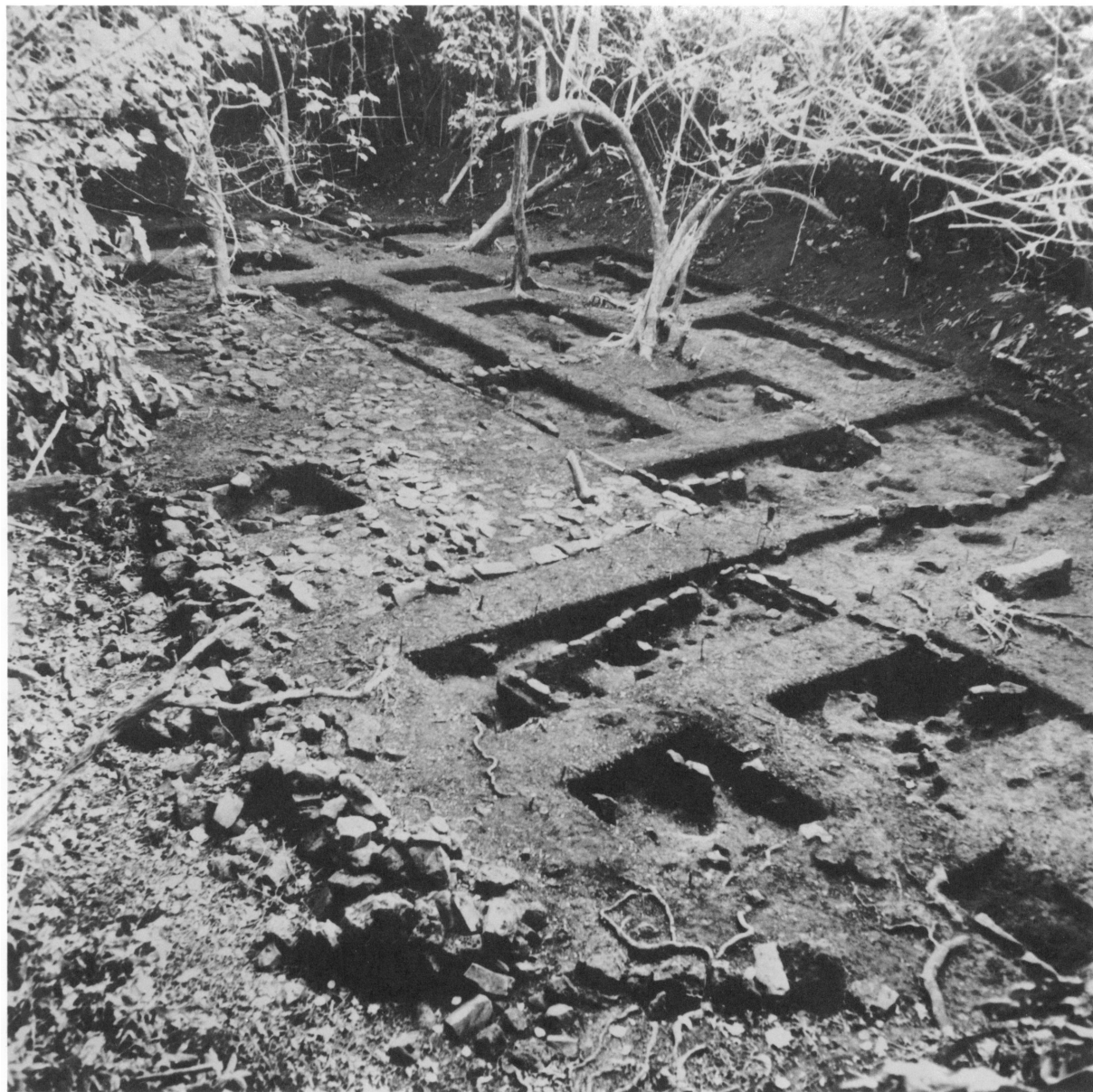
## CATALOGUE DATA FOR CERTAIN TEXT FIGURES

