ARCHAEOLOGY IN WESTERN SAMOA

VOLUME II

Editors:
R. C. GREEN and JANET M. DAVIDSON

Bulletin of the
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PREFACE

When the first volume of this study was published in 1969, work on the second was already under way. At the time we confidently expected to complete the second volume in the next two years. The delay of several additional years, therefore, requires some comment. In 1969, one of the editors (Green) in Hawaii was working with Ishizuki to finalise an English version of his report, initially written in Japanese, and was also making an analysis of the pottery from Sa-3. In New Zealand, the other editor (Davidson) was working with McKinlay, Fagan and De Nave on the presentation of their materials. When Green returned to New Zealand in 1970, revision and editing of the final reports on excavations in the Upper Falefa Valley began.

As the various reports were completed, problems arose which required further investigation. For example, Davidson found that conclusions she and Fagan reached on the age of the most recent occupation at SU-Le-12 (Report 24) were at variance with the one radiocarbon date for that occupation. New samples were then selected and submitted to the radiocarbon dating laboratory of the New Zealand Institute of Nuclear Sciences in the hope of resolving the problem and strengthening our dating of that sequence. Green, writing up the pottery sections of the SU-Sa-3 report (29), found the initial analysis and vessel reconstructions, especially of the thin fine ware pottery, not entirely to his satisfaction, and so the material was re-analysed, with a much improved result. Both editors, together with L. M. Groube, participated in an ANZAAS symposium in New Guinea on the then controversial issue of dating the Tongan sequence. This led to a general acceptance of the revised dating of Lapita sites on Tongatapu proposed by Groube, and a sense of relief on our part. In effect, it eliminated any need for argument in the concluding papers that, on the basis of the Samoan evidence, the Tongan sequence as presented by Golson and Poulsen was in need of revision.

By the end of 1972, the analyses and excavation reports were virtually complete. The new radiocarbon dates for Le-12 had been incorporated in Report 24, the Sa-3 pottery analysis and illustrations had been completed, and Groube's revision of the Tongan sequence and Green's comments on it had been published. In the meanwhile, Davidson had carried out and published the result of her field work in the Vava'u Group of the Tongan Islands, and Rogers was processing rather similar materials from Niuatoputapu. These had the effect of extending our knowledge of the early Lapita pottery sites and later field monuments from Tongatapu north through the Tongan island chain to a point not far from Samoa.

At that point we were in a position to complete the volume with 13 substantive reports, followed by concluding sections, parts of which were in draft. Then in early 1973 Hansen brought to our attention the recovery of pottery decorated in the Lapita style dredged from the lagoon at Mulifanua. While we immediately followed this up through contacts in Western Samoa, the Samoan Government at the same time made contact through official channels with the Auckland Institute and Museum and ourselves. By his interest and effective action in this matter, Tuala K. Enari, Secretary to the Government, assembled all the relevant information on this discovery and saw that all specimens were transferred to the Auckland Institute and Museum for study and safekeeping. The result has been the addition of three more reports to the volume which have proved very important. In particular, they have provided the direct evidence required in support of our view that remains from the earliest part of the Samoan sequence had not been recovered in our excavations.

As we began to assemble the data on structural features, Davidson realised that further details of the survey work on Upolu by herself and others should be presented in this volume, if she was to provide a sufficient foundation for her concluding paper on this topic. These reports, initially scheduled for a later work, were thus included, making a small group of miscellaneous papers into a substantial section.

In summary, by mid-1973 the various pieces of a much larger work than was planned all began to fall into place, and manuscript material for the concluding papers was revised or drafted anew. The result is, we believe, a much better volume than we might have put together in 1971, when a number of problems capable of resolution were still outstanding. We make, therefore, no apology for the delay; it has been beneficial. We do, however, thank our colleagues in this volume for bearing with us while we assembled this much revised and expanded final version.

The two volumes, appearing some years apart, each have separately numbered pages, figures, tables and plates, plus their own bibliographies. Reports and sections, however, continue in consecutive order from the first volume through the second. References in this volume to materials in volume I take the form of the volume number, report number and page, i.e. (I, Report 17, p. 260). Those internal to this volume give only the report number and page.

When we published volume I, satisfactory maps covering all of Western Samoa were not available. The situation has now changed and most of the 25 gridded topographic map sheets for the country have been published. We have retained the original site numbering scheme begun before those maps were printed (I, Introduction, p. 10). The system is, however, not entirely satisfactory for a large island group where locality designations, indicated by the middle set of prefix terms (i.e. Va-, Sa-, Lam-, Lu-), are difficult to decide with any consistency, and tend to proliferate in a somewhat disorderly fashion. We have begun to plot our site locations on the new maps, where the positions can also be fixed by a grid reference. We would now advocate that in future the middle prefix terms for localities be replaced by map numbers, and the sites numbered sequentially on each map. A manuscript outlining such a scheme has been prepared by W. R. Kikuchi. A table of published sites could be prepared to accompany it, converting the existing site numbers used here. It is our hope that one day the responsibility of recording sites will be taken over by the Western Samoan Department of Lands and Survey, forming an official file of historic and prehistoric sites for the country.

We wish to acknowledge here the assistance provided by a grant from the Wenner-Gren Foundation. Most of it, as indicated in the preface to volume I, went towards defraying expenses of illustrations in that volume; the remainder has been used in preparing the illustrations in this volume, and in obtaining assistance in the analysis of the pottery. We also wish to acknowledge a grant from the Scientific Research Distribution Committee of the N.Z. Lottery Profits Board of Control to defray the cost of preparing and printing blocks for this volume. The majority of the illustrations are again the work of Karel Peters. However, the adzes from early levels of SU-Sa-3 were drawn by Gerald Moonen, and the pottery reconstructions, some of the locality maps and some of the structural plans were done by Caroline Phillips. The plates were prepared by Cyril Schollum from photographs held in the Department of Anthropology at the University of Auckland. Kay Ponting and Ann Carver of that department typed much of the final copy.

Our debts to numerous people in the course of this research are many and varied and we would wish to thank everyone who has helped. Our largest debt, however, is to the Samoan people, whose prehistory it is. We hope that in some small measure we have here returned to them something for their hospitality and assistance by providing a meaningful record of their past which all may use.

O le va'a fau po fau ao

Roger C. Green

Janet M. Davidson

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VIII. INTENSIVE RESEARCH IN THE FALEFA VALLEY, UPOLU

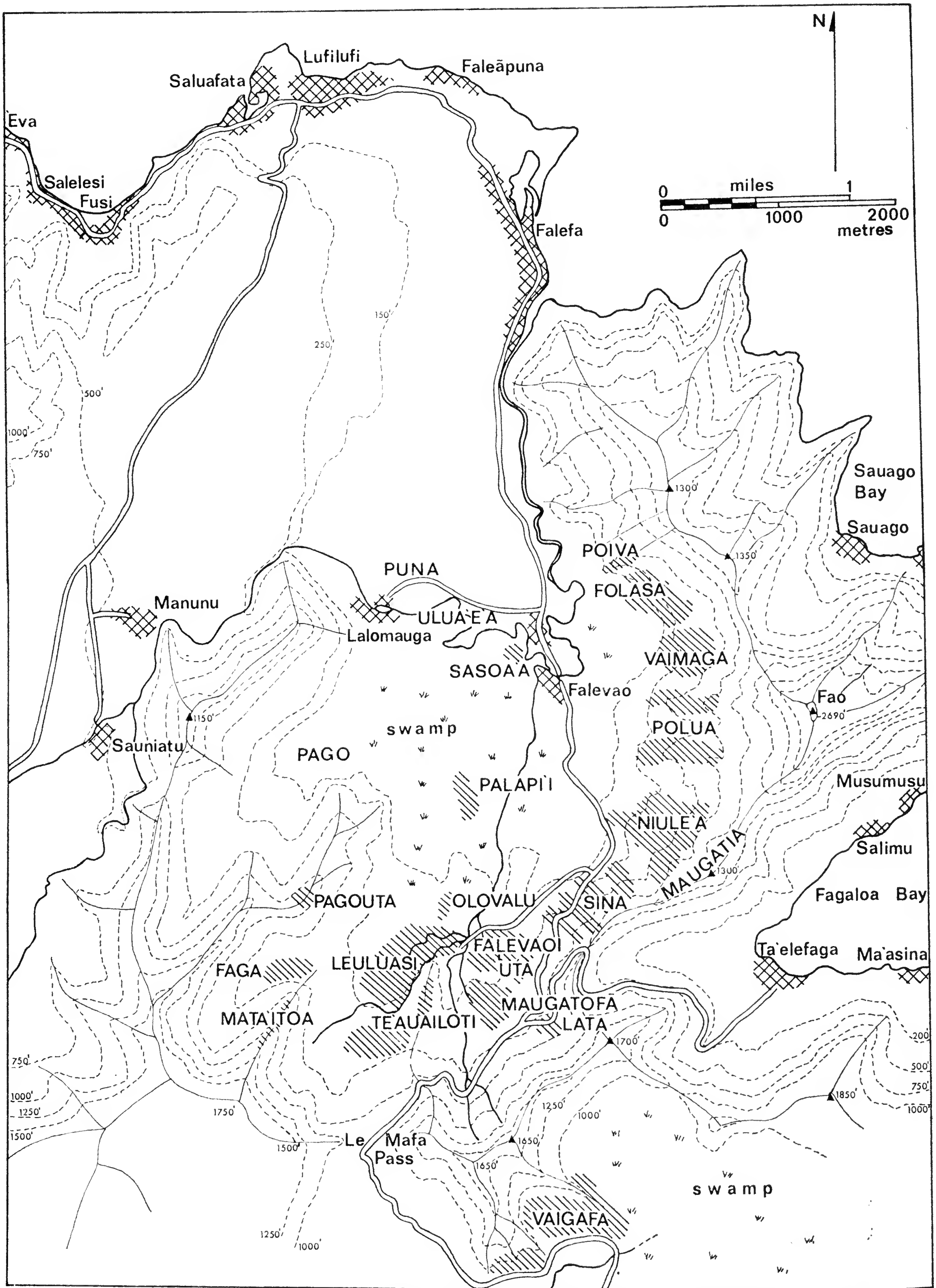

Fig. 1. Plan of the Falefa Valley showing areas of former settlement recorded during the site survey.

INTRODUCTION TO THE UPPER FALEFA VALLEY: THE SITE SURVEY

JANET M. DAVIDSON
AUCKLAND INSTITUTE AND MUSEUM

At the conclusion of the first phase of archaeological field work in Western Samoa in 1964, several projects were outlined which should form the basis of future work (I, Introduction, p. 6). One of these was "the intensive mapping and recording of sites in at least three other project areas on Upolu as a basis for study of the settlement pattern changes". Between October 1965 and May 1966 I carried out site surveys in three areas of Upolu: Aleipata, Mulifanua, and the inner eastern part of the Falefa Valley. The survey carried out in the Falefa Valley was the most extensive of the three and the area was selected for the final phase of excavation in Western Samoa in the period December 1966 - February 1967. This report provides a description of the inner part of the valley and its archaeological evidence, and serves as an introduction to the detailed excavation reports which follow.

THE SETTING

The valley is situated in the northeast part of Upolu, and extends for some 4 or 5 miles (6.4-8 km) inland from the large coastal village of Falefa. It has a broad, gently sloping floor and is surrounded by mountain walls. On the east, south and southwest these walls are formed by the steep, highly weathered rocks of the Fagaloa volcanic series. On the northwest, an extensive flow of younger volcanics reaches the coast, forming a much lower valley wall.

In the inner part of the valley occurs the most extensive area of alluvial soils in Western Samoa. Some of these soils are of moderate to low fertility but some, the Sauniatu sandy clays, are described as being of high natural fertility. These form the largest area of highly fertile soils on Upolu (Wright 1963: land classification map of Upolu).

The valley is well watered by a number of permanent streams. These are subject to flooding, however, and in their upper reaches change their courses fairly frequently. Much of the central inner part of the valley is swampy, and not suited for habitation or agriculture. Rainfall in the valley is high, probably approaching 200 in. (5080 mm) a year, and there is little or no dry season (Curry 1962: Fig. 10; Wright 1962: Fig. 15).

The easiest access to the valley is from the north, from the coast. Despite the steep mountain walls, however, there are several relatively easy access routes from other directions. The road to the south coast crosses the Mafa at the southern end of the valley and the road to Fagaloa uses the southernmost of three passes to the east. Walking tracks cross the northern and southern shoulders of Mt Fao to Sauago Bay and Fagaloa. To the northwest there is easy access to Manunu and Sauniatu; there is also a more difficult path to Sauniatu further inland.

Today there are two villages in the interior of the valley, Falevao, which is politically associated with Falefa, and Lalomauga, which, together with Manunu to the west, is associated with Lufilufi. A relatively small area of land in the back of the valley is privately owned but most of the valley is customary land controlled by the villages of Falefa, Falevao and Lalomauga.

HISTORY AND TRADITIONS

The earliest reference to the valley may be La Pérouse's account of a densely settled, amphitheatre-like area in eastern Upolu (La Pérouse 1797 (III): 219). The exact position of this area, however, cannot be determined. The account can only be regarded as an indication of considerable population in the northeast part of Upolu in 1779 (Davidson 1969a: 51-52).

The missionaries who made the first recorded journeys around Upolu in the 1830s traversed the distance from Aleipata to Falefa by canoe, by-passing the valley. The first recorded visit to the interior of the valley was made by Buzacott in August 1836. He and his party crossed the mountains from Fagaloa (Buzacott MS 1836-37).

> We found the inland road very rough and the mountain high and steep. When we got the other side we came into an extensive and beautiful valley, with extensive groves of coconut trees. We were informed that formerly there were several settlements here, but that they had frequently been conquered and numbers of their people slain — that the remainder went to live at the sea side and unite with those who lived there for the purpose of mutual defence. In our way to the village of Falefa we came to the beautiful waterfall . . .

By 1838 there were four inland settlements in the valley. The missionary Mills included the names of Falevao, Lalomauga, Sasoa'a and Folasa in the list of schools in his district at that time (Mills MS 1838). Falevao and Lalomauga still exist and the names of Folasa and Sasoa'a are remembered by present day inhabitants of the valley as sites of former settlements. No further documentary evidence of their occupation has been discovered, but records after the early 1840s have not been studied.

In 1841 Buchanan (MS 1841) reported walking from Lepa on the south coast to Falefa. He presumably came over the Mafa. He wrote that some villages in the Falefa district had never previously been visited [by English missionaries]. The neglected villages must have been inland since all those on the coast had been mentioned in earlier accounts, most of them several times. Buchanan thus provides some evidence of the continued existence of inland villages which in all probability Mills and Heath, his predecessors in the district, had never visited.

By the late nineteenth century, settlement in the valley was much as it is now. Krämer (1902: 272, 276-277) recorded the existence of the inland settlements of Falevao (associated with Falefa) and Lalomauga (associated with Lufilufi). At that time Falevao was divided into two parts, Falevao-i-uta and Falevao-i-tai, the latter corresponding to the present village. The former site of Falevao-i-uta is well known, but probably nobody now alive lived there unless as a baby. The move to Falevao-i-tai was completed about the turn of the century.

Falefa is a large and politically important village, one of the strongholds of the Safenunuivao family. Its *malae,* Moamoa, was one of the most important in the Atua district. Various holders of the Tui Atua title lived at or near Falefa, the most famous being Leutelele'i'iti, with whom many Falefa traditions are associated.

Falevao is a satellite of Falefa and its traditions are subsidiary to those of the larger and more important village. The inhabitants of Falevao regard their community as a recent association of several families who had not previously lived together in a nucleated settlement. At some point in the fairly recent past (thought to have been about the time of European contact) two family groups, headed by their principal title-holders Gaga'e and Naioti, founded Falevao at the site of Falevao-i-uta; they were subsequently joined by Tafili and Tofai. Shortly thereafter the move to Falevao-i-tai began.

The principal titles in Falevao had their origin long before the founding of Falevao and are believed to derive from the patronage of more important titles, notably Leutele and Malietoa. They confer rights to certain land in the valley, but the precise details and chronology of the events which led to the creation of the titles are not easy to ascertain.

For the most part, Falevao people today have rights over land in the most inland part of the valley. Some of these holdings are thought to be where the families concerned lived before the village of Falevao existed. The modern village appears to be situated at the seaward extremity of the lands to which its villagers have rights. Thus some people from Falefa have gardens very close to Falevao, while Falevao people must go further inland to reach their own gardens.

The Site Survey

The valley is too large for its entire area, or even the entire inner half, to be surveyed during the three months spent on this project. The inner eastern section of the valley was therefore selected. It is bounded by the road to Lalomauga in the north, by the mountainous valley wall in the east and south, and in the west by an arbitrary line running south from Lalomauga village. The area investigated thus approximately corresponded to Falevao customary land, with the privately owned cattle run in the back of the valley and some customary land of Falefa families included, but Lalomauga land with its well known old settlement of Pago excluded.

During the survey I lived in Falevao from Monday to Friday each week, returning to Apia at weekends. Guides and informants were used, particularly at first, but as I became better acquainted with the area and the villagers became more familiar with my work, the project developed into a systematic search of all habitable places. Wherever possible land names and associated stories were recorded and measurements and descriptions of at least some sites in each area were taken. Four areas were mapped in detail. At three of these, Folasa, Vaimaga and Leuluasi, a representative area but not the whole was mapped by plane table. At the fourth, Sasoa'a, all recognisable archaeological sites were mapped by plane table. Test excavations carried out at these localities are described in Report 28.

The principal difficulty encountered in the survey was the vegetation. Most sites are in village plantations or fallow land, where they are covered and often completely obscured by a lush growth of creepers. Before mapping could take place large areas had to be completely cleared; this restricted the amount of mapping that could be done. Only at Leuluasi, grazed by cattle, could mapping begin at once. In areas which were not cleared it was difficult to estimate the numbers or nature of sites accurately and only a general impression could be formed.

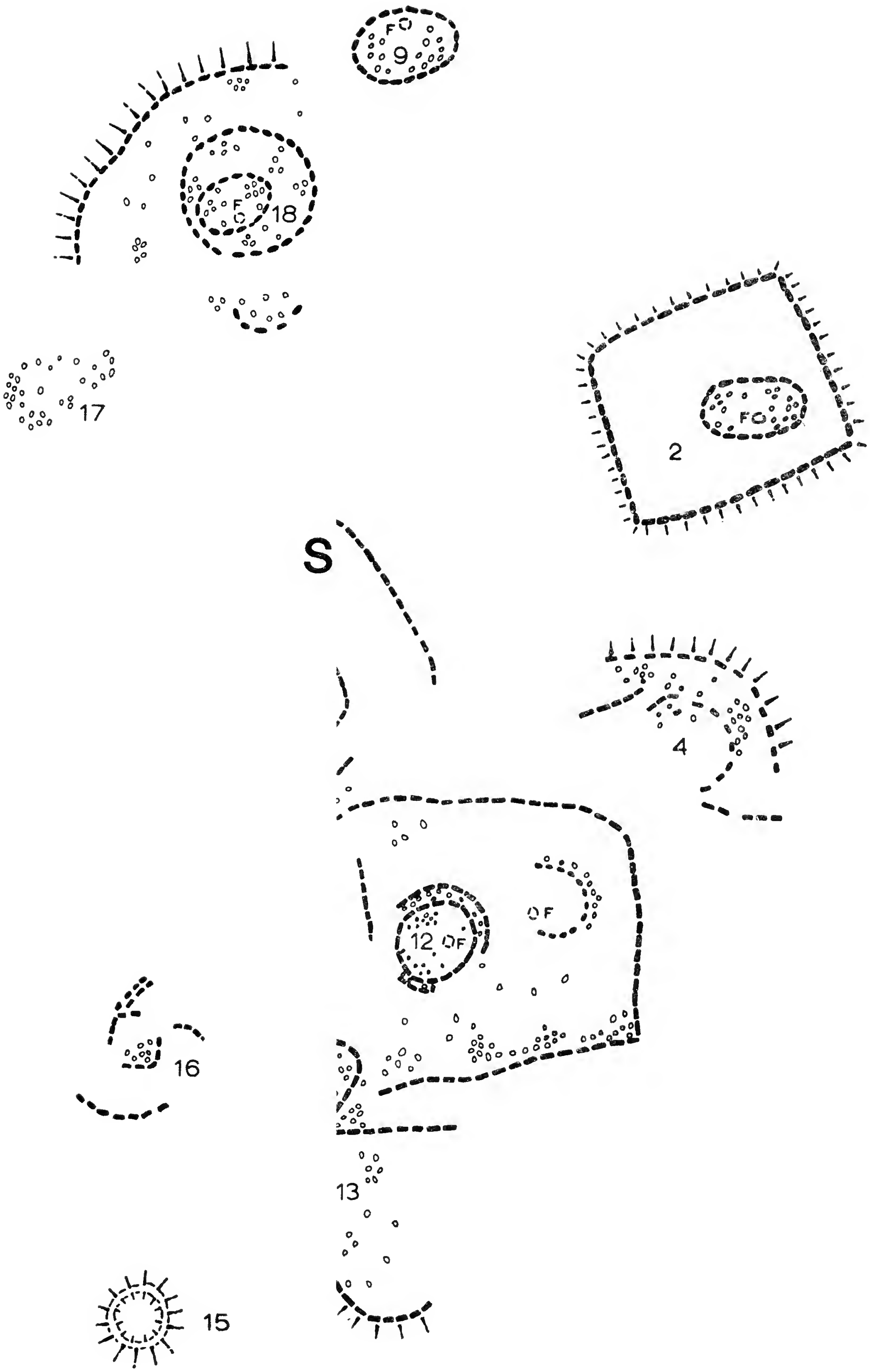

Fig. 2. Plan of Sasoa'a Village.

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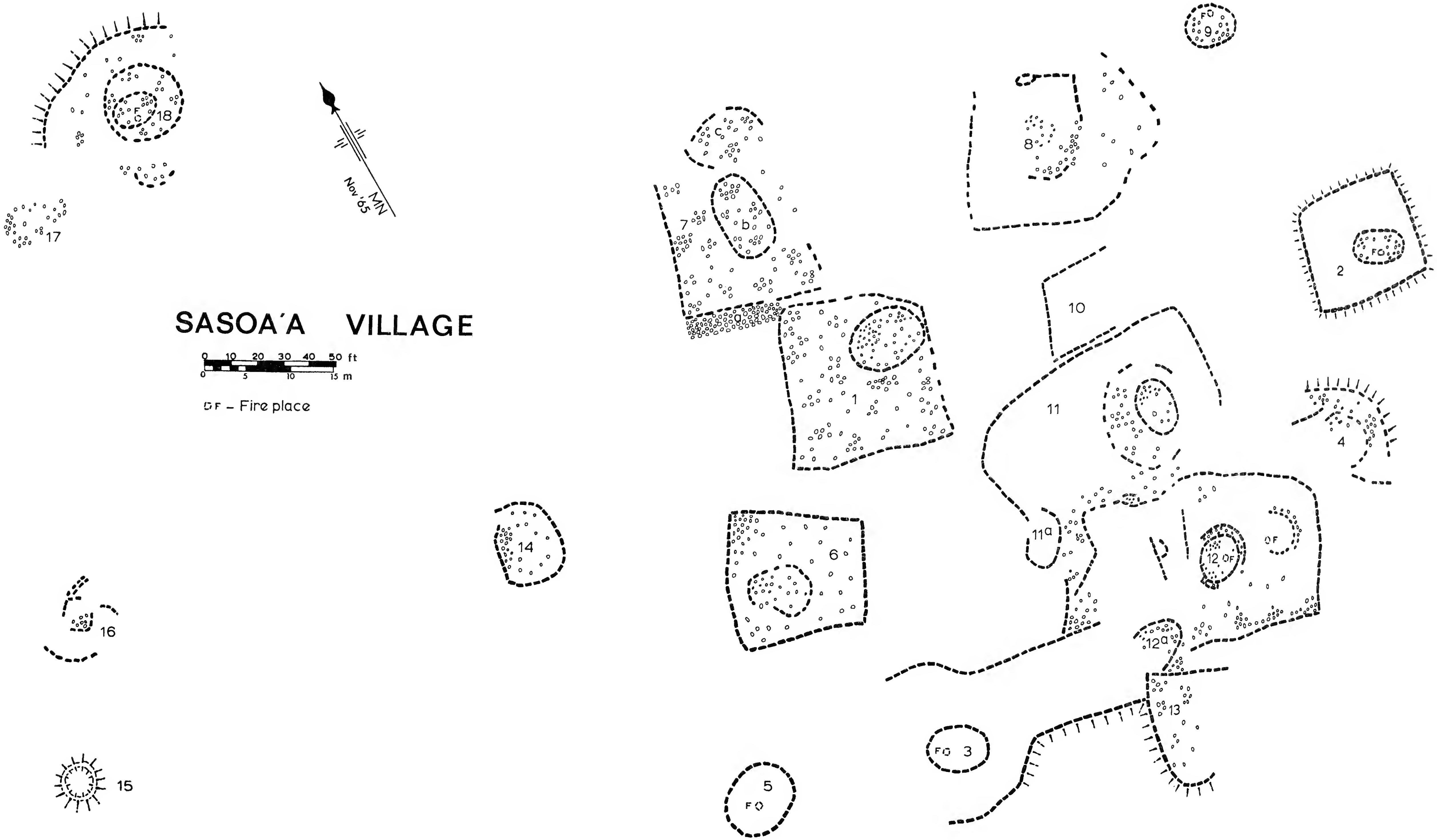

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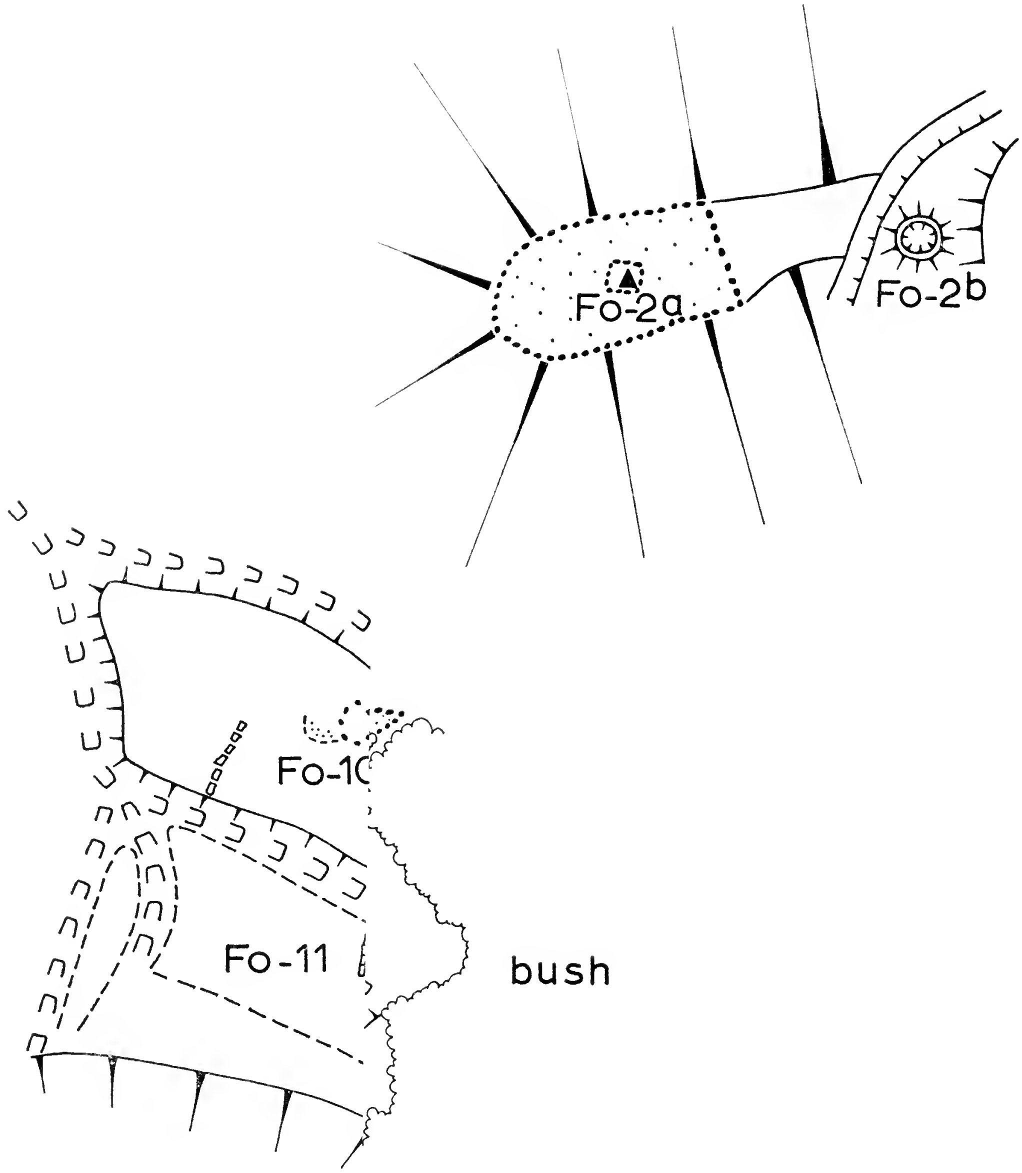


Fig. 3. Plan of part of the settle

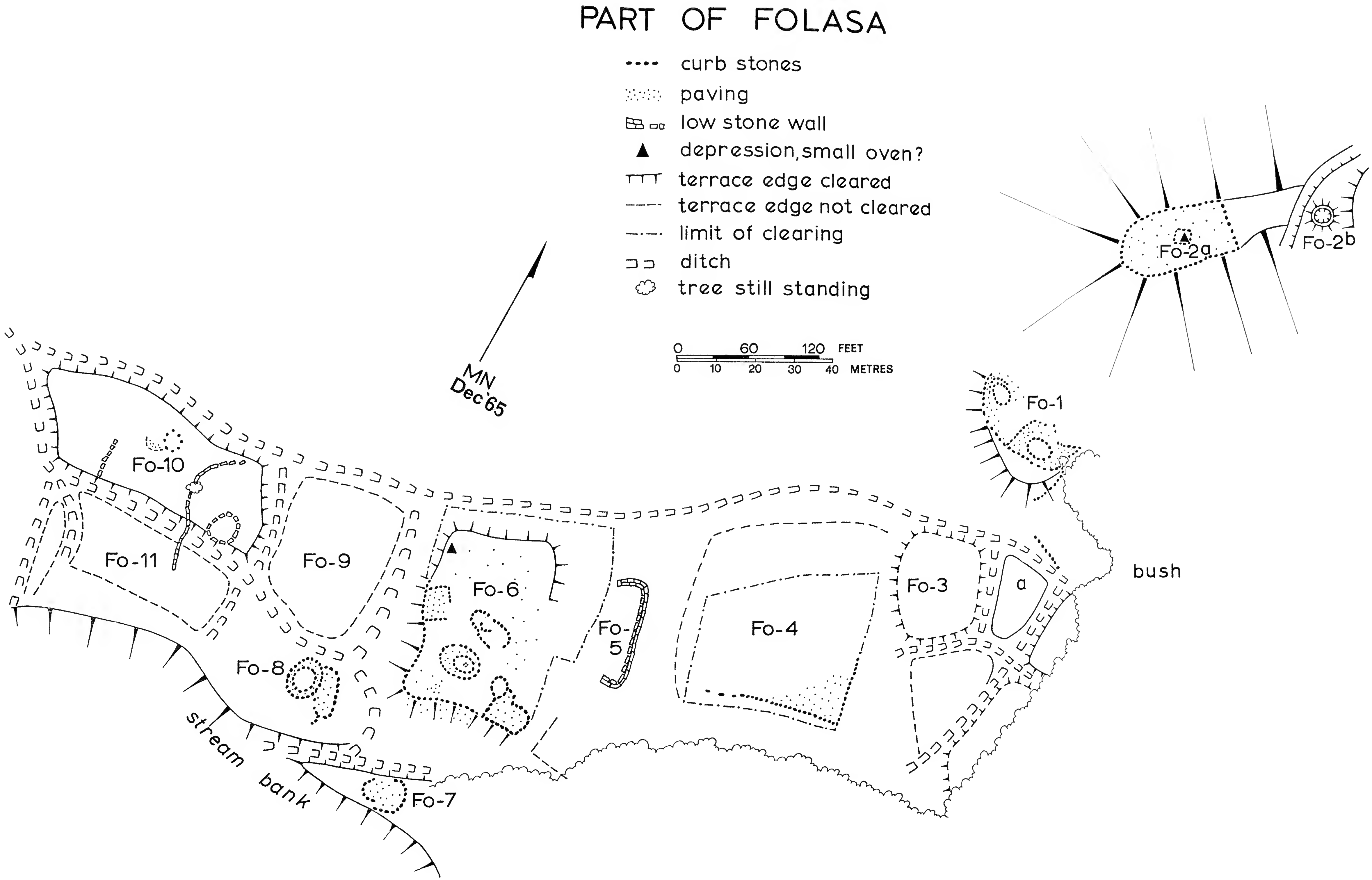


Fig. 3. Plan of part of the settlement of Folasa-a-lalo.

This was also true of sites in bush, although the problem was less severe here than in gardens.

Archaeological sites were recorded on 18 different named areas within the part of the valley surveyed. Several other names were recorded, either as alternatives, or as names of sub-areas. In several instances a name clearly did belong to a former settlement whose existence was remembered. In one case (Sasoa'a) the exact extent of the settlement was determined but in others (such as Folasa) there was doubt as to which archaeological sites within a fairly large and vaguely defined area were those of the settlement to which the name referred. In many instances, however, the name recorded seems merely to refer to a particular piece of land (usually one or more ridges running down from the mountain walls, but at Leuluasi a specific flat area). Sites occur in these places because all habitable land in the valley has been occupied at some time.

The various locations and the sites discovered on them are described below. The approximate position of each area is shown on figure 1.

Sasoa'a

A short distance northwest of Falevao, between the two main arms of the valley's river system, is the settlement of Sasoa'a. This was described as a very old settlement of Falefa people, contemporary with two other similar settlements, Ulua'e'a, a short distance to the west, and Pago, inland from Lalomauga. At the time of the survey I was not aware of the 1838 reference to Sasoa'a as a settlement with a mission school (Mills MS 1838). Informants' insistence that it was very old led me to believe it was a prehistoric settlement. Test excavations in one of the house floors, however, revealed artifacts of European origin, suggesting that the settlement belonged to the nineteenth century.

Sasoa'a is on flat swampy land, close to the river, in an area of very fertile soils. Before it was cleared there was nothing to be seen except a flat wet expanse of long grasses and some large forest trees (plate 12). Beneath the concealing grass, however, lay a number of low house foundations. The entire settlement was cleared and mapped, and was found to consist of some 14 house sites grouped in a tight cluster, with 2 more house sites and a large oven set slightly apart to the west (fig. 2). Careful probing in the grass revealed no other structures. Sasoa'a is characterised by the high density of house sites in a small area. It stands out from other settlements in the valley in this respect.

The land around Sasoa'a is covered with a meandering series of large ditches, which extend some distance to the west towards Lalomauga, and to the south into the swampy central part of the valley. The largest of these was identified by informants as the old (early twentieth century) road to Lalomauga. The others, however, appear to be a mixture of old stream meanders and artificial drainage channels, suggesting that at some stage during occupation of the area it was necessary to provide artificial drainage.

Folasa

Traditionally there were two places of this name, Folasa-a-lalo on the eastern side of the valley and Folasa-a-luga in the west, somewhere near the present village of Manunu. Between the two ran a ceremonial road along which was carried the chief to whom these settlements belonged. Falevao people believe that Tui Atua Polailevao lived at Folasa; an informant from Falefa, however, stated that the principal title at Folasa was Lemaga or Lemana. Polailevao appears as generation 17 in Krämer's list (1902: 294), six generations after Leutelele'i'iti and four before Salamasina. This means that he probably lived in the fifteenth century. He is usually said to have lived at Vaigafa, on the other side of the Mafa. Whether or not Polailevao lived at Folasa, however, it is thought to have been a more important place than any of the other settlements recorded.

Folasa also appears on Mills' list of schools in 1838. However, we were not able to identify any specific sites belonging to the village of that date.

Folasa-a-lalo is situated on the eastern side of the valley, north of Mt Fao. The semi-circular area here, between the mountain ridge and the swampy river flat, was at first all described by informants as Folasa. Subsequently, however, it was agreed that the name Folasa refers particularly to the northern half, while the southern half is more properly known as Vaimaga or Vaiifi. A bush-clad ridge divides the two areas. Wright shows the soils at Folasa and Vaimaga as being of moderate natural fertility, and forming one of the more fertile parts of the valley, after the highly fertile alluvial soils in the centre.

There is a general similarity between all the occupation areas on the lower slopes of the mountains surrounding the valley. The lower lying areas slope more gently and are less broken; as one climbs higher ridges become more marked and gullies steeper, and sites begin to be concentrated on ridges only. There is some individual variety, however. In comparison with other settlements on this side of the valley Folasa makes more use of relatively unbroken gently sloping land and only at its upper extremities are sites found on steep narrow ridges. The sample area mapped at Folasa included the lower part of one of these ridges, where the lowest of five terraces was mapped, and a strip below it extending towards the river flat (fig. 3). Several low mounds exist, west of the mapped area, closer to the river, but no other sites were seen there.

The lower part of Folasa is marked by a series of ditches, not unlike those at Sasoa'a but shallower, which break up the area into a series of platforms. Some, but not all of these platforms have relatively poorly preserved house outlines and pavements on them. Folasa is characterised particularly by these ditches, by the generally poor condition of the house sites (the site described in Report 22 was one of the best preserved) and by the lack of stone walls of any substance. The last is probably due to a shortage of stone in the relatively boulder-free soils.

The mapped sample at Folasa represents about one-quarter of the total settlement. Remaining areas were partly in dense secondary bush and partly in overgrown plantations, both offering highly unsatisfactory conditions for site surveying.

My first impression of Folasa was that it could be of considerably greater age than other surface remains studied; that its last occupation could, in fact, have been that of Tui Atua Polailevao. However, no remains impressive enough to suggest the presence of a high ranking person, let alone one so famous as Polailevao, were found in the mapped sample, or in the wider area more cursorily explored. On the whole it is difficult to accept that this was the precise locality of the traditionally famous Folasa-a-lalo, particularly in view of the extended debate and uncertainty among informants which led eventually to the pronouncement that this, rather than Vaimaga, was the place. Similarly, no evidence was found in the area intensively investigated to suggest that it corresponded to a nineteenth century settlement. There is, however, archaeological evidence from site Fo-1 (Report 22) and site Fo-2 (Report 28) to suggest that Folasa may have been continuously occupied for a number of centuries, occupation perhaps shifting from time to time within the general area. The 1838 occupation, which may have been small and brief, could well have centred on an area of Folasa other than that cleared and mapped.

Vaimaga

Vaimaga (or Vaiifi) occupies the southern half of the semi-circular piece of land of which Folasa forms the northern part. It is quite possible that Folasa was once the name of the whole area and Vaimaga and Vaiifi are more recent land names for part of it.

A bush-clad ridge divides Vaimaga from Folasa, although most of Vaimaga itself is garden land. On this bush-clad ridge are two substantial terraces with stone pavements, a stone-faced terrace, a small transverse ditch, and traces of an old path formed by two parallel ditches running up the centre of the ridge, the path being the raised ridge between them.

Vaimaga itself consists of a fairly gently sloping area broken by small streams. The archaeological evidence consists of a number of earth terraces, many of which have pavings or house outlines (fig. 4). The mapped sample is less than half the total area.

Vaimaga is characterised by low stone walls which divide the terraces into smaller groups and cover quite large distances. The shortage of stone that was apparent at Folasa is not evident at Vaimaga. An interesting feature at Vaimaga is a small irregular pavement to the side of one of the house pavements with two upright slabs standing on it. Old people in the village, hearing about this structure from the workmen (who thought it was a grave), volunteered the information that it was a religious structure.

Polua

The name Polua refers to one or two higher ridges which run down from Mt Fao into the valley, forming the southern boundary of Vaimaga. Informants agreed that the southern ridge was in Polua, but there was doubt whether the northern one was part of Polua or of Vaimaga. Soils on both ridges are classed by Wright as steepland soils of moderate to low natural fertility.

Both ridges carry extensive archaeological remains. On the northern ridge 12 earth terraces were observed, 5 of which have either stone facing or pavement. No stonework was seen on the others but vegetation (bush and fallen trees) was not conducive to its discovery. In places a sunken path is visible. Fifteen terraces were recorded on the southern ridge. The five uppermost are stone-faced, one (Polua-24) having an impressive 5 ft (1.5 m) high stone wall on the downslope side. The lower terraces have scattered stones or vestigial pavements but no recognisable house outlines. Two are, however, associated with ovens. On the lower part of this ridge, below the recorded structures, several more terraces were probably obscured by fallen trees and a thick covering of creepers and vines.

Poiva

A similar but smaller ridge marking the northern boundary of Folasa has a number of earth terraces which apparently lack stonework. An adjacent ridge has several small terraces and a defensive earthwork in the form of a shallow transverse ditch with a very steep scarp.

Niule'a

Immediately south of Polua is a more gently sloping area, topographically similar to Vaimaga, although its soils are classed by Wright as steepland soils of moderate to low fertility. The extent of the archaeological evidence here was realised only at the end of the survey when there was not time to clear and map the sites in detail. Four days' careful investigation suggests the sites are like those of Vaimaga.

There are two main ridges at Niule'a, each with two main branches and one minor branch. On the lower slopes of the western ridge a well preserved area of low stone-faced terraces and stone walls was found (complex A). The name Mauga a le fa'i was given by one informant for this area, but disputed by others. As the ridge becomes narrower and steeper a series of more marked earth terraces without stone facings becomes apparent.

A similar situation prevails on the eastern ridge but the lower slopes, although abounding in stone walls, have fewer recognisable house sites. Several of the upper terraces are well preserved. In this eastern part of Niule'a are traces of the old walking track to Musumusu which continued in use until about 1947. It is marked for part of its length by a double stone wall (Niu-140), which is part of an extensive complex of walls (complex D). This track may have been the route used by Buzacott in 1836.

Altogether 150 sites and 4 major complexes of stone walls were recorded at Niule'a. The majority of the sites, 139, are terraces. Only about five, high on the steeper parts of the ridges, are characterised by the irregular outlines and careful stonework suggestive of specialised sites (Report 37, p. 207). The remainder appear to have been residential sites, although house outlines were not found because of the dense vegetation. Eight large ovens were recorded. Three are on recorded terraces, and the other five were recorded as separate sites. All the ovens are in the middle or upper parts of the area. There is one deep oval hole of unknown use. The remaining numbered sites are stone walls other than those in the main complexes.

The stone wall complexes are all located on the broader, more gently sloping areas at the lower part of Niule'a. The walls at the base of each main branch of the ridge system were mapped by compass and tape, and designated complexes A to D. The division is probably artificial, however, for in at least one case a wall crosses an intervening stream to link two complexes. In complex A a wall partially encloses a cluster of 12 terraces grouped almost as closely as the houses at Sasoa'a. In the remaining areas, however, walls meander in various directions and terraces are scattered among them.

Sina

Niule'a is separated by a stream from the next group of ridges known as Sina. Sina in turn is bounded on the west by a stream which separates it from a confusing area for which several names were given. Sina itself appears to consist of four ridges, all of which are fairly steep and have the steepland soils typical of this part of the valley.

The first ridge of Sina, nearest Niule'a, is also said to be called Fa'aleaga. On it are five large earth terraces. The two uppermost are extremely large with steep scarps. There is a carefully made stone structure of irregular outline on the top terrace, and a star-shaped mound on the fourth. On each of the remaining three ridges are several terraces, only one of which carries a stone-faced structure of irregular outline. The old road to Fagaloa (the *ala sopo)* runs across the middle of Sina, above the terraces of the western ridges, but below those of Fa'aleaga.

Sites were also recorded below the Mafa Pass road at Sina. These included 11 terraces and a large oven, as well as some meandering stone walls.

In the extreme west of Sina is a fifth ridge running up towards the Mafa Pass road. This ridge was said not to be part of Sina, but no other name was given for it. It contains two large terraces, and above these, just below the road, another irregular stone-faced structure (Sina-26).

Sina contains a higher proportion of irregularly shaped sites, apparently of a specialised nature, than areas such as Niule'a and Vaimaga (Report 37, p. 207). Only in the lower parts of Sina do the sites appear to have a residential character.

Falevao-i-uta

Although the general location of Falevao-i-uta is well known, the precise identification of structures belonging to it proved impossible. It is situated between Sina and Leuluasi, where many of the present gardens of Falevao are, and where the cattle owned by Falevao villagers graze. The land is characterised by a number of meandering stone walls, but few recognisable house sites. One former house site of the family of Malaga was pointed out which consisted of a low stone foundation in very bad condition. Informants were confident that they knew where graves of their families were, but the graves, formerly marked by heaps of stones, have been trampled by cattle and the stones scattered. If there was a church at Falevao-i-uta its position is not remembered and we did not find it. Nor was there any sign of European artifacts.

The position of Falevao-i-uta is complicated by the fact that most of the people who joined together to form the village were apparently living in a more dispersed form of settlement in this general area. Both Gaga'e and Naioti had their *malae* quite close to the land now known as Falevao-i-uta—Naioti at Fusi on the border between Falevao-i-uta and Sina, Gaga'e at Lolomea close to the boundary between Falevao-i-uta and Leuluasi. Tafili lived at Leuluasi. Only a small group at Vaimaga were any distance from Falevao-i-uta.

Within the general area now known as Falevao-i-uta there are probably some older sites which antedate the historic settlement, particularly in the south and towards the steeper slopes, where there are ridges known as Mauga Tofā. Nine terraces with paving suggesting residences were found at Mauga Tofā. The lowest, a well made stone-faced and paved terrace with four stone walls radiating from it, and a large hollow ground stone (grindstone or kava pounding stone) on its surface, was identified by the workmen as the former residence of an important chief, possibly one of the Tui Atua line. Their interpretation, however, appeared to be based on the impressive appearance of the site, rather than on prior knowledge.

Lata

High above Falevao-i-uta, close to the road, is a relatively flat open grassy area known as Lata. This was said to be part of Falevao-i-uta, but is separated from it by a fairly steep climb, and is probably a quite separate area. Time did not permit its thorough investigation, but there appeared to be at least a dozen house foundations. On the ridge above are one or two more irregularly shaped structures.

Leuluasi

The privately owned cattle run at the back of the valley provided excellent conditions for mapping archaeological sites and the entire area grazed by cattle in October-November 1965 was mapped by plane table. The name Leuluasi seems to apply to the river flats rather than to the bounding ridges; the area of the cattle run probably corresponds fairly closely with the former settlement to which the name Leuluasi applies. The southern boundary of the valley floor marks its southern boundary. It is bounded on the east by the prominent ridge known as Te'auailoti and on the west by a very low ridge along which the old Mafa Pass road runs. To the north sites peter out on the edge of the extensive swamp which reaches almost to Sasoa'a and Ulua'e'a (plates 5 and 6). There are, however, a few sites beyond the northern limits of the cattle run, and a few ditches similar to those at Sasoa'a and Folasa were observed on the edge of the swamp.