9. Stone artifacts from Sites ScMo 103C and 158
  - a. Adze, broken, fill of pit underlying southeast corner of rectangular house curbs, inside Site ScMo 158D (A 9/6)<sup>1</sup>
  - b. Adze, in loose debris between two stones, probably from pavement, now at base of it, Site ScMo 158C (A 9/7)<sup>1</sup>
  - c. Adze, broken, with evidence of butt modification, southwest corner of Square E7, Layer 5, Site ScMo 103C (A 9/22)<sup>1</sup>
  - d. Adze, unusual quadrangular form, Square D2, Layer 5, partly under large stone, Site ScMo 103C (A 9/23)<sup>1</sup>
  - e. Adze, 30 cm. below surface in pit with Layer 3 or Layer 4 fill lying along west wall, Balk E7-8, Site ScMo 158 (A 9/9)<sup>1</sup>
  - f. Adze, Layer 4, Balk E-D2, Site ScMo 158 (A 9/11)<sup>1</sup>
  - g. Adze, in loose debris fill between pavement and round-ended house, Site ScMo 158C (A 9/8)<sup>1</sup>
  - h. Pounder, at base of pit underlying southeast corner of rectangular house curbs inside Site ScMo 158D (G 9/1)<sup>1</sup>
19. Simple or one-piece fishhooks
  - a. Tab with drill hole, pearl shell, Square X50, southeast quadrant, 42 inches, Site ScMf 2 (85-2157)
  - b. Point leg with inturned point tip, pearl shell, Square X20, southeast quadrant, 18 inches, Site ScMf 2 (85-2111)
  - c. Point leg with inturned point tip, pearl shell, Square A1, southeast quadrant, 24 inches below datum, Site ScMf 6 (85-2138)
  - d. Form-B line attachment on shank leg, pearl shell, surface, Turua Puru, Mo'orea (85-2099). Transferred to Papeete Museum
  - e. Form-C line attachment on shank leg, pearl shell, Square 2, southwest quadrant and northwest quadrant, 7 to 7½ inches, Site ScMf 5 (85-2123)
  - f. Line attachment, shank leg, and base of *Turbo*-shell hook, Square A2, southwest quadrant, 40 inches below datum, Site ScMf 6 (85-2143)
  - g. Form-A line attachment on shank leg and base, pearl shell, Square X54, northeast quadrant, 5½ inches, 28 inches, Site ScMf 2 (85-2114)
  - h. Base with extreme widening of bend, pearl shell, Square X50, southeast quadrant, 26 inches, Hauiti, Mo'orea, Site ScMf 2 (85-2105)
  - i. Drilled tab with hook form, pearl shell, Square V54, northeast quadrant, 7 inches, Site ScMf 2 (85-2158)
  - j. Form-D line attachment on shank leg and base, pearl shell, Square A1, southwest quadrant, 8 inches below datum, Site ScMf 6 (85-2129)
  - k. Angular asymmetrical base with straight tip point leg, pearl shell, Square O, southwest quadrant, 25 inches below datum, Site ScMf 3 (85-2125)
  - l. Outward-curving shank leg of very small hook, pearl shell, Square B2, northeast quadrant, 33 inches below datum, Site ScMf 6 (85-2139)
  - m. Base and part of shank leg for tiny hook, *Turbo* shell, Square B2, northwest quadrant, 24 inches below datum, Site ScMf 6 (85-2145)
20. Lure shanks and point
  - a. *Conus* lure shank with line attachment, surface, Hauiti, Mo'orea (85-2094)
  - b. Unusual head form for shank of bonito lure, pearl shell, surface, Site ScMf 2 (85-2116)
  - c. Lure shank, line attachment, pearl shell, surface, Tu Tara, Mo'orea (85-2098). Transferred to Papeete Museum in 1962
  - d. Distal end of lure shank, *Tridacna*(?), Square V54, northwest quadrant, 1 to 12 inches, Site ScMf 2 (85-2309)
  - e. *Conus* lure shank, battered line attachment, Square B2, southeast quadrant, 22 inches below datum, Site ScMf 6 (85-2146)
  - f. Base of lure shank, double grooves for hackle, pearl shell, surface, Hauiti, Mo'orea (85-2095)
  - g. Base of lure shank, broad notching on sides, pearl shell, Square 2, northeast quadrant, 35 inches, Site ScMf 5 (85-2122)
  - h. Lure point with double lashing holes, pearl shell, Balk 50, 19 inches, Site ScMf 2 (85-2136)
  - i. Head of lure shank, transverse groove for line attachment, pearl shell, Square Y50 northwest quadrant, 40 inches, Site ScMf 2 (85-2119)
21. Woodworking tools, pounder, and coconut grater
  - a. Butt portion of tanged adze, basalt, Square 2, southeast quadrant, 43 inches, Site ScMf 5 (85-2295)
  - b. Base view of adze, basalt, fragment with quadrangular cross-section, Square 2, northwest quadrant, 26 inches, Site ScMf 5 (85-2294)
  - c. Formed stone pounder, Square 1, northeast quadrant, 20 inches, Site ScMf 5 (85-2296)
  - d. *Terebra*-shell gouge, Square 2, northeast quadrant, 36 inches, Site ScMf 5 (85-2204)
  - e. Pearl-shell grater, hand coconut type, Square 2, northwest quadrant, 26 inches, Site ScMf 5 (85-2206)

<sup>1</sup> Field numbers; artifacts will ultimately be deposited in the Museum in Pape'ete, Tahiti.