It is debatable whether the northeast part of the cattle run is really part of Leuluasi since it verges on Lolomea and Falevao-i-uta. The fact that it was formerly all controlled by Tafili, however, suggests that it was indeed all part of Leuluasi. The narrower valley on the east of Te'auailoti is called Leafia and is regarded as a separate area. Few sites were located in this part, which is rocky, swampy and at the time of the survey covered in long grass. There are, however, stone walls and at least one large oven and one terrace.

At Leuluasi a form of dispersed settlement is visible which stands in marked contrast to the tightly clustered settlement of Sasoa'a. The principal forms of archaeological evidence are pavements, often with house outlines, stone walls, paved paths, large ovens, and stone enclosures. Most of the house sites are almost level with the surrounding ground surface but there are a few low mounds and one more pronounced earth mound. Although some of the sites at Leuluasi are well preserved, there are also many fragmentary remains of pavements and walls which have been damaged either by robbing of their stones or by the many floods to which this part of the valley is subject.

The total area mapped at Leuluasi covers about 85 acres (34.4 ha). The smaller northeastern part covering about 14 acres (5.7 ha) is shown in figure 5. Altogether 70 separate sites were numbered, of which about two-thirds are residential sites, the remainder being walls, paths and isolated ovens.

Olovalu

Just north of Leuluasi, on the southern edge of the swamp in the central part of the valley, is a low hill, known as Olovalu, too low to appear on the contour map of the valley. This hill, and the larger hill to the north, known as Palapi'i, are characterised by poorer soils than those of the adjacent flats and swampy areas.

At the southern tip of Olovalu is a low mound or terrace, said to have been the site of an important pigeon-snaring contest which gave rise to a title in Falevao. North of this are at least four paved terraces, two with rather unclear house outlines, and one with an associated oven and an unusual circular feature similar to one found at Leuluasi and described in Report 28 below. The northern part of Olovalu is in bush, but the southern part is covered in grass and creepers so that some house sites may have been missed.

Palapi'i

North of Olovalu is a second and larger hill surrounded by swamp. Twelve terraces were recorded here, five with well preserved pave-

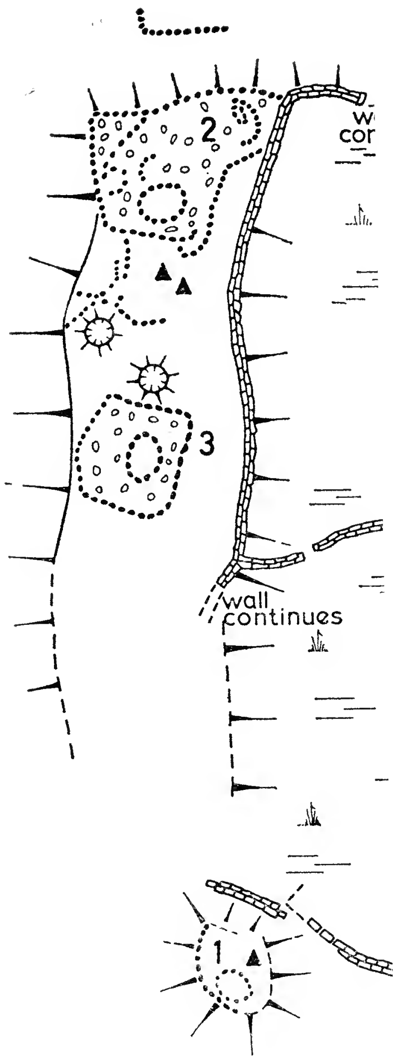


Fig. 4. Plan of part of the settlemen

living in a more dispersed form of settlement in this general area. Both Gaga'e and Naioti had their *malae* quite close to the land now known as Falevao-i-uta—Naioti at Fusi on the border between Falevao-i-uta and Sina, Gaga'e at Lolomea close to the boundary between Falevao-i-uta and Leuluasi. Tafili lived at Leuluasi. Only a small group at Vaimaga were any distance from Falevao-i-uta.

Within the general area now known as Falevao-i-uta there are probably some older sites which antedate the historic settlement, particularly in the south and towards the steeper slopes, where there are ridges known as Mauga Tofā. Nine terraces with paving suggesting residences were found at Mauga Tofā. The lowest, a well made stone-faced and paved terrace with four stone walls radiating from it, and a large hollow ground stone (grindstone or kava pounding stone) on its surface, was identified by the workmen as the former residence of an important chief, possibly one of the Tui Atua line. Their interpretation, however, appeared to be based on the impressive appearance of the site, rather than on prior knowledge.

Lata

High above Falevao-i-uta, close to the road, is a relatively flat open grassy area known as Lata. This was said to be part of Falevao-i-uta, but is separated from it by a fairly steep climb, and is probably a quite separate area. Time did not permit its thorough investigation, but there appeared to be at least a dozen house foundations. On the ridge above are one or two more irregularly shaped structures.

Leuluasi

The privately owned cattle run at the back of the valley provided excellent conditions for mapping archaeological sites and the entire area grazed by cattle in October-November 1965 was mapped by plane table. The name Leuluasi seems to apply to the river flats rather than to the bounding ridges; the area of the cattle run probably corresponds fairly closely with the former settlement to which the name Leuluasi applies. The southern boundary of the valley floor marks its southern boundary. It is bounded on the east by the prominent ridge known as Te'auailoti and on the west by a very low ridge along which the old Mafa Pass road runs. To the north sites peter out on the edge of the extensive swamp which reaches almost to Sasoa'a and Ulua'e'a (plates 5 and 6). There are, however, a few sites beyond the northern limits of the cattle run, and a few ditches similar to those at Sasoa'a and Folasa were observed on the edge of the swamp.

It is debatable whether the northeast part of the cattle run is really part of Leuluasi since it verges on Lolomea and Falevao-i-uta. The fact that it was formerly all controlled by Tafili, however, suggests that it was indeed all part of Leuluasi. The narrower valley on the east of Te'auailoti is called Leafia and is regarded as a separate area. Few sites were located in this part, which is rocky, swampy and at the time of the survey covered in long grass. There are, however, stone walls and at least one large oven and one terrace.

At Leuluasi a form of dispersed settlement is visible which stands in marked contrast to the tightly clustered settlement of Sasoa'a. The principal forms of archaeological evidence are pavements, often with house outlines, stone walls, paved paths, large ovens, and stone enclosures. Most of the house sites are almost level with the surrounding ground surface but there are a few low mounds and one more pronounced earth mound. Although some of the sites at Leuluasi are well preserved, there are also many fragmentary remains of pavements and walls which have been damaged either by robbing of their stones or by the many floods to which this part of the valley is subject.

The total area mapped at Leuluasi covers about 85 acres (34.4 ha). The smaller northeastern part covering about 14 acres (5.7 ha) is shown in figure 5. Altogether 70 separate sites were numbered, of which about two-thirds are residential sites, the remainder being walls, paths and isolated ovens.

Olovalu

Just north of Leuluasi, on the southern edge of the swamp in the central part of the valley, is a low hill, known as Olovalu, too low to appear on the contour map of the valley. This hill, and the larger hill to the north, known as Palapi'i, are characterised by poorer soils than those of the adjacent flats and swampy areas.

At the southern tip of Olovalu is a low mound or terrace, said to have been the site of an important pigeon-snaring contest which gave rise to a title in Falevao. North of this are at least four paved terraces, two with rather unclear house outlines, and one with an associated oven and an unusual circular feature similar to one found at Leuluasi and described in Report 28 below. The northern part of Olovalu is in bush, but the southern part is covered in grass and creepers so that some house sites may have been missed.

Palapi'i

North of Olovalu is a second and larger hill surrounded by swamp. Twelve terraces were recorded here, five with well preserved pave-

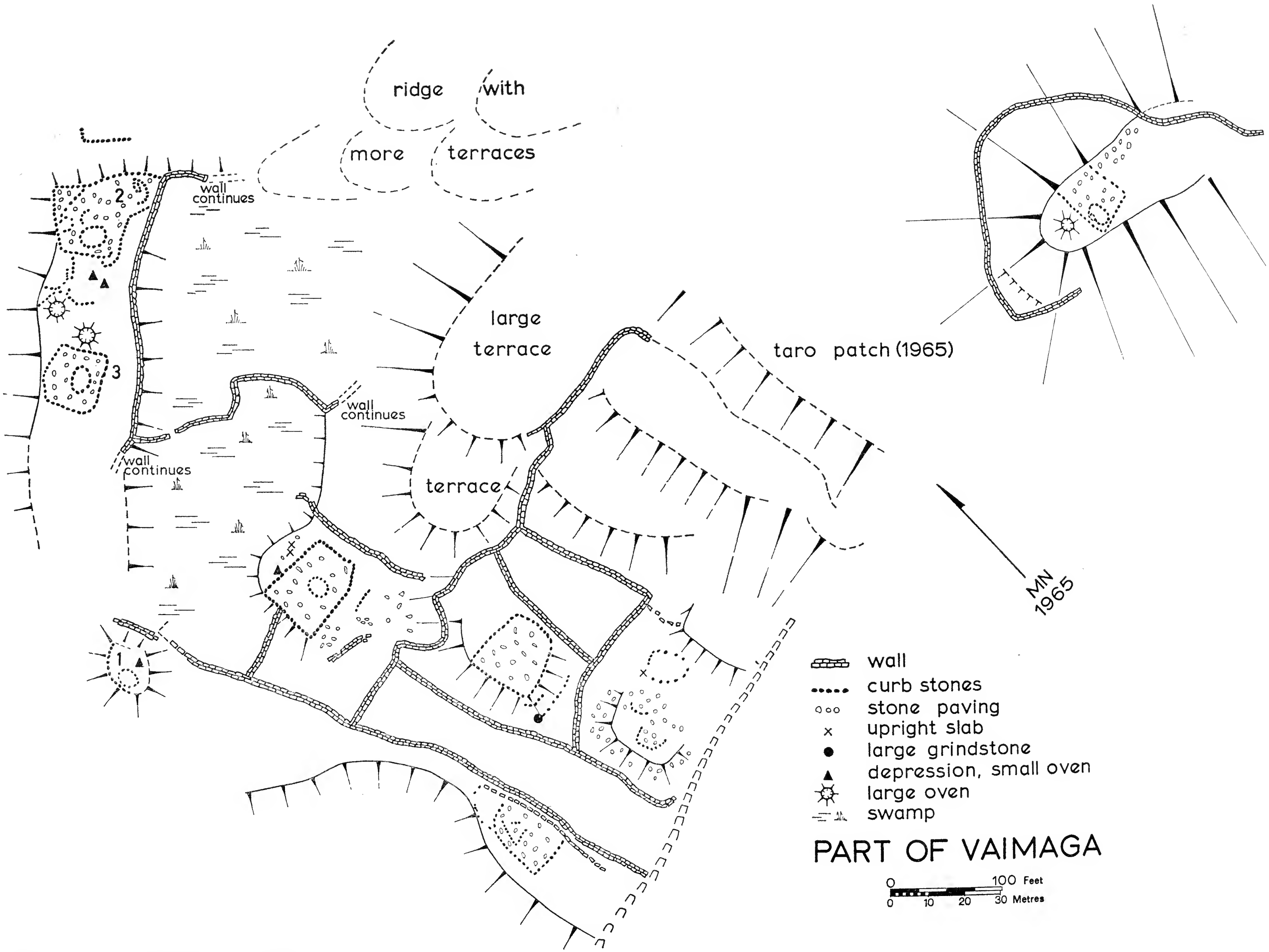
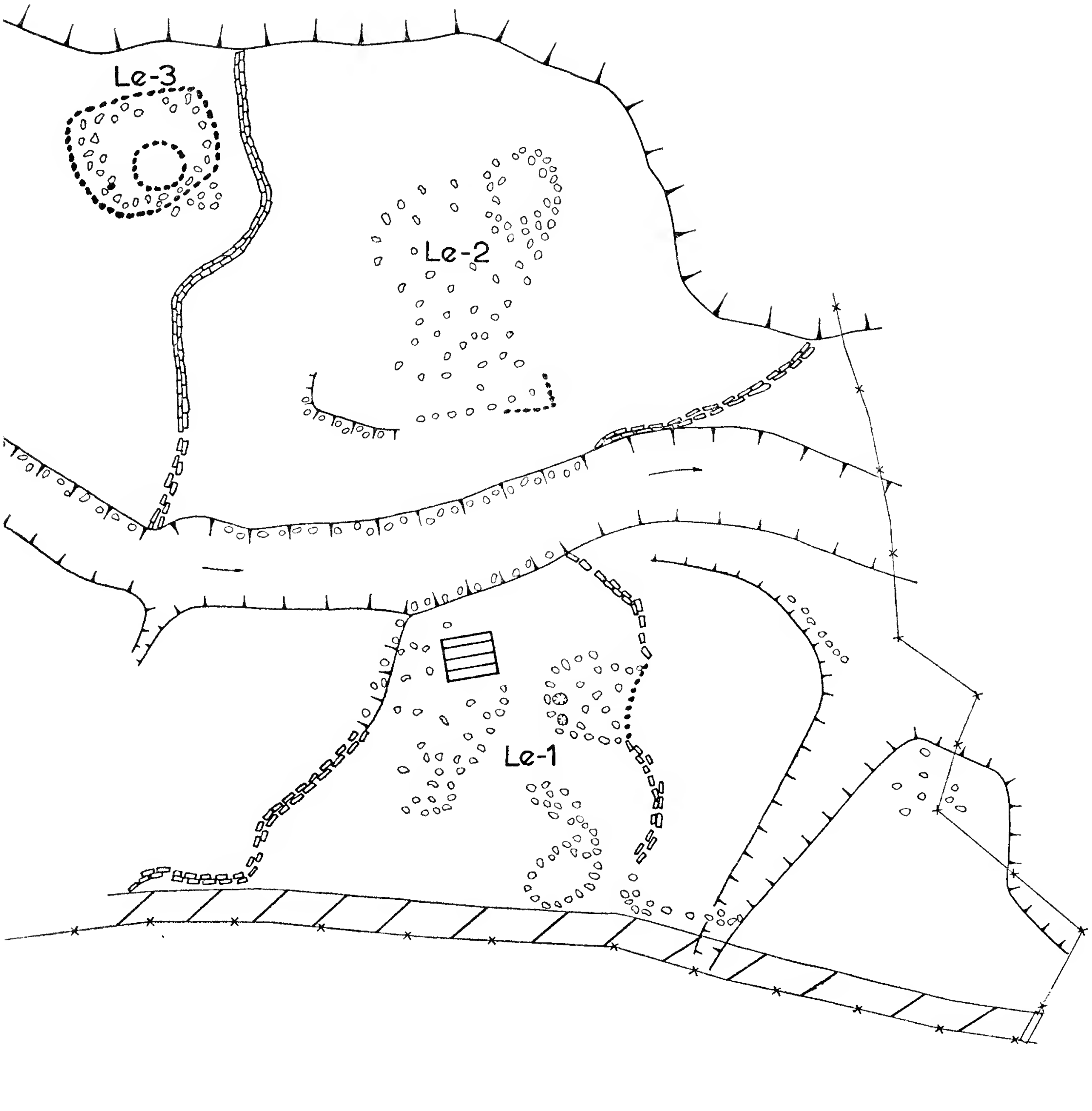


Fig. 4. Plan of part of the settlement of Vaimaga.


Le-3
Le-2
Le-1

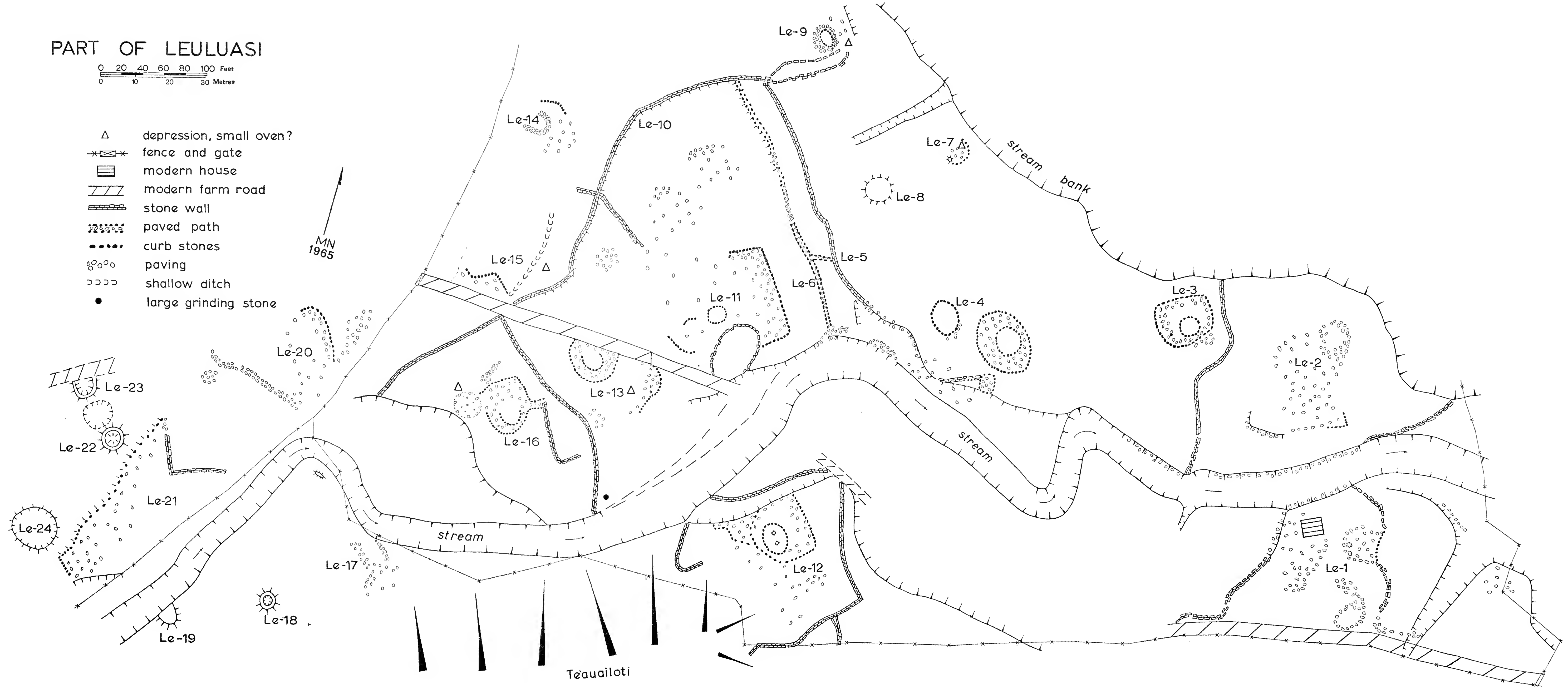


Fig. 5. Plan of part of the settlement of Leuluasi.

ments, on at least one of which a house outline was clearly visible. Both Olovalu and Palapi'i, being largely in bush, have fairly well preserved archaeological remains.

Tialata

A long low ridge extends from Niule'a to the present village of Falevao. The road to the Mafa pass runs to the east of this ridge until it reaches Niule'a, where it crosses the ridge and climbs through Sina towards the Mafa. In contrast to Olovalu and Palapi'i, the ridge is very eroded, with grass and fern cover instead of bush. It has been severely damaged by pig rooting. Consequently there are few recognisable archaeological sites.

Three transverse ditches and one defensive scarp were noted on this ridge. There appear to have been a number of house sites as well, but these are in very poor condition. At least one is recent, with remains of a metal sheath from the ridge of a recent house. The part of this ridge nearest to Falevao is called Tialata, but no name was given for its southern part.

Te'auailoti

Considerable difficulty was experienced in obtaining the correct spelling of this name. The principal alternative given was Tauailauti. The name applies mainly to the ridge which runs north into the valley separating much of Leuluasi from Falevao-i-uta, but was also deemed to apply to a sloping, stony area immediately south of Leuluasi. Here there may be as many as 20 or 30 terraces, some separated by stone walls. The bush has recently been partly felled and rotting tree trunks, festooned with creepers, obscured the archaeological features. Where house outlines could be seen on the platforms they were noticeably smaller than those of Leuluasi below.

On the ridge itself are several wide shallow earth terraces, one above the other, at least two of which have stone pavements. A shallow trench at the back of Te-1 is the only possible defensive earthwork on the ridge. A number of terraces and one possible specialised site near the point where the ridge reaches the Mafa Pass road were also recorded as part of Te'auailoti.

Faga

At the base of the ridge known as Mata'itoa, west of Leuluasi, and particularly on the east side of the narrow southwestern arm of the valley, is an area of occupation known as Faga. This land has recently been under the control of Tafili, but at the time the settlement was occupied it is said to have belonged to people of Lotofaga and Lufilufi, particularly the former. Faga is now in bush, and is fairly frequently visited by pigeon hunters.

Seventeen structures were recorded here, spread out along a narrow sloping area between the base of Mata'itoa and the stream below. The structures are mostly stone platforms or stone-faced terraces, without clear house outlines but often with areas of fine gravel on their surfaces suggesting the presence of small houses. In several places stone walls divide structures from each other. At least one large oven is present.

An area of flat land on the east side of Mata'itoa across the stream from Te'auailoti is also known as Faga. A number of sites were seen in the bush here but not recorded.

Mata'itoa

The ridge known as Mata'itoa is said to have been both a refuge and a place for catching pigeons. The ascent from the flats below is very difficult but the ridge top itself, once reached, provides a reasonably easy passage. At the northern tip is an artificially flattened area with room for a small group of people to sit or lie down. Behind this the ridge narrows to a razorback with one slight artificial transverse ditch and excellent natural defences. Further south the ridge widens slightly with a reasonable walking path for some distance to an irregular elongated stone-faced and paved structure with a sunken entrance path at one end (Report 37, fig. 83). Beyond this structure the ridge rises in a series of scarps until the peak is reached where the rock merges unnoticed into the roots and branches of an enormous banyan tree.

Maugatia

The ridge dividing the valley from Fagaloa, between the Fagaloa saddle and the old pass to Musumusu, is known as Maugatia. Like Mata'itoa it is said to have been a place for pigeon snaring. This length of ridge, which is narrow and precipitous, was explored for sites. Together with Mata'itoa and Pago-uta it is regarded as a reasonable sample of the archaeological remains occurring on the mountainous circumference of the valley.

Six stone-faced structures were found spaced out along the ridge. The two southernmost face each other across a small saddle. This is the actual place known as Maugatia. The next two are well separated from each other and from other sites. Then there is a small fortification and then two more structures, quite close to the Musumusu saddle. All the structures are long and narrow and most are irregular in shape (Report 37, p. 206). Several are in bad condition, with stones falling away. None appeared to be a residential site.

The defences of the fort when approached from the northeast are: outer scarp, scarp, ditch and inner scarp; and from the southwest: outer ditch and scarp, scarp, ditch and inner scarp. There is a narrow flat area of ridge between the two sets of defences.

Pago-uta

Pago-uta occupies a flat area on the ridge between Faga and Pago at an altitude similar to the lower end of Mata'itoa, and the Mafa Pass. The ascent is steep and difficult but unlike Mata'itoa, there is quite a large flat space at the top. In the bush here three extensive but not well made stone pavements were noted, and several oven-like depressions. These structures are more like the residential pavements encountered on the lower slopes of the valley walls than the irregular structures of Mata'itoa and Maugatia.

Pago

In the western arm of the inner valley is an extensive area of archaeological remains known as Pago. Beyond a single exploratory visit Pago was not included in the survey, but it appears to have a similar range of house sites and stone walls to that found at the eastern settlements of Folasa, Vaimaga and Niule'a. The sites are mostly on the slopes but extend down on to the flat, where they are obscured by vegetation and patches of swampy land. Right at the entrance to the valley, however, a single earth mound and some well preserved low house pavements similar to those at Leuluasi, were observed.

Puna and Other Earth Mounds

On both sides of the road to Lalomauga, from the turn-off near Falevao to the ford at Lalomauga, substantial earth mounds were observed, some in isolation, some in groups of two or three such as the cluster at the place known as Puna (Report 23). These mounds are fairly close to the river and so are associated with the same zone of highly fertile soils as Sasoa'a. The mounds were not generally recognised by informants as archaeological sites. The large mound at the turn-off to Lalomauga, however, which has a modern house on it, was said to have been built by the demons who first occupied the valley.

Earth mounds are rare further inland in the valley. One site at Leuluasi is built on an earth foundation large and high enough to be described as a mound, and there is one mound at Pago and what may be an artificial mound at Olovalu. There are, however, as many as 14 substantial mounds close to the Lalomauga road. They were accordingly treated as a separate complex, unnamed as a group (although individual mounds or small clusters may have separate land names), and for the purposes of the survey regarded as comparable to the various named areas described above. The two mounds at Folasa could also be considered to belong to this group.

Discussion

Three broad zones could be distinguished in the survey area, on which archaeological sites occurred. The nature of the archaeological evidence varied from zone to zone, but also from location to location within zones. The first zone is the almost flat central part of the valley. The most fertile soils are found here, close to the rivers, but it is also the most subject to flooding, and much of it is now swampy and uninhabitable. This zone is likely to have changed considerably during the period of human occupation of the valley, as a result of erosion from the surrounding hills, deposition of alluvium and constant flooding. The second zone consists of the gently sloping lower walls of the valley above the 150 ft (45.7 m) contour. Olovalu and Palapi'i can also be included in this zone. Soils here are generally steepland soils of moderate to low fertility, with some small areas of less stony and moderately fertile soil. A number of permanent streams cross this zone but the sloping ground means that flooding is less of a hazard than in the central valley. The third zone consists of the high precipitous ridges and remote and inaccessible inland regions, usually more than 750 ft (228.6 m) above sea level. This zone is generally unsuited for normal occupation, but archaeological sites still occur there.

The only sites recorded in the first zone are those of Sasoa'a and Leuluasi, and the earth mounds close to the Lalomauga road. There are marked contrasts between these three areas. The earth mounds are unique in the inner valley, although matched in other parts of Upolu (Report 36; I, Report 6). They appear to have been residential sites of a kind which was only briefly popular in the valley, possibly indeed a response to the rather serious flooding which occurs here. Sasoa'a and Leuluasi both consist largely of residential sites, in the form of pavements with house outlines, sometimes slightly raised above the surrounding ground surface. There are several large ovens at Leuluasi and one at Sasoa'a. The former also has a variety of stone walls and paved and sunken paths which are lacking at Sasoa'a, which is, however, surrounded by ditches. The principal difference between the two locations is their site density. Fifteen houses at Sasoa'a occupy an area which at Leuluasi would have at most three houses. The age of the two settlements may explain this difference; Sasoa'a is dated to the early European period, while Leuluasi is apparently of late prehistoric age.

The good state of preservation of Sasoa'a is undoubtedly due to its recency. Leuluasi, right at the back of the valley and slightly less subject to flooding, nonetheless shows evidence of considerable site damage caused by floods. It is impossible to guess how many prehistoric settlements are now concealed beneath alluvial deposits or isolated in the swamps of the central valley. This central area must always have presented a conflict between the attraction of the soils and the hazards of the floods. The ditches around Sasoa'a suggest that the soils were sufficiently important for much effort to be devoted to making the area habitable.

On the lower slopes of the valley wall, particularly at Folasa, Vaimaga, Niule'a and Mauga Tofā, are found residential areas not unlike Leuluasi, except that the influence of local topography is seen in the presence of earth terraces on which residential sites like those of Leuluasi are found. Ovens and stone walls are present. Folasa, with its lack of stone walls and its system of ditches differs from the others, and more closely resembles Sasoa'a than any of the other sites in the second zone. These differences could be attributed to topography, but might also be chronological. More restricted groups of residential sites occur at Olovalu and Palapi'i.

On the steeper ridges of Poiva, Polua, Sina and the northern part of Te'auailoti, which are still, however, in the second zone, sites are restricted by topography to single rows of terraces whose residential character is less certain. Whereas the sites at lower elevations often resemble house sites, those higher up, particularly at Polua and Sina, have the irregular outline associated with specialised non-residential sites.

Lata, Faga and the southern part of Te'auailoti, while undoubtedly residential in character, have some apparent differences from sites in the more accessible parts of the valley. Lata is a compact settlement in a fairly inaccessible place. Platforms at Faga tend to be higher and make greater use of stone than those of other areas, while the houses themselves are not clearly outlined. Faga's other point of difference is its allegedly anomalous position traditionally in this part of the valley — its association with Lufilufi and Lotofaga, rather than with Falefa. The southern part of Te'auailoti is distinguished principally by the smaller size of the houses where these could be measured. Whereas the residential sites in the first zone and in the more accessible parts of the second zone appear to reflect peaceful occupations of considerable duration, there would be grounds for considering Faga, Lata and Te'auailoti as "bush refuges" occupied in times of duress and perhaps fairly briefly.

On the remote inaccessible mountain ridges of the third zone are structures which are hardly likely to be residential. Generally these are of the irregular outline thought to characterise either religious structures or pigeon-snaring mounds. Traces of fortifications show that this zone was also used for refuge. Pago-uta, which falls in this zone, presents a problem, since its structures have the appearance of residential platforms. It could be a bush refuge, or possibly a base for extended pigeon-snaring excursions. The problems of what structures, if any, were associated with pigeon snaring will be discussed below (Report 37). It is certainly improbable that Pago-uta is a normal settlement.

From the above discussion it can be seen that in the flat and gently sloping parts of the valley large numbers of residential sites occur. Although different names are given to different areas, and there are some differences in archaeological features from area to area, it also is true to say that all habitable parts of the valley have archaeological sites, occurring in at least as great a density as at Leuluasi, and that only where there are swamps, rivers or steep mountain slopes are there no sites. In the higher parts of the valley there is a gradual change to sites which are not obviously residential, or which have the character of refuges.

Very little time control was obtained either from traditions or from obviously chronological variations in the character of sites. Sasoa'a, with its high density of sites, stood out from all other areas. Moreover it was discovered to be of nineteenth century age. Falevao traditions and the good state of preservation of sites at Leuluasi and Vaimaga suggested that settlements here were only slightly older, probably of late prehistoric age. The lack of traditions about Niule'a and the belief that Folasa was of considerable antiquity suggested that they might be slightly older. No great length of time was indicated by this sequence, however, and it seemed likely that all sites recorded had been occupied within a few centuries of the present day.

In view of the known propensities of Samoans to reoccupy old house sites, it was predicted that many of the sites would have been occupied more than once. Moreover it was to be expected that some parts of the valley, particularly the first zone, and the most desirable parts of the second zone, would have been occupied for a long time. If a representative sample of sites in various areas was excavated and dates for earlier occupations obtained, a sequence of occupation for the inner valley could be established. This was one of the aims of the 1966-67 season.

Equally important was to investigate in greater detail than was possible by mapping alone, the exact nature of the last occupation, reflected by surface remains, at the various localities recorded. It was thus hoped to obtain a detailed understanding of the last occupation at each of several different areas, in conjunction with as much information as possible about the date and nature of earlier occupations. Because the principal interest was the use of the inner valley for habitation, however, the sites excavated should be residential sites. The residential sectors of the valley are remarkably lacking in large or unusual types of site; there is little indication either of differentiation of sites belonging to people of high status, or of structures which could be interpreted as religious sites, pigeon mounds, burial mounds or other specialised sites. Those structures which can be distinguished as probably not residential occur in the higher and more inaccessible parts of the valley.

The following locations were selected for excavation: Sasoa'a as the most recent and most nucleated settlement; Leuluasi, Folasa and Vaimaga as representatives of late prehistoric settlements differing slightly among themselves; Te'auailoti as a more remote location with the appearance of a temporary refuge rather than a long occupied settlement; and one of the earth mounds, for comparison with those at Vailele, because they appeared intrusive among the normal range of sites in the valley, and because I believed that the earliest occupation in the inner valley was likely to be found in the fertile central part.

In the event all these areas were investigated except Vaimaga, which had to be omitted because of the greater length of time spent at Sasoa'a than originally intended (Reports 21 and 29). Excavations at the remaining areas selected are described in the following reports, while Report 30 discusses the results of the excavations in relation to the survey.

ACKNOWLEDGEMENTS

The LMS pastor at Falevao, Taofia, and his wife Savali, looked after me during my stay at Falevao. Malaga, the Pulenu'u, made many arrangements for me. I am grateful to all those in Falevao who helped with the survey, to Leauga of Falefa for his interest, and to Alan Ripene and Vito Meisake of the Public Relations Office, Prime Minister's Department, for initial arrangements.

I am indebted to Dr R. C. Green for advice and encouragement at all times.

EXCAVATIONS AT SASOA'A: THE HISTORIC PHASE

J. R. McKINLAY
N.Z. HISTORIC PLACES TRUST

The small, compact settlement of Sasoa'a lies a short distance northwest of the modern village of Falevao. Its setting and features and the reasons it was selected for excavation are described by Davidson in the preceding report (p. 5). A plan based on her plane table map made in 1965 is given in figure 2.

The mapped area of settlement consists of 18 numbered sites including some with multiple remains. Number 15 is a large oven, nos. 8, 10, 13, 16 and 17 are sections of pavement and stone alignments which are difficult to classify, while the rest are house outlines marked by alignments of natural stones used as curbstones. Three of these house outlines, 5, 9 and 14, are without associated paved platforms, but the others, nos. 1, 2, 3, 4, 6, 7, 11, 12 and 18, are situated on low paved platforms generally less than 50 cm high, a height only just sufficient to raise the surface of each above the level of the surrounding flat, which is often swampy and sometimes covered by surface water or floods.

In general the house platforms are of rectangular shape and most are outlined by a single row of boulders around the edges. The surfaces are usually paved with waterworn boulders and river gravel deposits *('ili'ili)*, while the remains of oval and round houses are outlined on the surface by alignments of curbstones of slightly smaller size than those used around the edge of the platforms. The house outlines often occur in multiple and sometimes overlapping sets; excavation has shown that this usually reflects re-use of the same pavement for housing over an extended period of time rather than short-term occupation.

Three sites, all belonging to the category of house outline with associated pavement, were selected for excavation. The first was Sa-1, in which Davidson had conducted a test excavation in 1965; the other two were nearby sites which were designated Sa-2 and Sa-3 on her plan of the settlement. Two of the sites, Sa-1 and Sa-2, consisted of roughly rectangular platforms, while Sa-3 was of more rounded outline and its eastern side extended out towards a neighbouring platform. Of the three sites, Sa-2 was the most raised above the level of surrounding land, while Sa-3 was paved with stones of slightly smaller size than those used at the other two sites.

The principal objectives of the Sasoa'a excavations which opened the final phase of the Samoan programme were: (1) to define archaeologically the nature of an early European contact period settlement in the inland portion of this valley, and (2) to give the personnel involved, most of whom had not previously worked in tropical Polynesia, an opportunity to familiarise themselves with some of the problems inherent in archaeological work in Samoa.

In carrying out the first objective, attention was directed towards an archaeological definition that would include both the structural features and the portable artifact assemblage, in particular, items of European trade which would help to date the site fairly precisely. The historic nature of this site and the probable success of this goal had already been demonstrated by Davidson's test excavation, while from her Samoan informants she had obtained the name of Sasoa'a for the settlement. However, it was not until after the excavations were completed that historical research confirmed that this was the name of a village in this valley which had had a mission school in 1838 (Mills MS 1838). The name does not appear among villages listed by Watters (1958: 5) for 1840. The initial expectation was that these excavations would provide a controlled archaeological assemblage from the early historic contact period permitting the assignment of a fairly precise date to one small nucleated inland settlement only known traditionally, thus supplementing the inadequate historic record of the 1820s and '30s. The results, while suggesting that this would have been possible, have, of course, allowed us to test both the traditional and the fragmentary historical evidence.

To accomplish the second objective, the excavations were carried out by three teams of Samoan labourers under the direct supervision of Kisao Ishizuki, Trevor Hansen, Kathryn De Nave, and myself. It was anticipated that at the conclusion of these excavations, the leaders, who by that time should have accustomed themselves to the new situation of controlling and directing the work of a group of inexperienced workmen with whom they did not always share a common language, would each be able to conduct an individual excavation at another site elsewhere in the valley using the same labour force. This expectation was realised at the first two sites, but when Sa-3 proved to have several phases of occupation, it was decided that I should continue with the investigations there, and consequently I spent the whole of my excavation time in Samoa at this site. Because of this, it was decided that the responsibility for the writing of the report on these three sites should be mine, although as I was unable, because of lack of time, to finish the work at Sa-3, Green (Report 29) covers its earlier phases of occupation. While the excavations at each of the individual sites was under the supervision of one of the student members of the expedition, the project as a whole was under the constant direction of Green. When work at Sa-1 and Sa-2 was completed, Green was absent from time to time at other sites, but at no stage did he not spend at least part of each day at Sasoa'a.

The Investigations

The investigations, which were started on 15 December 1966, began with the clearing of the vegetation from the three sites and the cleaning and sweeping of the paved surfaces of the platforms. Ishizuki continued the work begun by Davidson at Sa-1, excavating at first with two men, but later with four. Twelve working days were devoted to this site, until on 10 January 1967 Ishizuki moved with his team to carry out the investigation of a site at Folasa-a-lalo (Report 22). At Sa-2 Hansen and De Nave worked with a team of four labourers for the same period as Ishizuki at Sa-1. Hansen then shifted to a cluster of mounds near Lalomauga to supervise test excavations in one of them (Report 23) while De Nave moved to Sa-3 to investigate the smaller structure outlined on the surface of the platform at that site. I commenced work at Sa-3 with an initial crew of two, later increased to three. With the discovery of pottery in the lower layers of the site on 12 January, the programme planned for Sa-3 had to be altered and the area intended for excavation greatly extended. At this point the crew was increased to six, which was maintained thereafter. At the end of January, when I returned to New Zealand, the direction of the Sa-3 excavations was taken over by Green, who carried through to completion on 22 February, after a total of 43 working days. In this period he was assisted by De Nave and Dr Y. H. Sinoto for a week each, after which De Nave left this site to supervise test excavations of a site at Te'auailoti (Report 26).

Site SU-Sa-1

On all three sites it was decided to excavate only one half of the most intact structure outlined by the curbstones, as it seemed reasonable to expect that any internal structural pattern revealed would be repeated on the second half of the area, which in any case would remain to be excavated at a later date if necessary. For this reason, at Sa-1 an excavation grid on a base-line 8 m long, parallel to the edge of Davidson's original test excavation, was laid out across the centre of the intact structure outlined by the larger curbstones. The whole of the area of the platform was then cleared of the smaller vegetation and accumulated debris. As this work progressed, the outline of a further structure in somewhat smaller curbstones was revealed, as was a second "fireplace" within the first structure and another in the second structure (fig. 6 and plate 1). The cleared site was mapped and photographed.

The task of removing the layer of small waterworn stones and gravel or *'ili'ili* from one half of the interior of the intact structure commenced at the end where Davidson had carried out her test excavation. A number of portable artifacts, mainly of European origin (table 2) were recovered, many of them in the *'ili'ili* fill within the curb outline of the house. The position of these artifacts within the square and layer was recorded but they did not occur in sufficient numbers to make possible the drawing of any distribution map showing a meaningful pattern. Scattered charcoal which also occurred in this layer made it possible to collect several samples for radiocarbon dating, but as the results should all be "modern", or less than 200 years before the present, none has been submitted for analysis.

As the section drawings (fig. 7) indicate, the area of more closely packed paving stones which surrounded one end of the main structure (fig. 6) overlay the fill of the second structure. This, together with the fact that the main structure cut through the the other, showed that the main structure, which was intact, was definitely the later of the two. The gravel fill in the interior of both structures rested on a layer of brown clay, containing only a few pebbles. Careful trowelling on this surface revealed the positions of the postholes of both structures (fig. 8). These postholes had proved impossible to identify in the gravel layer itself, even though it could reasonably be assumed that they would closely follow the line of the curbstones. When identified in the underlying brown clay layer, they were found to follow this pattern and an almost complete set of postholes for part of the perimeter of each structure was delineated (fig. 8 and plate 1). Two larger holes, possibly of the centre posts of the main structure, were identified in square D-6. It seemed they had either been redug or at this point coincided with posts of the earlier structure.

It was originally thought that the brown clay layer at Sa-1 represented the natural subsoil. When pottery was found at Sa-3 under such a layer, however, a 1 m² test pit was dug in one of the squares of the already completed excavations at Sa-1 (fig. 6). This revealed that the brown layer on which the structure rested was a thick water-lain deposit with a well-developed structure. There was no sign of an underlying soil horizon as at Sa-2, nor of an occupation layer as at Sa-3. Two pieces of pottery were found in the test pit, but as these lacked any cultural associations and their edges were somewhat rounded as if from movement in water, it was decided that they represented sherds washed in with this deposit from some nearby site during periods of flooding. It has already been noted that in periods of heavy rain this area still may be covered by flood waters.

The portable artifacts recovered represented a reasonable range of items of European origin, together with two fragments of stone adzes (table 2). These latter need not be regarded as unexpected because in present day Samoan villages one may still find stone adzes lying together with items of European origin in the stone pavements of house platforms. These artifacts, along with those from the other two sites, will be described in greater detail below.

It seems feasible to interpret the evidence

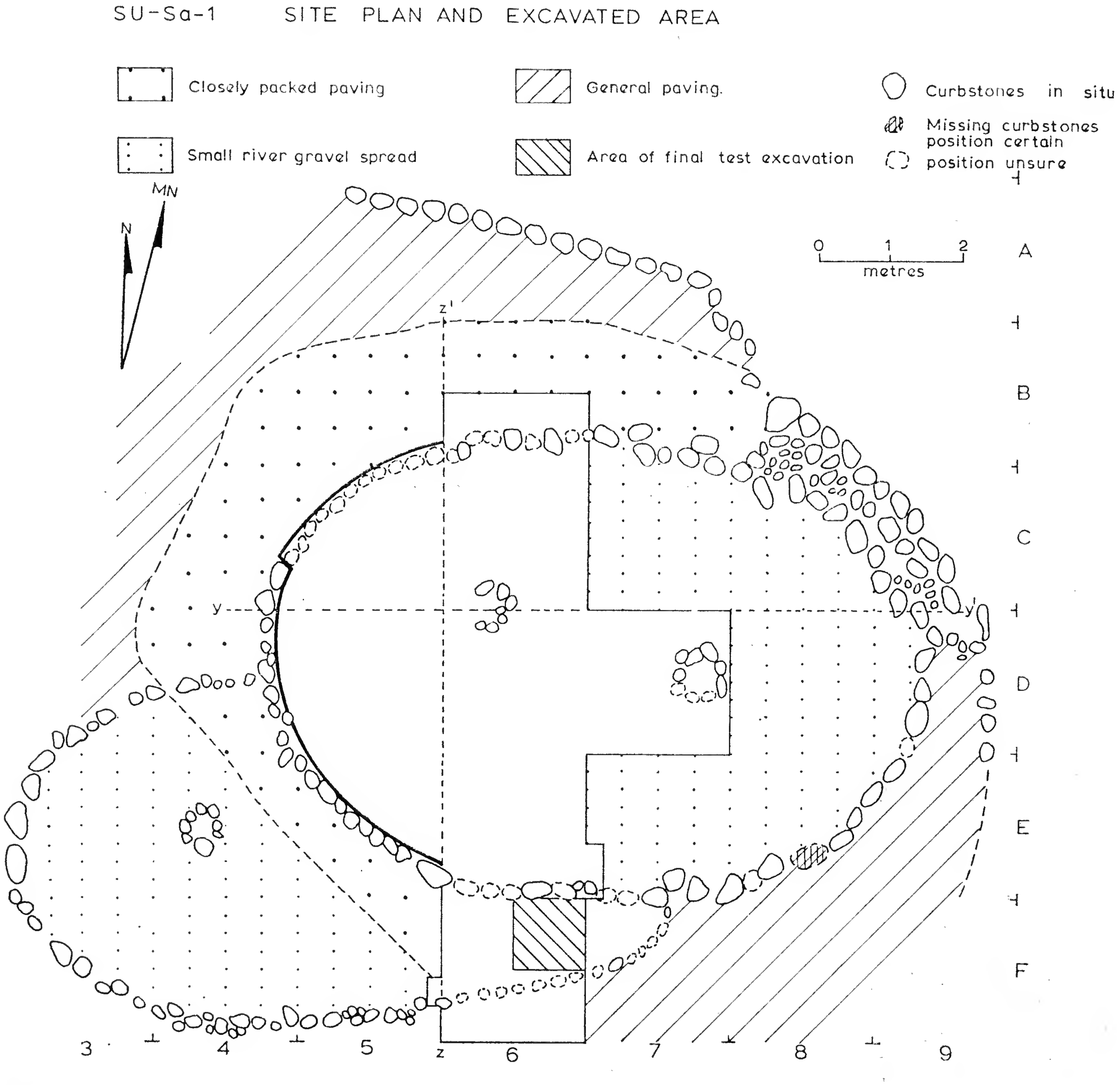


Fig. 6. Site plan of SU-Sa-1 showing excavated area.

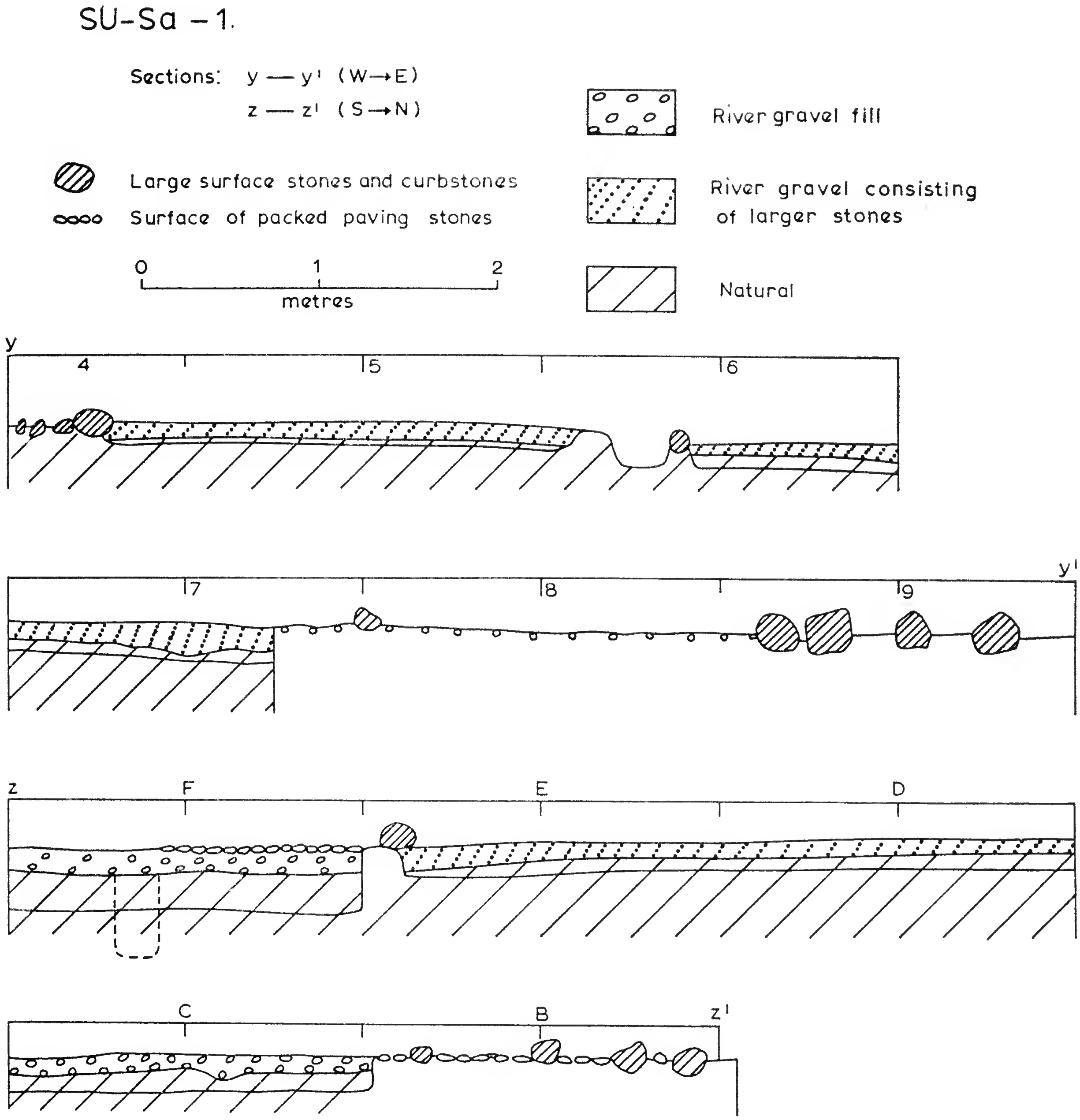


Fig. 7. Principal cross-sections, SU-Sa-1.

at this site as reflecting a single period of continuous occupation. A low platform was constructed of locally available boulders and gravel from the nearby river, forming the base for at least two successive house structures with a roof supported by upright wooden posts. In each case the plan of the posts described an oval, the line of which was marked by a series of natural boulder curbs, while the floor was formed by filling the interior with layers of river gravel or *'ili'ili* in much the same manner as is practised in the building of Samoan houses today. Although both structures were built with the same alignment and in the same general position on the platform, their positions were not identical, so that the second structure overlapped the first on the northeast side. In the process of building the second structure the curbstones on this side were removed, but the remaining outline of the former structure and its fireplace were left intact as part of the pavement. Around the northern side and western end of the second structure, an additional paving of closely packed stone was laid which then gave way to the general paving of the platform.