Over-all view of Site ScMo 103C at completion of excavations



Close-up of rectangular house overlying earlier features at Site 103C



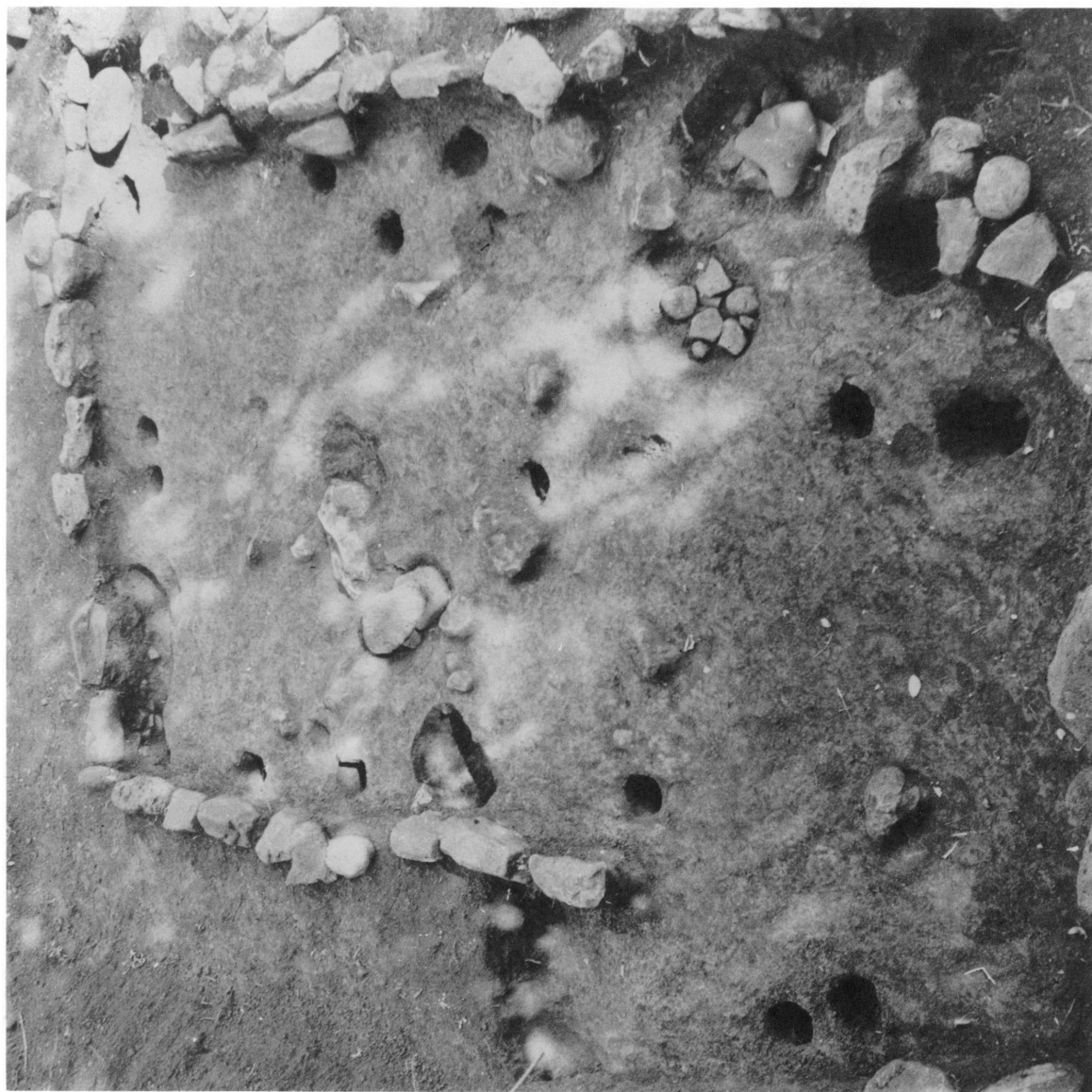
Detailed view of stratigraphy at Site 158D, showing pit with artifacts and late house fireplace





Over-all view of Site ScMo 4 at completion of excavations





House B, Site ScMo 4 after excavation, showing post-holes, pits, and ovens



Close-up of skeletal material at rear of *marae*, Site ScMo 163



Detail of section in stepped *ahu* of Site ScMo 129



Detailed view of excavation section at rear of *ahu*, Site ScMo 129