The structural features of this site are so similar to those of present day dwelling houses in Samoa that on this basis, as well as on the historical evidence discussed below, it is reasonable to infer that they had the same function.

The portable artifacts support the identification of a domestic unit and reveal two other major points. First, in dwelling sites of the historic period, portable artifacts of the prehistoric as well as historic period may be expected at all levels. Secondly, there is a fairly wide range of distinctive unperishable artifacts of European origin found at all levels in the *'ili'ili* floor layers. This would seem to indicate that such items were being dropped by the inhabitants for the whole period for which the site was occupied.

Site SU-Sa-2

This site consisted of an almost rectangular and very well made platform outlined by large curbstones, on which in slightly smaller curbstones were, the almost complete outline of an oval structure, a partial outline of another and an outline in smaller stones of a third structure which it had been suggested was a grave (fig. 9). Along the southeast edge of the complete oval curb outline was an area of pavement with closely packed stones distinctly different from the paving over the rest of the platform.

Again, for reasons given above, it was decided to excavate only one half of the intact structure, and to devote the remaining efforts to relating it to the partial house outlines and the suggested grave. A grid was laid out on a north-south magnetic alignment which fitted the site most appropriately. Excavation techniques followed those employed at Sa-1. As at the other

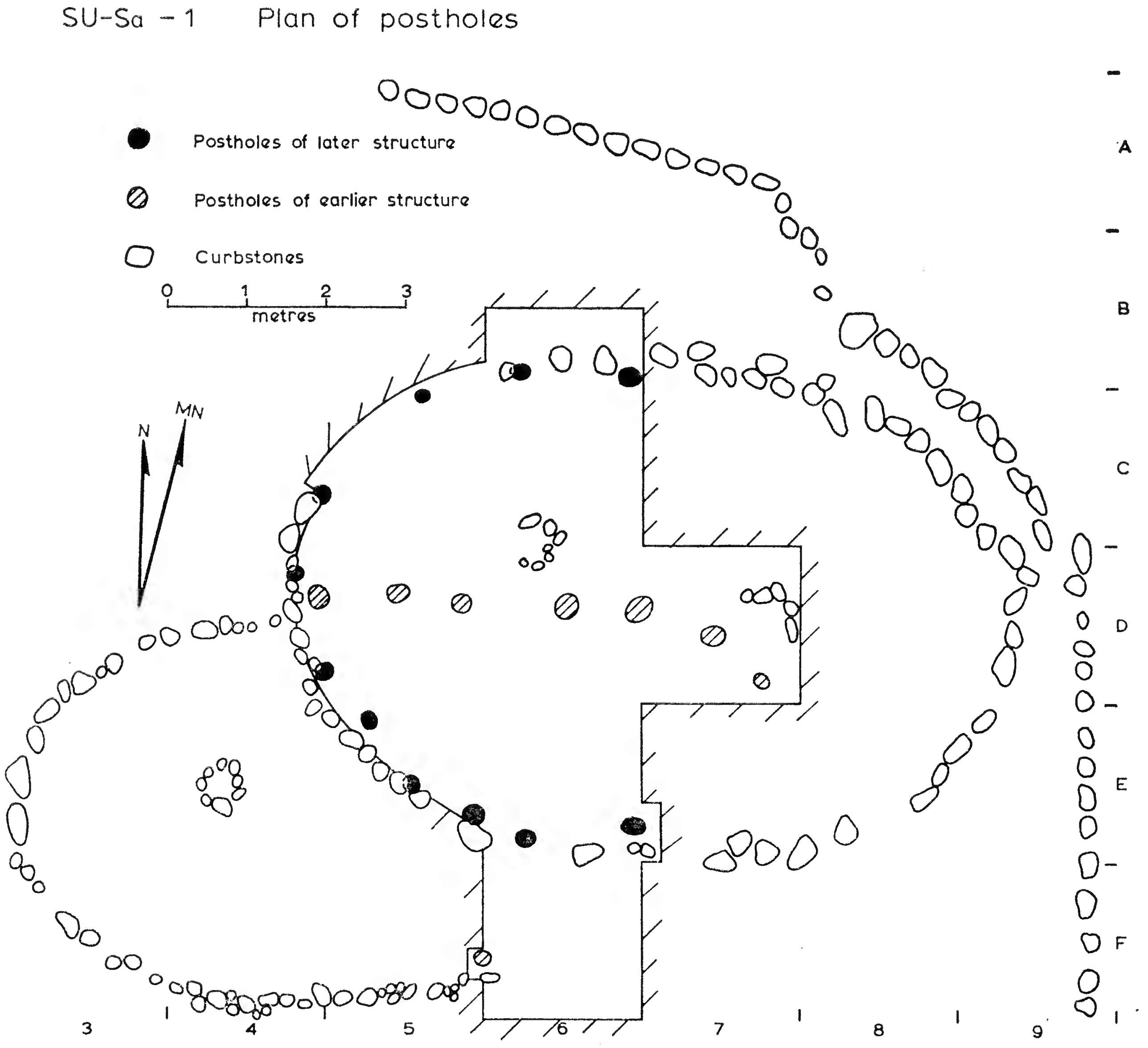


Fig. 8. Plan of postholes, SU-Sa-1.

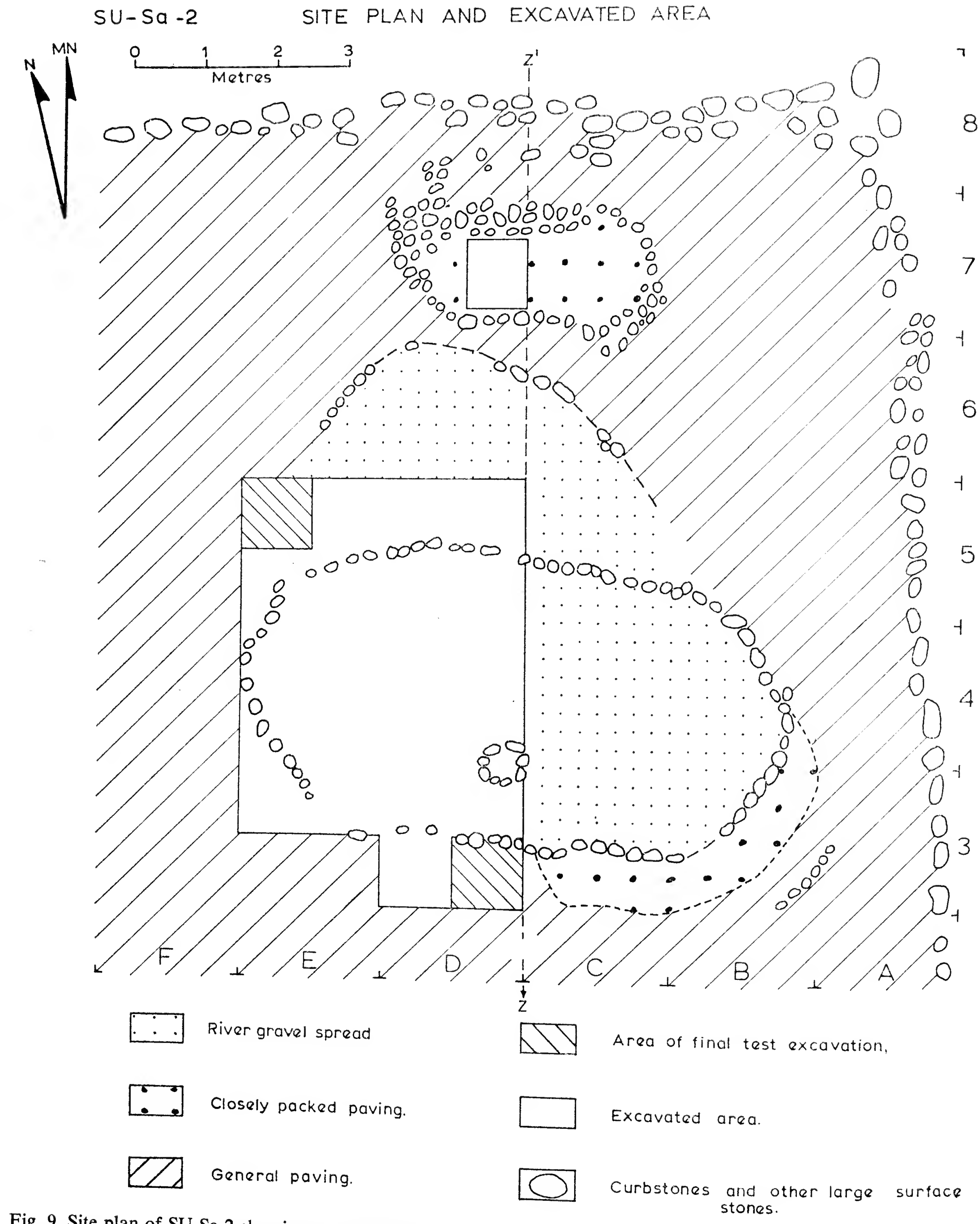


Fig. 9. Site plan of SU-Sa-2 showing excavated area.

two sites it was found that the identification of postholes in the gravel layer was difficult and patterns could not be established until the underlying clay layer was reached. However, because the bulk of the portable artifacts were recovered from the *'ili'ili* layers, the excavation of this material was at all times carefully controlled.

The postholes and other sub-surface features encountered in the excavations are shown in figure 10. Recognisable patterns among the postholes suggest there had been at least three structures on the site. The two earlier ones appear to have been oriented at right angles to the latest one, although all of them occupy the same general position on the pavement (plate 2). However, no series of postholes was complete, not even those belonging to the most recent structure, and it appears that not all of the postholes of the last house were of sufficient depth to have penetrated into the clay layer where they could be recorded. In addition, there are other postholes which do not fit into any of the alignments suggested in figure 10.

In the area of squares E-3 and E-4 the gravel layer was found to be relatively thin where it overlay an area of earlier pavement of closely packed larger stones (fig. 10). This pavement is probably to be associated with the outline of one of the earlier structures in much the same way that an area of closely packed pavement is associated with the southeast side of the latest house at this site, and, as noted above, around one end of the latest house at Sa-1. When the earlier pavement was removed, a fire-burned area was found beneath it (fig. 10), together with a fragment of bottle glass, indicating that the pavement of one of these earlier houses is also to be assigned to the period of European contact, as is the occupation under it. Again at least three occupations within the span of early European contact are implied.

The small oval structure on the northern side of the platform, which had a surface filling of uniform but slightly larger stones built up to

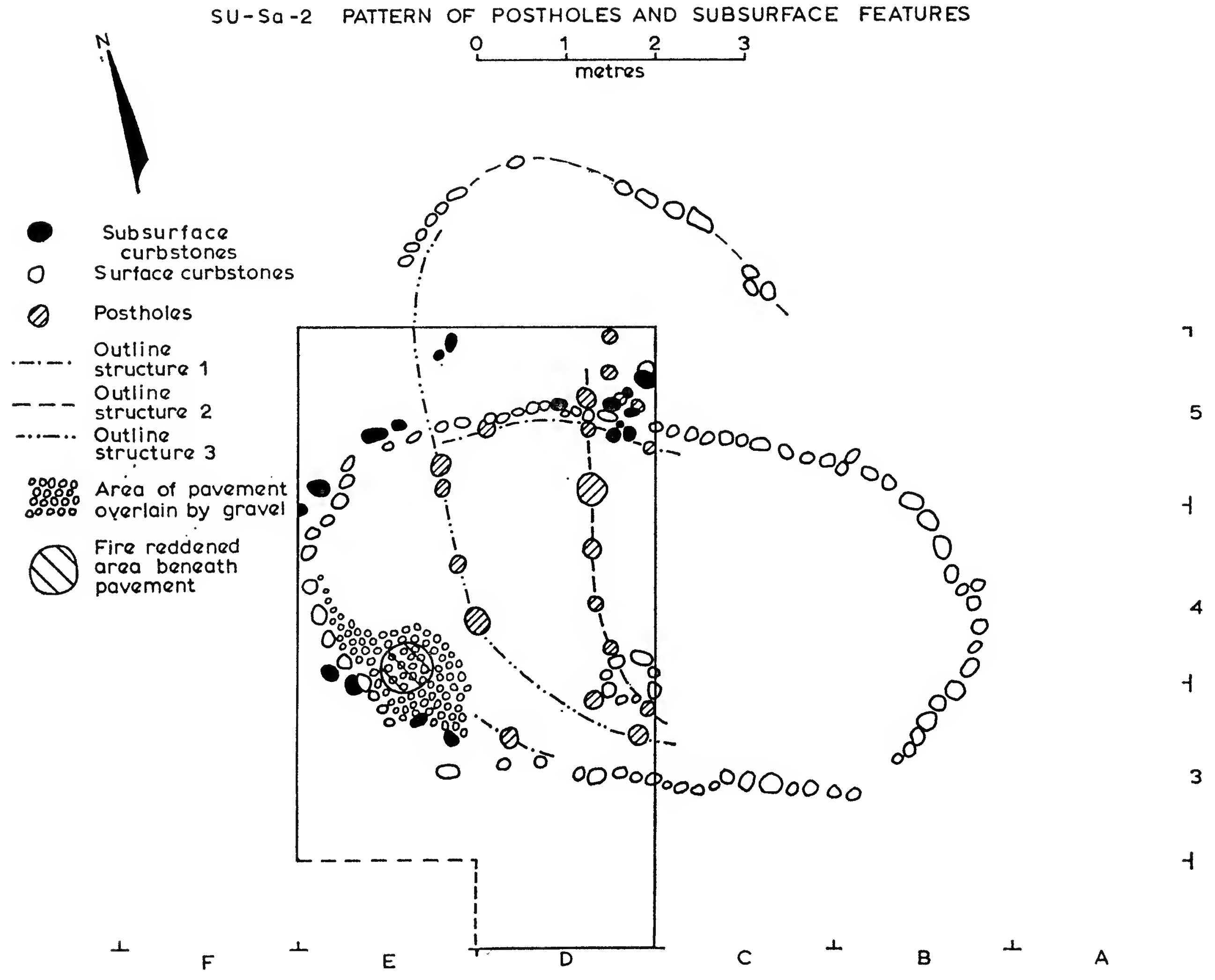


Fig. 10. Plan of postholes and other sub-surface features, SU-Sa-2.

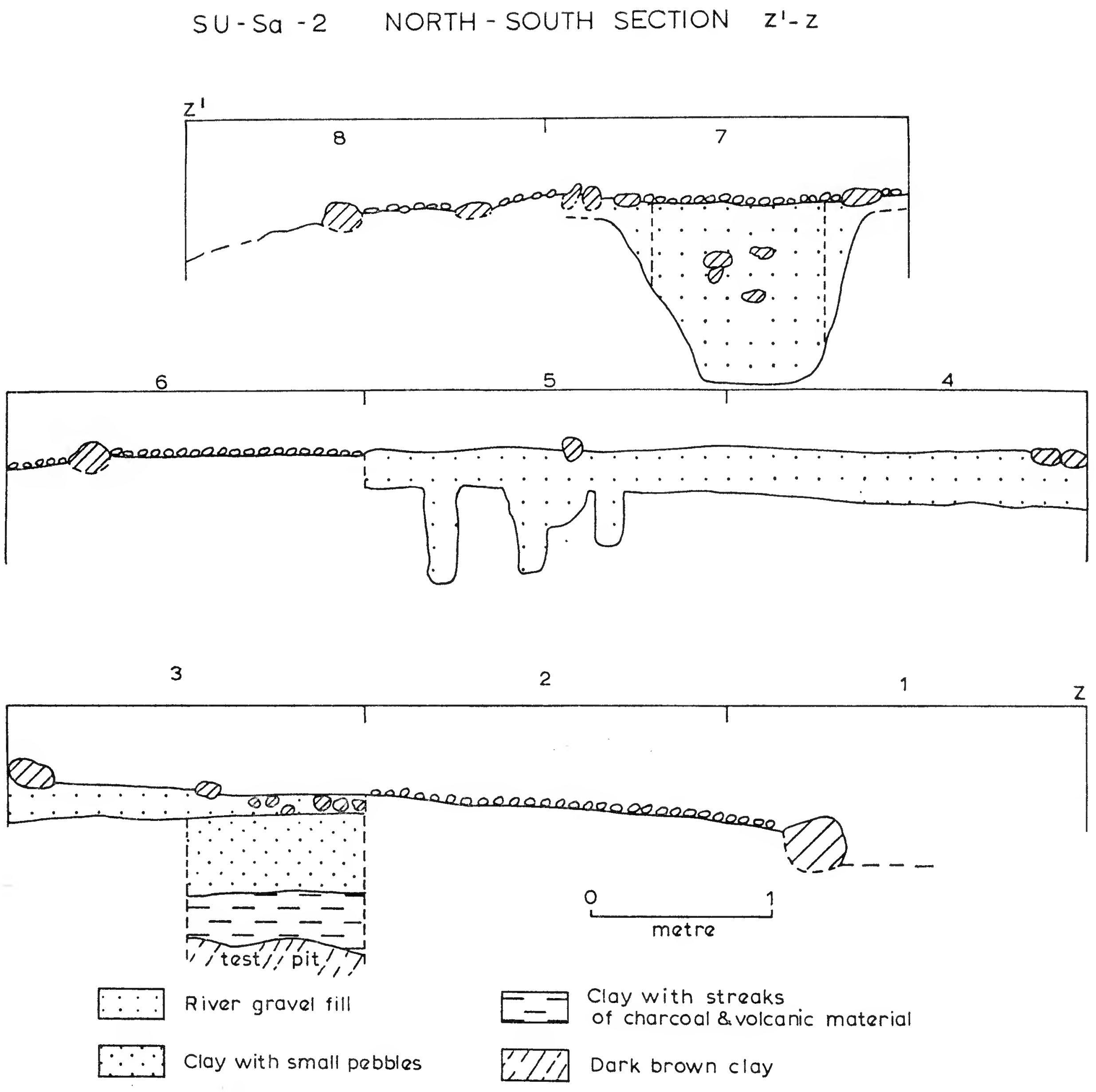


Fig. 11. Principal cross-section, SU-Sa-2.

make it slightly higher than the surrounding pavement, appeared to be the most recent feature on the platform. Excavation proved that these stones did indeed outline a grave, although the stone oval on the surface did not correspond exactly with the sloping walls of the grave pit, which proved to extend out beyond the walls of the excavation square (fig. 11). The 1-m-deep pit was filled with a rather earthy material containing some larger stones. The skeleton at the base had already largely decayed in the wet and acid soil, and only parts of the skull and some teeth remained. The base of the pit was covered by a layer of red clay, a feature common to most of the burials at Sasoa'a, and one that can probably be used to identify a pit as a grave even where no trace of the skeleton remains.

To conclude the investigations at this site two test pits, each 1 m², were dug, one in square E-5 and the other in D-3. Both of these encountered a buried soil horizon with scattered charcoal at a depth of some 70 to 90 cm below the pavement surface (fig. 11). The layer had a well-developed crumbly structure and is probably to be interpreted as a garden soil belonging to an earlier agricultural use of the locality, now preserved under the platform. It need be of no great antiquity.

Immediately the work of removing the upper surface of the *'ili'ili* layer from this site was commenced, portable artifacts of European origin were found — a piece of bottle glass on the surface, and a clay pipe fragment from within the outline of the last structure. The artifacts found covered a range similar to those found at Sa-1 (see table 2 below).

The evidence at this site again points to the building of at least three successive structures during an apparently continuous occupation of the house platform. This has resulted in the greatest build-up of *'ili'ili* deposits at the centre of the platform, which was thus adequately drained (fig. 11). Although there was a burial on the platform, it was placed outside the house area and could be identified at the surface by an oval of stones and some differentiation in the type of paving. The red clay lens in the base of the pit is significant, because under the conditions of rapid disintegration of skeletal material which prevail in many of the wet and acid inland soils of Samoa (Wright 1963: 170), it may well be the only feature to indicate that a pit is in fact a grave. The artifacts recovered are consistent with those of the other two sites at Sasoa'a, and provide a fairly comprehensive range of items of European origin belonging to the early period of regular contact. Because of their presence in the gravel layer and even below the pavement of an earlier structure, they indicate that the whole complex of structures on this platform falls within the time span of this period. As at Sa-1, because of the similarities to modern houses in size and shape, features such as stone curbing, gravel floors and fireplaces, and the presence of portable artifacts of a domestic nature, the interpretation of the site as a dwelling unit within the historic village seems secure.

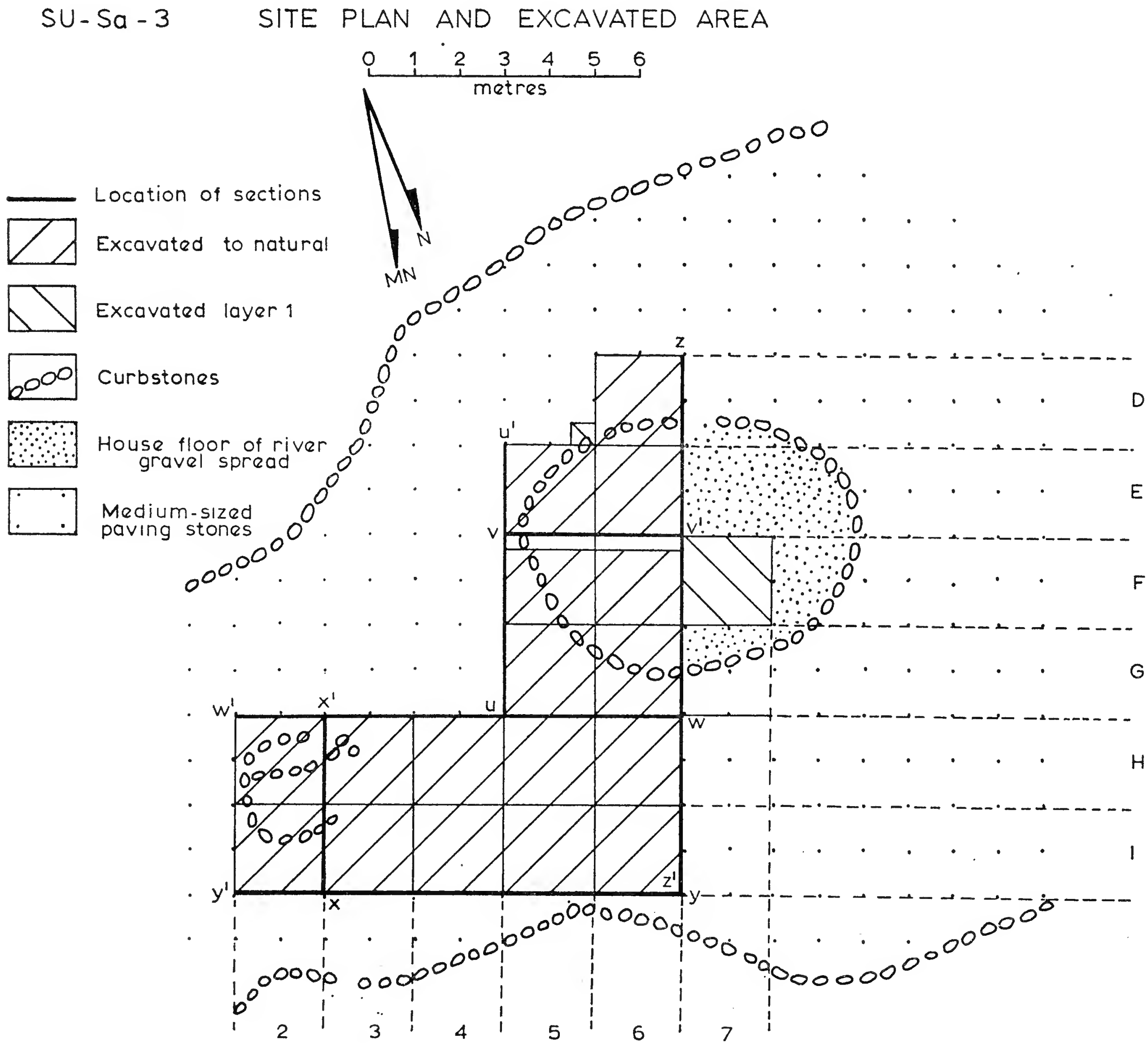


Fig. 12. Site plan of SU-Sa-3 showing excavated area.

Site SU-Sa-3

The platform of Sa-3 was neither as rectangular nor as well defined as those of the other two sites, and its surface, covered only in medium-sized waterworn stones, lacked the quality usually associated with a house pavement. In addition, only two sides of the platform were marked, and then only by a rather irregular alignment of curbstones, one line of which extended towards a neighbouring structure (figs. 2 and 12). The consistent feature was a large oval structure outlined by curbstones centrally located on the platform. Of additional interest towards the eastern side of the platform was an oval feature outlined in smaller curbstones, which because of its similarity to the smaller structure at Sa-2 was thought to be a grave (fig. 12).

The initial investigations centred on the intact structure, and again only one half was investigated. However, one square was opened in the second half of the structure in order to investigate a small depression in its centre (fig. 12) but its excavation was not continued below the level of the first layer of river gravel. From the start this site gave indications of being more complex than the other two, and when, in defining a large pit dug through the upper gravel layers in square E-6, pottery was discovered in the clay deposit at the base of the pit, to be followed by more sherds from a similar deposit at the base of another pit in H-2 and I-2, the whole approach to the site had to be reformulated. It was decided to extend the excavated area in the form of a large L as shown in figure 12, so that the

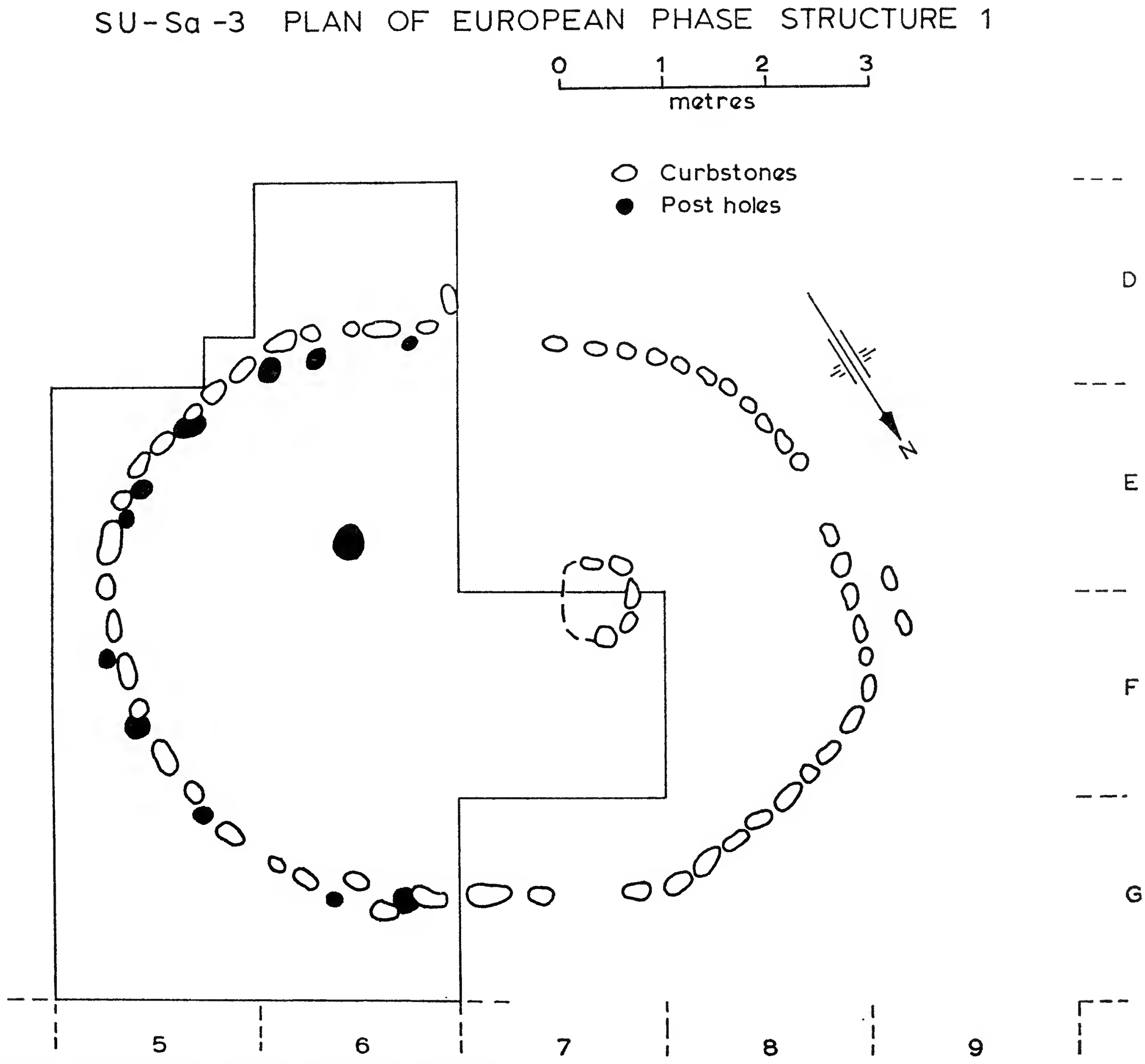


Fig. 13. Plan of most recent house structure, SU-Sa-3.

probable pottery-bearing area might be completely sectioned, and a reasonable sample of it excavated. This meant that the investigations at this site, which had been scheduled to end at the same time as at the other two sites, were continued until the end of the period available for this final section of the field programme in Samoa. Because of this and because of the necessity for me to return to New Zealand at the end of January, this site is dealt with in two separate reports. The pre-European phases of occupation are described below by Green (Report 29).

The general plan and tactics of the excavation of the European phase of occupation were the same as at the other two sites. As at Sa-1 it was not possible to define postholes within the gravel layers from which they were cut, so that their identification rests on their penetration into the underlying more clayey layer. Figure 13 shows the postholes associated with the final structure on the site, while figure 14 includes all the other postholes discovered, along with some suggested alignments, although some of these are rather fragmentary and not all postholes are included in the alignments. However, there was enough evidence to suggest that there had been at least two earlier structures, and possibly three. It was possible to distinguish, though not clearly at all points of the excavation, two layers of gravel infilling. This was particularly true of those areas where they were separated by a thin band of clay (fig. 15). Only a single floor of this earlier period could be traced, however, and this only in places (figs. 15 and 16). The general distribution of the later gravel fill would appear to indicate that when the last structure was erected, the addition of a new *'ili'ili* floor was confined to its interior.

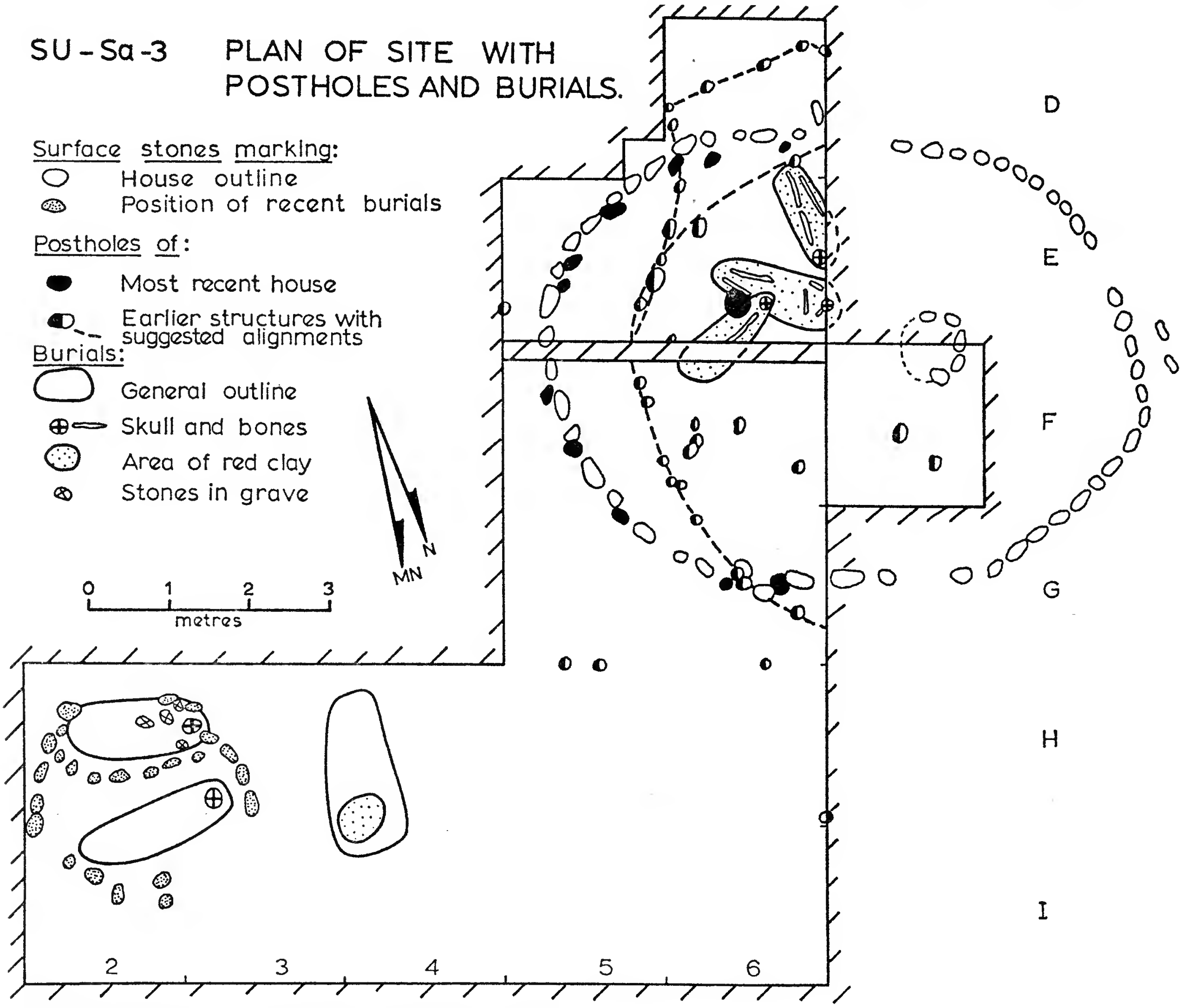


Fig. 14. Plan of SU-Sa-3 showing postholes and burials.

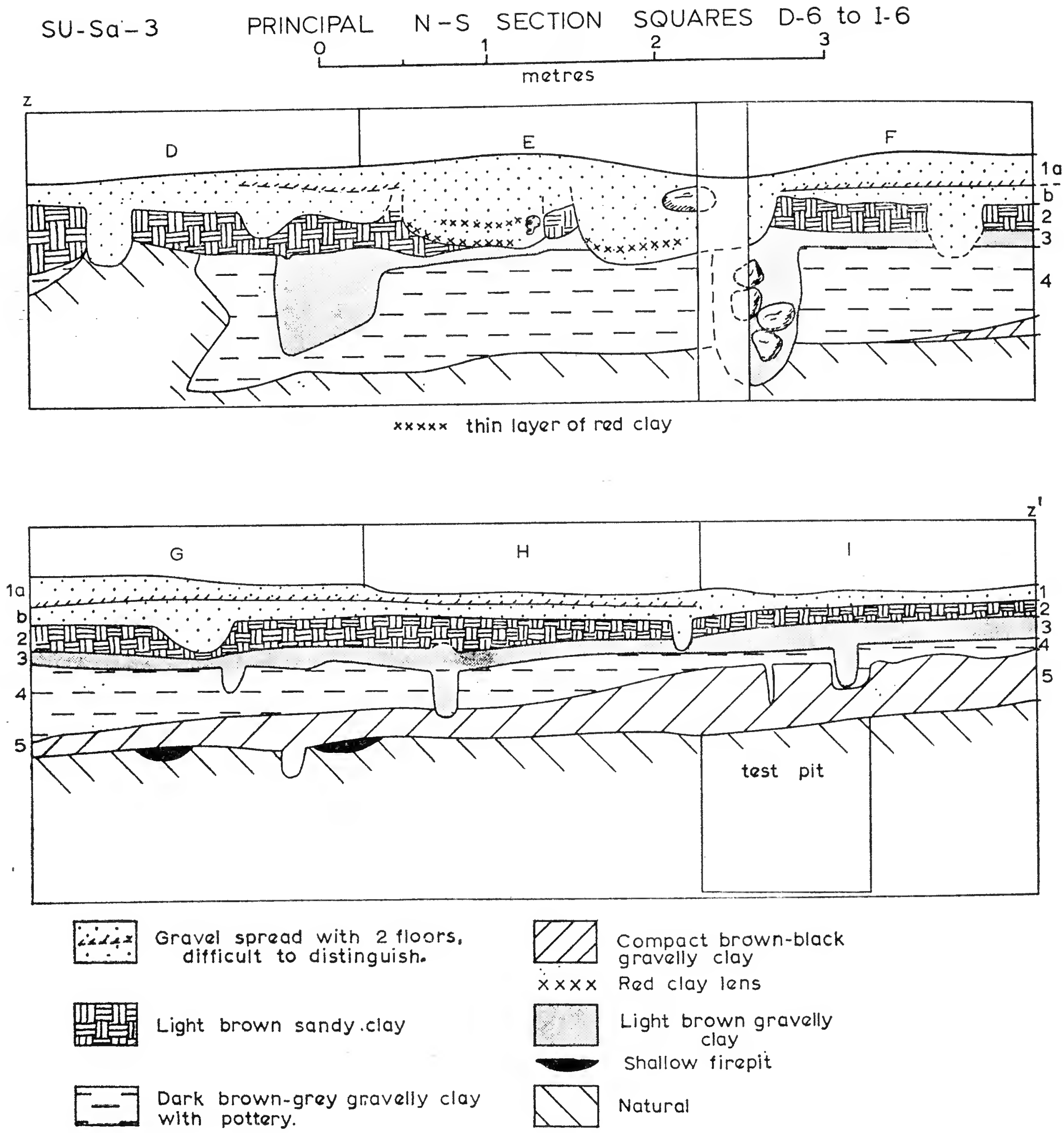


Fig. 15. Principal north-south cross-section, SU-Sa-3.

Three burials were excavated in square E-6. The stratigraphy of the site at this point was very complicated. After close study of all sections it seemed clear that one of the burials was associated with the latest structure (fig. 15) and one of the other two with the earlier floor because the earthy contact which separates the layer 1a from 1b extends over it (fig. 16). In each of these extended burials the bones were so decayed that in the main they were indicated only by a creamy white colouration in the soil, and only a few soft pieces of the long bones and some of the teeth could be recovered. A significant feature was the presence in each of these burials of a layer of red clay material underneath the body, and in one case above it as well, thus verifying that this feature, first noted in the burials at Sa-2, may be used to infer that such pits were actually graves even when no bones remain, as in the pit in squares H-4 and I-4.

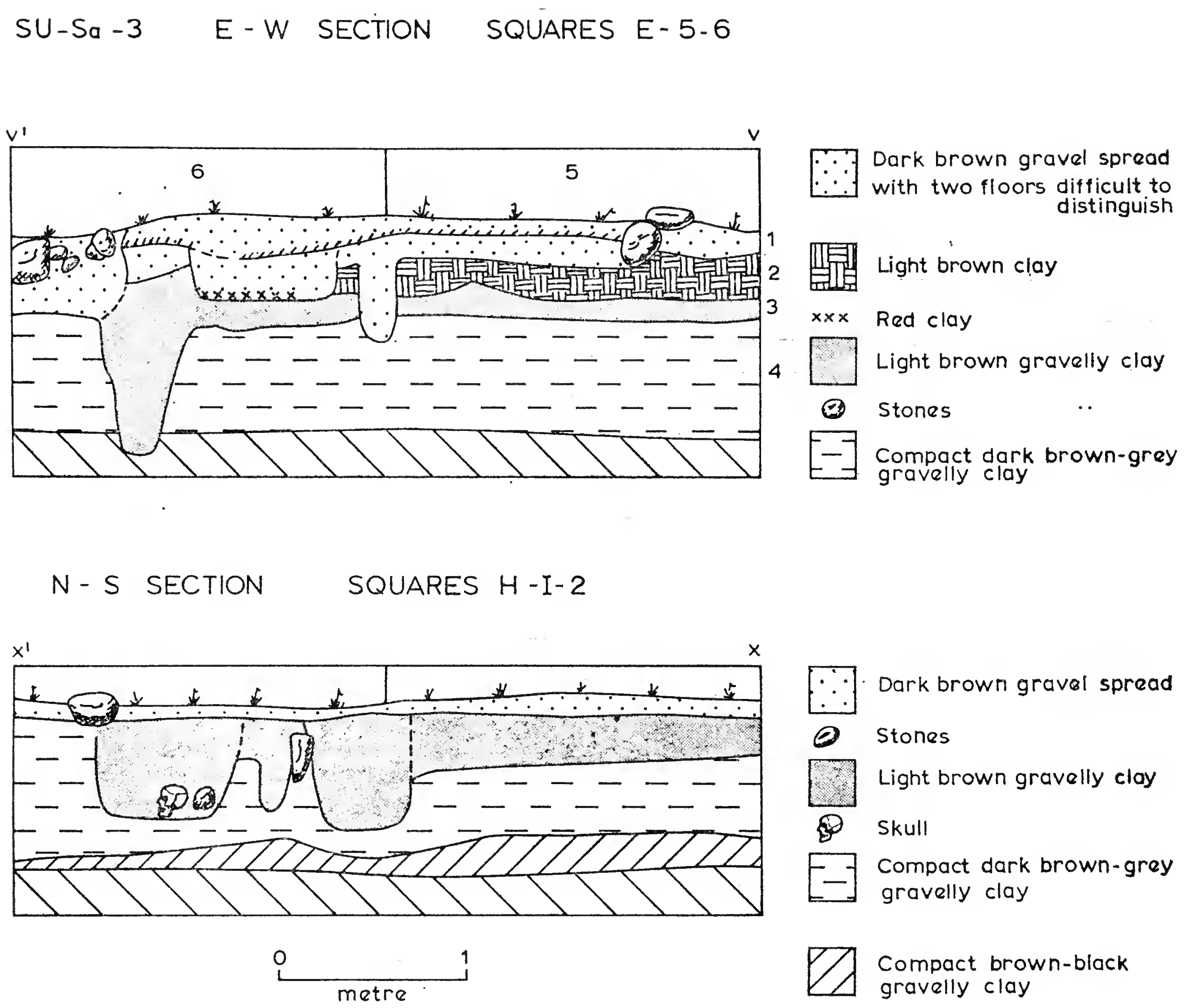


Fig. 16. Principal cross-sections, SU-Sa-3.

This type of burial can be contrasted with the later burials at this site located on the north-eastern side of the platform. Here the positions were indicated at the surface by overlapping but incomplete ovals of the smaller size of stone curbing. It was fortunate that fragments of the skull remained in these pits as there was no red clay material at the base of the grave from which to infer its function. As the stratigraphic section shows (fig. 16), the two graves had been dug close together and were probably contemporaneous, for they were sealed in by an unbroken layer of the same *'ili'ili* paving. As at Sa-2, the stone demarcation of the grave at the surface did not correspond exactly with the pit itself. A final difference is that these two grave pits were significantly deeper, their depths being 65-70 cm as against 25-50 cm for those under the floors of the two houses. No grave goods were associated with any of the burials on the site.

Although the portable artifacts recovered at Sa-3 were more numerous than those found at either of the other two sites (table 2), they reflect an almost identical range of material. There was a wider range of prehistoric items including adzes, fragments of grinding stones, and stone flakes, but as explained above their presence is not unexpected. The collection is dealt with in more detail below in conjunction with the assemblages from the other two sites.

While it was not possible to construct a meaningful location map of the precise find spots of *all* portable artifacts, figure 17 does show their general distribution on the site in relation to the two structures of the European period. The concentration is in and around the perimeter of the two main curbstone outlines.

The archaeological evidence recovered from this site proved to be far more complex than that from either of the other two, mainly because of disturbances in the stratigraphy as a result

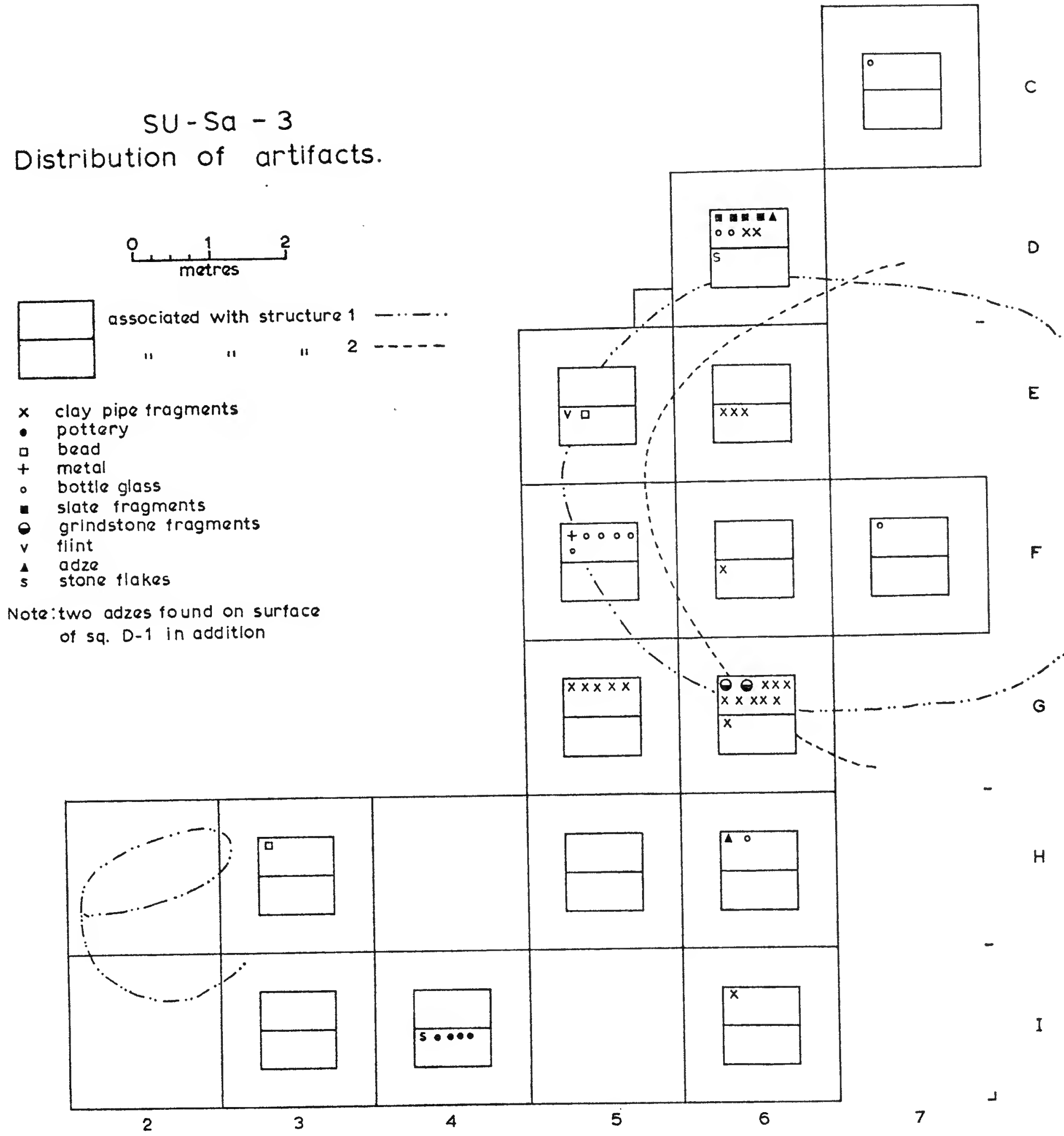


Fig. 17. Distribution of artifacts, SU-Sa-3.

of an increased number of features cut from various layers and a longer period of occupation. In addition Sa-3 was given a far greater significance by the discovery of the earlier pottery-bearing layers underlying the occupation of the European period. However, if only the period of European contact is considered, then this site exhibits a considerable degree of consistency with the other two.

The earlier layers which comprised the main build-up on the site over time had the effect of raising the surface used in the last occupation above the level of the surrounding area, which was, and in fact still is, liable to periodic flooding. It would seem reasonable to interpret the deposit of clay, layer 2, which overlay layer 3, the lower river gravel spread of a prehistoric occupation, as being the result of the deposition of silt during one of the more severe periodic floodings, perhaps at a time when there was no human occupation of the site. This layer was similar in composition to the base layer at each of the other sites. At the adjacent site of Sa-1, where it was excavated to some depth, the conclusion reached above, on the basis of a few water-rolled fragments of pottery and the composition of the deposit, was that it had been water laid, incorporating a few sherds of pottery through erosion from nearby sites containing this material.

As the clay of layer 2 at Sa-3 probably represents a fairly long temporal interval, and certainly provides a definite break in the cultural sequence at the site, it would seem reasonable to consider it in much the same way as the clay layer at Sa-1 and Sa-2, that is, as the base level on which the structures of the European contact period were built. If this is accepted, then the site can be interpreted more clearly, and the division of the site between the two reports is in no way artificial, but in fact represents the realities of human occupation of this locality.

As at the other two sites excavated in Sasoa'a, there were at least two, and probably more oval structures built during the occupation phase belonging to the early European contact period. As with the similar structures at the other two sites, the evidence is sufficient to interpret them as dwellings. Each was built over the previous one with no great regard to any exact alignment and with the provision of a new living surface confined largely to an additional layer of river gravel in the interior of the house. A new feature is the presence of shallow extended burials directly under the house floor. The stratigraphic evidence at this site and the occurrence of similar burials in the fully prehistoric houses of Fo-1 at Folasa (Report 22, pp. 45-47), suggest that this was an earlier mode of burial, although at Fo-1 the associated lenses of red clay, which appear in these graves, did not occur. A later burial type at this site, also in evidence at Sa-2, is separate from the house, marked at the surface by stone curbing, and employs a much deeper grave pit. However, the presence in the pit of materials which form a red clay lens at the base of the grave, a diagnostic feature of other burials at Sasoa'a, was by then apparently discontinued. Because the portable artifact assemblage is one that would be expected in a dwelling of this period, its occurrence in association with structural features representing houses provides a fairly sound basis for interpreting the successive occupations of layer 1 at Sa-3 as those of typical domestic units of the early European contact period. Only the cooking area is missing and a wider search on the platform surface would perhaps have revealed one as it did at Folasa (Report 22, p. 47).

Principal Structural Features

While paved platforms in stone with their border outlined by larger boulders acting as curbs are the most obvious structural feature in the settlement of Sasoa'a, the oval and round houses outlined in stone curbing on these platforms constitute the most significant structural features investigated. This is because there are very few records giving shapes, sizes, or post-hole arrangements for dwellings of the contact period, even though the stone platforms on which these rested have been commented on by most people who left records of the early years of intensive contact with Europeans in Samoa (e.g. Williams and Barff MS 1830; Wilkes 1845 (II): 66, 146; Erskine 1853: 45-46; Turner 1884: 153; Walpole 1849 (2): 327). The heights given for the platforms range from 1 ft to as high as 6 or 8 ft. Turner (1884: 153) recorded that houses of important chiefs were on mounds 3 ft high and Wilkes (1845 (II): 67) recorded a height of 4 ft for the house platform of Tui Manu'a, whereas most such platforms in Manu'a were said to be 2 ft high. Such comments indicate that social status governed the heights of platforms, particularly as Peale (Poesch 1961: 162) observed in 1839 that the general height of platforms in one inland village was about 1 ft, while Wilkes (1845 (II): 146), speaking for Samoa generally, also suggested 1 ft. All the platforms with house outlines in Sasoa'a are closer to the lesser height given by Peale and Wilkes and none even begins to approach any of the greater heights recorded. They can also be contrasted with the much greater heights of many of the modern house platforms in the adjacent villages of Falevao and Lalomauga.

It would appear that the principal functional reason for the platform was as a slightly raised and easily drained surface on which to site a dwelling. Particularly was this necessary at Sasoa'a, where after heavy rainfall, ground water is often left standing on the surface. But in the prevailing conditions of high rainfall in Samoa, it can easily be appreciated that such pavements would be necessary to remove the inconvenience of continual muddy conditions underfoot. This is immediately obvious in a present day Samoan village. The fact that there was no such higher platform in the settlement of Sasoa'a is not unique and may indicate that there was no person with a title of sufficient rank residing there to require such a status symbol. This interpretation would be consistent with Davidson's (1969a: 57-58) assessment of the settlement as one of a number of dispersed village sections located on an inland sector of the parish lands belonging to the *nu'u* of Falefa, and not a central and independent village complex with its own *fa'alupega* (ceremonial address) and formally recognised *fono* (council) around which ranking members of the parish would tend to focus.

Buck (1930: 11-27) recorded five principal types of structures as occurring in Samoan villages: carpenter sheds *(fale ta)*, canoe sheds *(afolau)*, cooking houses *(fale umu)*, dwelling houses *(fale o'o)*, and guest houses of two varieties — a long house *(fale afolau)* and a big or "round" house *(fale tele)*. In any discussion of the house remains at Sasoa'a the categories of canoe and carpenter sheds are of little relevance and probably not represented. The cooking house, on the other hand, would be, although as it was a roughly built structure consisting largely of a roof of one of two "original" types described by Buck (1930: 13-14), it would leave little evidence other than a set of eight or so postholes. No cooking houses of the European phase were discovered, probably because of the limited areas excavated, but postholes probably belonging to such structures were encountered in association with an oven in the prehistoric occupation C at Sa-3 (Report 29, p. 115) and in the immediately prehistoric occupation at Fo-1 (Report 22, p. 47). They would probably have been encountered on or near these platforms as well had our excavations been oriented towards defining them. This leaves the dwelling house, or *fale o'o,* and the guest house of either the *fale afolau* or *fale tele* variety as the probable categories for interpreting the house outlines in Sasoa'a.

The term *fale fa'aafolau,* now shortened to *fale afolau,* is not a term for a guest house, but one that has come to be applied to one type of guest house through usage. It is a descriptive term for any house built like a canoe shed, i.e. the central section is long and free from posts because the roof is supported on the inner set of a double row of internal posts by means of tie beams and king posts under the ridge pole (Buck 1930: 9, 69). In the early twentieth century at the time of Buck's (1930: 17, 21) and the Handys' (1924: 4) studies the better and apparently more common class of dwelling houses, as well as some of the guest houses were of this type. Buck (1930: 20) thought that the *afolau* type of guest house was the older form because "it could more directly be derived from the dwelling house", but on the archaeological evidence available so far, as Davidson (1969a: 70 and fn. 166) points out, this has not proved to be the case. Rather the archaeological evidence, including that from Sasoa'a, supports a number of ethnohistoric statements from the first half of the nineteenth century that the *afolau* form was a recent Tongan introduction (Davidson 1969a: 70), and that most houses followed, as Williams' (MS 1832: Observations . . .) description suggests, the *fale o'o* type with median supporting posts. Thus at the three sites excavated at Sasoa'a, in at least two cases, and probably more, the houses had central posts, while in no case was a double set of interior side posts implied nor in terms of size and shape required. Other houses seem to have lacked central posts altogether, in which case the Samoan method of supporting the ridge pole on the curved rafters alone, termed *fa'asoata* (Buck 1930: 12-13) may have been applied in the smaller size of dwelling, as it certainly was in the cook house.

Other characteristics suggested for differentiating ordinary dwellings from guest houses or *fale tele,* are the greater length and breadth, but not necessarily height of the latter, and their almost round shape. Buck (1930: 9), however, warned that roundness was *not* the feature considered by the Samoans in the application of the term *fale tele,* but was an outcome of the structural requirements of this type of house as was the increased height; size and function in the community were the important considerations. Davidson (1969a: 70) in supporting his view from the early historic descriptions shows that these houses were often more elliptical than round. Thus Turner (1884: 152) recorded that the ordinary house was 35 ft (about 10.5 m) in diameter, by which he presumably meant the longer dimension. This can be contrasted with descriptions of *fale tele* measuring 40-50 ft long and 30-35 ft wide (12.2-15.2 m long by 9.2-10.7 m wide) by Williams (MS 1832: Observations . . .) and 100 ft in circumference (30.6 m) by Hood (1863: 32).

According to Walpole (1849 (2): 338) no house was without a fire and the consistent presence of fireplaces is confirmed by other writers (Wilkes 1845 (II): 147; Turner 1884: 156; *The Samoan Reporter,* No. 20). They noted that fireplaces were usually lined with clay, although we obtained no archaeological confirmation of this feature. Small box-shaped pits outlined by curbstones were common within the interiors of the houses of Sasoa'a, being present in at least 8 of 20 structures (table 1a). Although the pits were generally devoid of any amount of charcoal or ash, they have been interpreted as fireplaces. The lack of significant amounts of wood charcoal may be accounted for by the fact that the fires in them were for lighting rather than heating and that the candlenut was usually employed for this purpose, its debris being continuously removed. Some *fale tele,* with up to three central posts to support the ridge pole, were reported to have two hearths, one at either end (Davidson 1969a: 64 and fn. 123). Several fragments of candlenuts (*Aleurites moluccana* (L.) Willd.) were found in the fills of postholes in squares D-7 and D-6 at Sa-1.

The length and width measurements and the ratio between them are given for all those houses at Sasoa'a and Fo-1 sufficiently well defined for making this determination (table 1). Of the structures at Sasoa'a, only two would seem to possess any of those characteristics reviewed above for *fale tele* (fig. 18). One is the later structure at Sa-1, which has the more rounded outline, central posts, and a fireplace at each end. But it is much smaller than would be

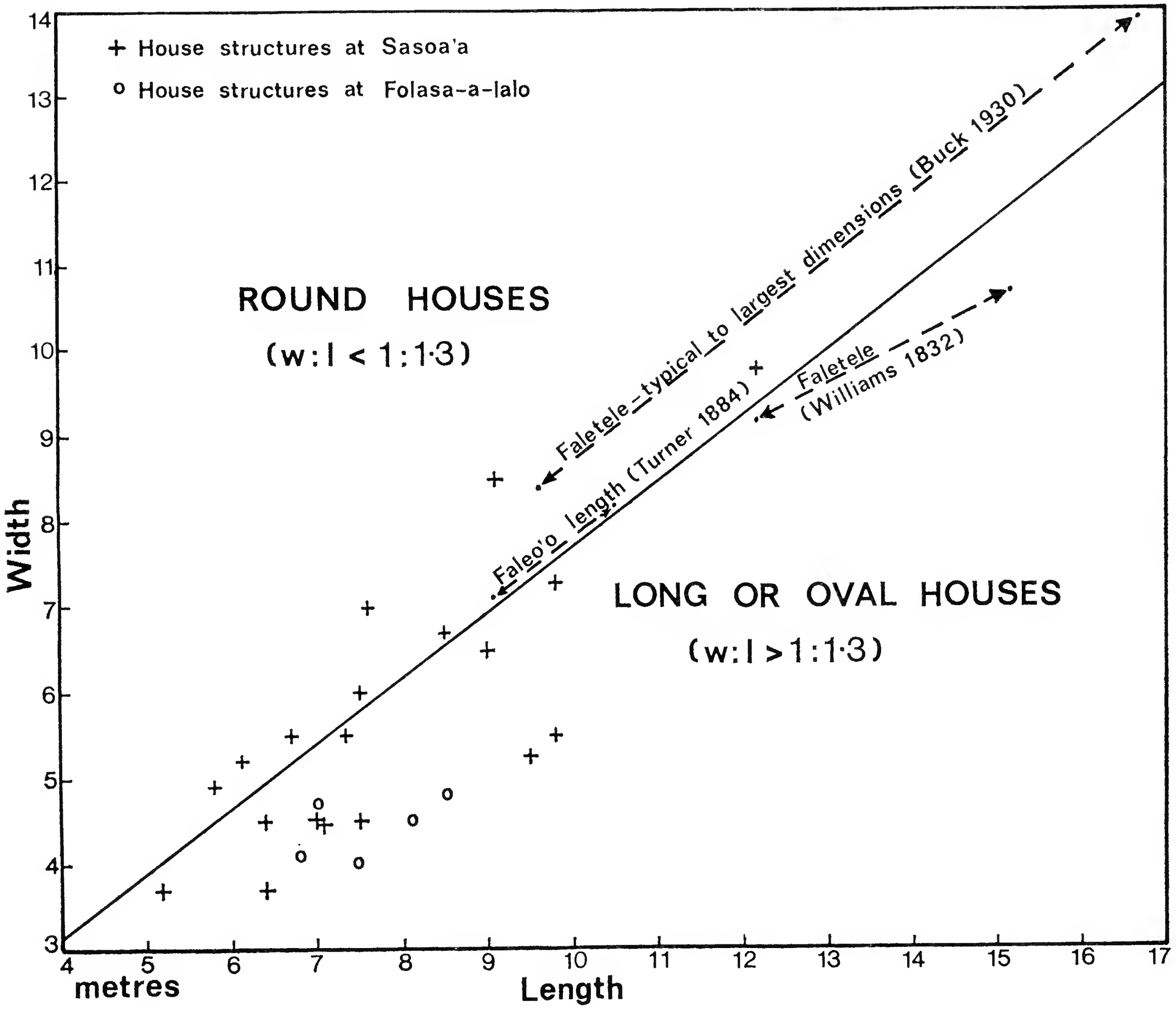


Fig. 18. Comparison of house dimensions at Sasoa'a and Folasa-a-lalo with historical descriptions.

expected from the size data given above, and is not significantly larger than many of the houses on the other platforms, two of them in fact being of the same size. Also, as is discussed below, rounded outline does not appear to be particularly diagnostic in this settlement, while central posts may be expected to occur in the larger ordinary dwellings. Finally, as discussed above, the whole settlement is at best a village section, so that the presence of more than one chief, or his *fale tele,* is unlikely (Davidson 1969a: 70). Therefore it is probably significant that there is only one structure in the whole settlement which would seem purely on the grounds of size to fall into the group of *fale tele*. It is the larger (no. 2) of the two house outlines on Sa-11, and is more rounded than oval in shape. However, as it was not excavated, we have no knowledge of the posthole pattern and from surface evidence no indication of fire-places. The rest of the structures at Sasoa'a, including those excavated, all seem to come into the category of ordinary houses, although some are smaller than the sizes given by the writers of the last century. This interpretation, as noted above, has been supported by the portable artifact content and by the additional structural features encountered in excavation of three of these sites.

If these are all ordinary dwellings then it is also of interest to note that the relative proportions of the houses or their shape seems to bear little relationship to their size. Thus if a ratio of width to length of less than 1 : 1.30 is taken to indicate a "round" rather than an "oval" house outline, and a ratio greater than 1 : 1.30 to indi-

Table 1

House Dimensions

(a) Houses on structural platforms at Sasoa'a

Platform	House	Length (in metres)	Width (in metres)	Ratio Width : Length	Fireplace recorded
1.	(1)	9.0	6.5	1 : 1.38	x
	(2)	9.5	5.25	1 : 1.81	
2.	(1)	7.5	4.5	1 : 1.67	
	(2)	7.0	4.5	1 : 1.56	
3.		7.5	6.0	1 : 1.25	x
4.		6.7	5.5	1 : 1.22	
5.		8.5	6.7	1 : 1.27	x
6.		7.3	5.5	1 : 1.33	
7b.		9.8	5.5	1 : 1.78	
9.		7.0	4.5	1 : 1.56	x
11.	(1)	6.4	4.5	1 : 1.42	
	(2)	12.2	9.8	1 : 1.24	
11a.		6.4	3.7	1 : 1.73	
12.	(1)	6.1	5.2	1 : 1.17	x
	(2)	7.6	7.0	1 : 1.09	
	(3)	5.8	4.9	1 : 1.18	x
12a.		?	4.9		
14.		9.8	7.3	1 : 1.34	
18.	(1)	5.2	3.7	1 : 1.40	x
	(2)	9.1	8.5	1 : 1.07	

(b) House structures excavated at Folasa-a-lalo

Area	House	Length (in metres)	Width (in metres)	Ratio Width : Length	Fireplace recorded
1	1	6.8	4.1	1 : 1.66	x
	2	8.1	4.5	1 : 1.80	
	3	?	3.5 - 4.0		
	4	8.5 - 9.0	?		
	5	7.5	4.0	1 : 1.87	
	6	8.7	?		
	7	8.5	4.8	1 : 1.77	
2	1	7.0	4.7	1 : 1.49	x

cate houses of a definite oval shape, the data from Sasoa'a (table 1a) indicate that round and oval shapes are almost equally distributed among the ordinary dwellings. In contrast, in the series of houses from Fo-1 at the prehistoric site of Folasa (table 1b), all would count as oval in shape. This raises the question of a possible change over time, with "round" structures becoming the more common among the ordinary dwellings as they did among the later *fale tele,* until by the last half of the nineteenth century they both began to be displaced by *fale afolau* of a definite oval shape.

Burial customs appear to indicate even more clearly a change of practice over time, between the prehistoric site of Fo-1 and the end of the early historic period at Sasoa'a. The earliest burials are those described by Ishizuki (Report 22, p. 45) below the floors of the later houses at Fo-1 which employed a shallow unmarked grave pit containing a few bones of an extended burial without grave goods. Closely related to these are the set excavated below the house floors at Sa-3. Again they were characterised by: (i) position within the house, (ii) unmarked grave pit, (iii) presence of decayed bits of femora, skulls and teeth, (iv) shallow depth (25-50 cm) of the pit, (v) lack of grave goods. In addition a red earth *('ele)* has been deposited in the base of the grave resulting in a red clay lens below and even sometimes above the body. This last feature may or may not be chronologically significant as it occurs in a fully prehistoric burial in Leuluasi (Report 24, p. 78), but not at Fo-1, and not in the two later types of burial discussed below. Certainly the use of the red earth in this context has a functional significance even though such a practice has not been previously recorded from Samoa, where the material was used primarily as a dye in the manufacture of bark cloth (Buck 1930: 303). It could easily have been imported from Uafato on the other side of Fagaloa, where abundant deposits exist. Elsewhere in Polynesia the use of red ochre in rubbing the bones exhumed from earth burials is known from New Zealand (Buck 1949: 425) but has not been encountered in excavation of burial mounds in Tonga (Davidson 1969b), for example.

A second burial type includes one at Sa-2 and two at Sa-3. In contrast to the type above they are characterised by: (i) position separate from the house, (ii) grave marked by oval of stones on the gravel surface of the pavement, (iii) grave pit 70 to 100 cm deep, (iv) presence of decayed bits of femora, skulls and teeth indicating extended burial, (v) the base of the grave pit in one case (Sa-2) lined with red earth, but in the other two cases red earth not used, and (vi) no grave goods.

Available ethnohistoric evidence would seem to support this evidence. Hale (1846: 38) reported that burials in 1839-40 in Samoa were still made in or near the houses, and this is confirmed by Buzacott (MS 1836-37: entry for 14 July 1836) and Peter Turner (MS 1835). That burials were being made in deeper graves in 1839-40 than formerly is remarked on by Wilkes (1845 (II): 76). Buzacott (MS 1836-37) also records that formerly graves had been shallower because it was the custom to recover the skulls to keep in a sacred place. How common this practice was, except among ranking members of the society, may be questioned, as archaeologically most grave pits have had at least some teeth and parts of the skull still *in situ* and exhibit little to suggest that the grave pits had been reopened. Also it is to be noted that Buzacott recorded this as a practice already abandoned. No mention is made of the use of red earth with burials, however, by any of these writers, though most say that it was usual to bury some utensils and possessions of the owner with the body. Again the archaeological record is negative, no grave goods having been found at prehistoric Fo-1 (Report 22, p. 47), at prehistoric Lotofaga (I, Report 15, p. 230), or among the historic burials of either type at Sasoa'a. However, it had become a practice in the later nineteenth century on the basis of evidence from the graves at Va-1, Vailele (I, Report 7, p. 127). In the early twentieth century Buck (1930: 322) described the graves of children and people of lesser importance as "merely rectangular patches of larger stones loosely laid on the ground near the houses" so that it was often difficult to distinguish them from the stone pavement. This type, so close to that of the later type at Sasoa'a, was, he asserted, once quite common throughout the villages, though few were now seen. Today detached cemeteries have come into use.

On the basis of all this evidence a sequence based on grave typology for this part of Samoa can be proposed.

Late prehistoric and early historic — up to 1830s
Shallow graves under the house floor, unmarked, and with no grave goods. Red clay lens in historic burials at Sa-3 and prehistoric one at Le-12, but not in those at Fo-1. No grave goods.

Early to mid-nineteenth century
Graves up to 1 m deep on or near the house platform, but separate from the house and marked by stone at the surface. In the earlier varieties of this type, red earth material may appear in the base (Sa-2) but no grave goods until after the late 1830s, at least on the evidence of historic observers.

Later nineteenth and early twentieth century
Graves increasingly separated from habitation sites, or in an abandoned habitation site, or a detached cemetery. Graves often marked at the surface by bottles and crockery. Use of coffin and placement of grave goods with body.

Portable Artifacts

Adzes

Only one of the eight specimens in the adze assemblage from Sasoa'a is sufficiently complete to be classified with certainty. Five others are pieces of the butts of adzes and two are no more than chips showing part of a polished surface. All except one of the butt pieces were found either on the surface of the platforms or in the *'ili'ili* gravel of the upper floor layer. The exception was under the earlier house floor at Sa-3. The complete specimen was found on the surface of the platform at Sa-4 and is not included in table 2. In describing these adzes the typology set out by Green and Davidson (I, Report 2) has been followed.

Two specimens were found at Sa-1. The first, A 17/94, is merely a chip off an adze and shows a small ground surface. It was recovered from the top gravel layer. The second specimen, a surface find, A 17/99, is more complete. It is the butt end of an adze ground on the front and on one side, with slight traces of grinding on the other side. It is 7.58 cm long, 4.1 cm wide and 2.15 cm thick. It is probably of Type I.

The only specimen from Sa-2, A 17/101, is little more than a chip with one ground surface. It was found in the gravel of the pavement.

All the specimens from Sa-3 are butt fragments. The most complete, A 17/110, a surface find, is rectangular in cross-section and ground all over. It is probably an example of Type III, but could possibly be from a Type IVa adze, for in the absence of the bevel it is not possible to decide which is the front. The other surface find, A 17/97, has a roughly diamond-shaped section with a narrow area of grinding on one

TABLE 2

PORTABLE ARTIFACTS FOUND AT SASOA'A

	Sa-1		Sa-2		Sa-3		
	A	B	A	B	A	C	D
ARTIFACT							
Adze fragment	1	1		1	2	2	
Stone flakes		2				1	1
Grindstone fragments	1		2		1	1	
Obsidian		1					
Flint				1			1
Beads	1			1		1	1
Glass pieces	3	10	3	2	1(a)	9	
Clay pipe pieces		13		1		16	5
Pottery							4
Slate pieces					4		
Metal pieces			1	2		1	

A: Found at surface
B: Found in gravel layer
C: Found in top gravel layer (1a)
D: Found in lower gravel layer (1b)
a: one find, but broken by workman into 18 pieces

surface. It is possibly from a Type II adze. A small fragment, A 17/217, from the upper gravel layer, has a rather thin triangular cross-section and is smoothed all over. However, this finish may be deceptive for the specimen appears to have been water rolled and may have been introduced to the site when the platform was being built up. It is possible that this fragment is the butt of a small Type Va adze. The other specimen associated with the upper gravel layer, A 17/98, was actually found in the fill of a burial in square D-6. It is roughly flaked and most closely fits the criteria for Type VI.

A complete specimen of Type II, A 17/104, was found on the surface of Sa-4. It is 12.1 cm long, 5.2 cm wide and 1.65 cm thick. It is ground on most of the front surface but the back is roughly flaked to give a triangular cross-section.

If the suggested classification of the more fragmentary examples is accepted, then the adzes at Sasoa'a include one example of Type I, two of Type II, one of Type III, one of Type Va and one of Type VI. Most of these types are present at all levels of the prehistoric sequence in Samoa, with only minor differences in form (I, Report 2, p. 32). The preponderance of Type II and the presence of Types I and VI suggest a relatively late date for the site, although Type III is not common in late assemblages. Its occurrence, however, and that of the heavily rolled Type V fragment are not unexpected, for the occupation which is the subject of this report is underlain by much earlier phases.

FLAKES

Two basalt flakes were found in the river gravels of layer 1 at Sa-3. One, a chip from an adze, has a partly ground surface. The low frequency and limited distribution suggest that little or no adze manufacture took place on that site at this time. This is supported by the recovery of only two flakes in Sa-1 and none at Sa-2.

POTTERY

Four pieces of pottery, all from square I-4, were recovered in layer 1 of Sa-3. They almost certainly derive from layer 4 and reached the surface at the time the European period grave in squares H-4 and I-4 was excavated.

GRINDSTONES

Grindstones are represented at each of the three sites at Sasoa'a. They are all composed of fine-grained igneous rock. All are broken fragments, and may have been discarded as no longer of any use. Two fragments from the surface of Sa-2 can be fitted together to give a specimen 29 cm long by 9 cm wide, which would make it of greater utility than any of the others found.

Obsidian

The one small piece of obsidian recovered from within the *'ili'ili* gravel floor of Sa-1 is a rounded and rolled core, 34 x 20 x 16 mm. Although the use of obsidian may have continued into the last 1000 years of the Samoan sequence, it is likely it did not continue in the period of European contact. As the rolled nature of this piece suggests, it is probably derived from an earlier deposit.

Flint

One dark brown gun flint was recovered from the second *'ili'ili* gravel layer at Sa-3. This specimen is 2.4 cm by 1.8 cm and is 0.9 cm thick. It shows many small flake scars resulting from use. A small irregular flake of flint-like material was recovered from the fireplace of the latest house on Sa-2. It is of a white colour, but this may have resulted from heating in the fire. There is no suggestion, however, that it is a gun flint.

Beads

Beads were recovered from each of the three sites, and although few in number, illustrate a variety of types. At Sa-1 a small, transparent, dark blue glass bead was recovered from the surface of the platform. Of a flattened discoid shape, it is 0.54 cm in diameter, 0.2 cm thick, and the diameter of the hole is 0.2 cm. A lighter blue transparent bead recovered from Sa-2 is rather larger, with an outside diameter of 1 cm, and thickness of 0.75 cm, while the diameter of the hole is 0.36 cm. These dimensions were estimated from two fragments, found separately. Two beads were recovered from Sa-3. From the layer 1 *'ili'ili* came an opaque light blue glass bead 1 cm in diameter, 0.8 cm thick with a hole of 0.23 cm. The second bead, which was found in the lower *'ili'ili* layer, is red in colour and much smaller than any of the others, being 0.4 cm in diameter, 0.3 cm thick and having a hole with a diameter of only 0.1 cm. It will be noted that these beads are smaller than the usual "large" trade beads.

Clay Pipes

Clay pipe fragments were found in all three sites. All the pieces are very small and worn, and no maker's names were discovered, although on one of the bowl fragments is a spur which has the initial I on one side and F on the other. No decoration is present on any of the fragments. The diameters of the stems vary from less than 0.5 cm to 0.8 cm, but the diameters of the holes seem to be either 0.23 cm or 0.16 cm.

The fact that the bowls were at right angles to the stem, and that there were spurs as opposed to flat heels under the bowl, indicates that the pipes fall into the time range of 1750 to 1850, with most examples being more similar to the type of pipe in use in the period 1820-1858 (Oswald 1959: 203; Wood 1968: 279).

It is noticeable that a large proportion of the stem fragments show the marks of the teeth of the smokers, or have been smoothed off to make the end of the stem usable after it had been broken. In fact, one bowl fragment has a stem less than 2 cm long attached to it, which even at this extremely short length has been shaped for further smoking. This practice contrasts sharply with the situation found on the site of a whaling station of the 1840s near Wellington, New Zealand, which I excavated in 1969. Here, although a much larger number of stem fragments were found, there were no signs of re-use of pipes and no signs of the teeth marks of the smokers. This collection is tentatively being interpreted as the "dump" area of the small settlement and the fragments as the breakages in transport which were thrown away when the case of pipes was first opened. However, this situation did not apply at Sasoa'a, where there is clear evidence that pipes were used to the very end of their days, indicating perhaps that pipes were not in very great supply or that they were too expensive to be replaced frequently.

Metal

The pieces of iron recovered from Sa-2 were too rusted for any positive identifications to be made. However, a piece of brass recovered from the top layer of gravel at Sa-3 had sufficiently clear features to enable a comparison with material held at the National Museum, Wellington, to be made. This piece of metal is 3.5 cm long, 1.2 cm wide and 0.35 cm thick. The edges have been rounded and smoothed and a countersunk hole drilled at the end which had been broken. This would have been the weakest point of the strip, and it appears that it was finally broken by bending the piece upwards, when it broke at the hole. Mr W. Spiekman (pers. comm.) of the Museum checked this item against his collection of weapons and although a positive identification could not be made, the piece was sufficiently close to the pattern of the element called the "barrel tang" to be identified as such. This, of course, made the find of the gun flint more meaningful.

Slate

Two larger pieces and two small fragments of slate were recovered from the surface of the platform at Sa-3. These all fit together to make one larger piece of slate 12.5 cm wide, but the length is unknown, for one end of the slate is missing completely. Parallel straight lines scratched into the surface of the slate indicate that it had been used for instruction in reading and writing, and this, of course, is indicated by the record of a mission school in this settlement in 1838.

Glass

Many pieces of bottle glass were found on the site, particularly at Sa-2 and Sa-3. This was mainly a pale green-blue colour or dark brown. The glass seemed to have been hand blown as the walls were of variable thickness, and were very thin in relation to the neck and the base. All of the glass exhibited a number of air bubbles in the material.

Discussion

Written records of the period of first European contact confirm the eagerness of the Samoans to acquire certain items of trade goods — among them beads, guns, pipes and tobacco. Buzacott (MS 1836-37) records using beads to get a native torch, Williams and Barff (MS 1830) had given beads to Malietoa, while Wilson (MS 1837) records that large blue trade beads were in demand. The use of, and desire for guns by the Samoans is recorded by Williams (MS 1832), Platt (MS 1835-36: entry for 31 March 1836), Buzacott (MS 1836-37), Williams and Barff (MS 1830) and Peter Turner (MS 1835). Williams (MS 1832) records that there was a craze for smoking but that there was a shortage of pipes, while Turner (MS 1836) writes in a letter that a fire at Lotofaga which burned nine houses started from tobacco. Wilson (MS 1837) notes that useful medicines were in demand, while Buzacott and Barff (MS 1834) and Turner (MS 1835) record that books were being taken to Samoa, and this would probably be associated with the teaching of reading and writing for which slates would be required. While this evidence is neither detailed nor extensive, it does indicate that by the 1830s the European trade goods represented in the archaeological assemblage at Sasoa'a were available to the Samoan villagers.

Plant and Animal Remains

As noted above, the soil at Sasoa'a is not conducive to the survival of bone. This was clearly demonstrated by the condition of the human skeletal remains in the various graves encountered. It is presumed that shell, too, would not survive well under these conditions. Only a few extremely fragmentary faunal remains were found in the site, making it impossible to assess the role of fish, shellfish, birds and animals in the diet of the inhabitants.

A single pig tooth was found in the fill of a posthole in square D-7, at Sa-1. This site also yielded several minute and crumbly fragments of bone, some from a posthole in D-6, and some from the fireplace in D-7. They are too small for identification.

The only shell found was at Sa-2, from the fill of a posthole in D-4. It is the fragmentary remains of a single shell fragment, possibly from a *Turbo*.

Plant remains were represented principally by charcoal, which has not been identified, although the distinctive pieces from burned coconut shell are present. As noted above, fragmentary remains of candlenuts were found in several places in Sa-1. The only other plant remains found are seeds of *Canna* sp. which were found on the surface and in the gravel layer at Sa-2. It is possible that these are very recent.

Conclusion

The excavations at Sa-1, Sa-2 and Sa-3 in the settlement of Sasoa'a were successful in achieving the two principal objectives outlined at the beginning of this report. First, each student member of the team was able to develop his skills in supervising and training Samoan workmen as archaeological excavators, thus enabling him to continue with his own project at another site. In my own case, however, this experience was used in the extended excavations at Sa-3 made necessary by the discovery of earlier phases of occupation at that site. In addition, this section of the field programme shows that a team of investigators can sufficiently integrate their work to make a single report such as this possible.

The more important of the two principal objectives was the definition of an occupation phase belonging to the early period of intensive European contact dating before A.D. 1840. Using structural features it has been possible to define fairly precisely the ordinary dwellings of this period in terms of their size, shape, posthole arrangements and probable types of roof construction, as well as interior features such as fireplaces. It has also been possible to associate dwellings with two grave types, an earlier type under the floor exhibiting a continuity with the prehistoric practice, and a later type separate from the house and marked in stone in the platform, a change in practice well recorded in the early nineteenth century literature.

In shape, size and posthole arrangements the dwellings of the early historic phase at Sasoa'a exhibit clear continuity with those of the immediately prehistoric periods at Fo-1 or Le-12. All employ the types of roof construction where the ridge pole rested either on the rafters *(fa'a soata)* or on median centre poles *(fa'asunu'i)*. Both oval and round house outlines occurred and the largest dimension was generally less than 10 m. These house types may be contrasted with those observed by Buck in the early twentieth century. He recorded a type of house construction commonly employing addititonal side posts, with tie beams and king posts supporting the ridge pole, as the more frequent form of *fale o'o*. This is the *afolau* house type reported in the ethnohistoric literature as having been introduced from Tonga in the early nineteenth century. On the evidence of Sasoa'a, its use for dwellings was not yet common in the 1830s, and perhaps unknown, although it may have been used for the guest houses of the period. But apart from a modern change to a preference for dwellings of the *afolau* type, and an increase in height in many modern platforms, substantial continuities in house construction, form and function may be traced from the late prehistoric phase, through the phase exemplified by Sasoa'a, to the dwellings of the present day. Finally, the practice of building successive houses on the same platform, often on an alignment or in a position differing from that of the original structure, is now well attested archaeologically for both the prehistoric and protohistoric periods as well as recorded for the later historic period, including modern villages. It is worth observing that in modern villages some completed houses are being replaced or are under repair, some have been abandoned, and there are also platforms which for the time being possess no intact structure, although an occasional central house post remains. Such a pattern, it could be suggested, might also have applied to Sasoa'a.

The presence within most of the dwellings of one, and sometimes, two fireplaces for illumination rather than heating has been confirmed, although it has not been observed that they were clay lined as recorded by many of the writers of the early contact period. It is also clear that there was considerable variation in the size and shape of dwellings, making it difficult to extrapolate from the ethnohistoric records characteristics which would serve to identify the guest house or *fale tele* presumed to be present in each settlement. The possibility of Sa-1 being such (Green 1970: 25) was examined closely and rejected. However, one structure did stand out in terms of the principal characteristic, larger size, and in a community like Sasoa'a, which was probably a village section of the coastal community and parish of Falefa, this is all that would be expected.

On the basis of the changes in burial type at Sasoa'a and the type of roof construction employed in dwellings, an early historic date is implied for the occupation. This is confirmed both by an actual historical date, A.D. 1838 for the settlement, and by the numerous portable artifacts of European origin recovered from the house floors and pavements. These, and the presence of burials not yet influenced by missionary endeavours, as well as those that were, suggest that the occupation should be dated between the 1820s when intensive European contact began and the 1840s.

The portable artifact assemblages also demonstrate that on protohistoric as well as historic sites, artifacts of the prehistoric period, particularly adzes, are likely to occur, and that their presence may not reflect the fact that they were still in use, but simply that such items were carried in with the stones used in the pavements. In addition, the range of trade goods is fairly comprehensive and fits well with written records of that period in Samoa. As an assemblage it can easily be contrasted with those of a later nineteenth century date from Lotofaga (I, Report 15, pp. 250-251) or Vailele (I, Report 10, p. 166). Some items in it, in particular the pipes, gun flints, and blue trade beads, help to date the assemblage as belonging to a period before A.D. 1850.

Finally, in terms of settlement archaeology, one of the reasons for conducting the series of excavations in the upper Falefa valley, this archaeological definition of the late end of the protohistoric period fixes a firm base-line to which to attach one end of the sequence, and provides a suitable end point from which to work back into the past.

ACKNOWLEDGEMENTS

I would like to thank Dr R. C. Green, under whom I studied at the University of Auckland, for the experience of participating in these excavations at Sasoa'a, and in the larger Samoan programme, which in approach, method and execution have been a valuable part of my archaeological training. Dr Green has given assistance and encouragement in the writing of this report, and in this respect I would also like to acknowledge the assistance given by Miss J. M. Davidson, who so readily made available results of her library researches and whose typescript bibliographies have been so useful. Kisao Ishizuki, Trevor Hansen and Kathryn De Nave made available the records of their excavations at Sasoa'a. Without such co-operation this report could not have taken its present form.

EXCAVATION OF SITE SU-FO-1 AT FOLASA-A-LALO

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The area known as Folasa-a-lalo is situated on the east side of the Falefa River about 2 miles (3.2 km) inland, and not far from the modern village of Falevao. It is one of several named areas of settlement found and mapped by Davidson during a general survey of this part of the valley (Report 20, pp. 5-6; Davidson 1967: 28; Davidson *et al.* 1967: 226). At Folasa-a-lalo there are a number of earthen terraces, some with stone pavements and curbstones on their surfaces indicating former houses, others lacking such remains (fig. 3). The entire cluster can be interpreted as a dispersed community or settlement covering a wide area. Much of the cluster is situated on gently rising ground where terraces or mounds are defined by encircling ditches or stone walls, but the northeast extremity of the mapped area extends on to one of a series of steep ridges descending from the mountain wall behind. On these ridges, terraces were formed by cutting into the mountain slopes. Such a site is SU-Fo-2, mapped and partially excavated by Davidson in 1965 (Report 28).

Excavations at Folasa-a-lalo focused on a terrace with visible house remains designated SU-Fo-1, immediately below Fo-2 and at the base of the spur on which it is situated. Test excavations were also extended to an adjacent area with no surface features.

The flat surface of the main earthen terrace at Fo-1 is of irregular oval shape, 30 m long and 15 m wide. The long axis runs from northwest to southeast; the surface is slightly lower at the northwest end. All of the northern part lies adjacent to the ridge, with the northeastern portion bordering the ridge possessing a slope of up to 30 degrees. To the south and west this slope gradually levels out to between 20 and 25 degrees (fig. 19).

The flat area is divided into two approximately equal parts by the remains of two houses and their respective pavements (fig. 19). Both pavements consist of waterworn river pebbles as small as a fist and larger boulders with diameters of 40 to 50 cm. The northwest portion of the terrace, designated house area 1, had its widest pavement on the southwest corner. To the north of this some curbstones, which apparently represented the remains of former houses, appeared among the very small waterworn pebbles known as *'ili'ili*.

The most complete oval-shaped set of curbs was thought to define the most recent house. A fireplace was found inside it, near its northern end. This set of curbs was almost completely surrounded by another set of larger stones, and it appeared that this larger house was the older of the two. The long axes of both house sites coincided almost exactly with that of the terrace. A line of curbs from an even earlier house was also exposed within the first house near its southeastern end. The unpaved area and the areas inside and outside the house curbs were all covered with *'ili'ili* (fig. 19).

The other pavement on the terrace, designated house area 2, possessed features similar to those at house area 1. On the western side the pavement was well defined, but the stones outlining the eastern border were not visible on the surface owing to a covering of soil and fallen trees. However, it appears that the last house, well-defined by curbstones, was situated almost in the centre of this part of the terrace. Its long axis differs slightly from that of house area 1, stretching from east to west. Except for the stone curbing of the most recent house and the pavement, the surface both inside and outside the house curbs at house area 2 was covered by *'ili'ili*. Surface observations did not reveal a fireplace.

When the structural relationship of the pavements associated with the two house areas was closely examined it was apparent that the pavement of house area 2 was constructed first and that the pavement of house area 1, at least along the border common to both, was added later.

A small mound about 3.5 m in diameter and 20 to 40 cm high, with its long axis running from northeast to southwest, was encountered where the pavement of house area 2 borders on that of house area 1. It was thought that this mound might be a grave. It appeared to be of later date than house areas 1 and 2, because the soil of the mound covered the pavement stones of both areas (fig. 19). Another small mound, also thought to belong to a later period, was found outside the pavement to the south of house area 2. It was a

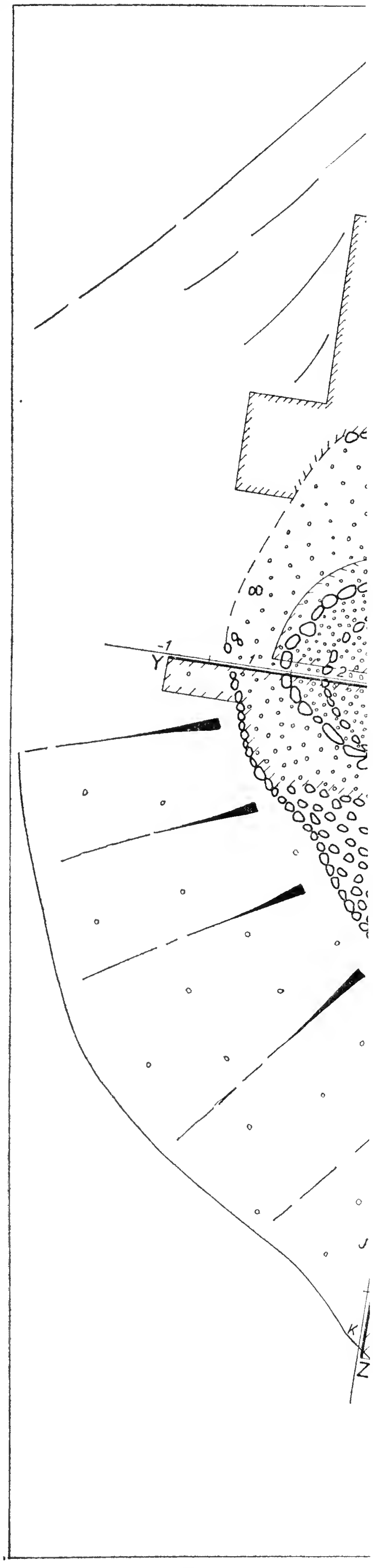

Fig. 19. Plan of SU-Fo-1, showing p

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The flat area is divided into two approximately equal parts by the remains of two houses and their respective pavements (fig. 19). Both pavements consist of waterworn river pebbles as small as a fist and larger boulders with diameters of 40 to 50 cm. The northwest portion of the terrace, designated house area 1, had its widest pavement on the southwest corner. To the north of this some curbstones, which apparently represented the remains of former houses, appeared among the very small waterworn pebbles known as *'ili'ili*.

The most complete oval-shaped set of curbs was thought to define the most recent house. A fireplace was found inside it, near its northern end. This set of curbs was almost completely surrounded by another set of larger stones, and it appeared that this larger house was the older of the two. The long axes of both house sites coincided almost exactly with that of the terrace. A line of curbs from an even earlier house was also exposed within the first house near its southeastern end. The unpaved area and the areas inside and outside the house curbs were all covered with *'ili'ili* (fig. 19).

The other pavement on the terrace, designated house area 2, possessed features similar to those at house area 1. On the western side the pavement was well defined, but the stones outlining the eastern border were not visible on the surface owing to a covering of soil and fallen trees. However, it appears that the last house, well-defined by curbstones, was situated almost in the centre of this part of the terrace. Its long axis differs slightly from that of house area 1, stretching from east to west. Except for the stone curbing of the most recent house and the pavement, the surface both inside and outside the house curbs at house area 2 was covered by *'ili'ili*. Surface observations did not reveal a fireplace.

When the structural relationship of the pavements associated with the two house areas was closely examined it was apparent that the pavement of house area 2 was constructed first and that the pavement of house area 1, at least along the border common to both, was added later.

A small mound about 3.5 m in diameter and 20 to 40 cm high, with its long axis running from northeast to southwest, was encountered where the pavement of house area 2 borders on that of house area 1. It was thought that this mound might be a grave. It appeared to be of later date than house areas 1 and 2, because the soil of the mound covered the pavement stones of both areas (fig. 19). Another small mound, also thought to belong to a later period, was found outside the pavement to the south of house area 2. It was a

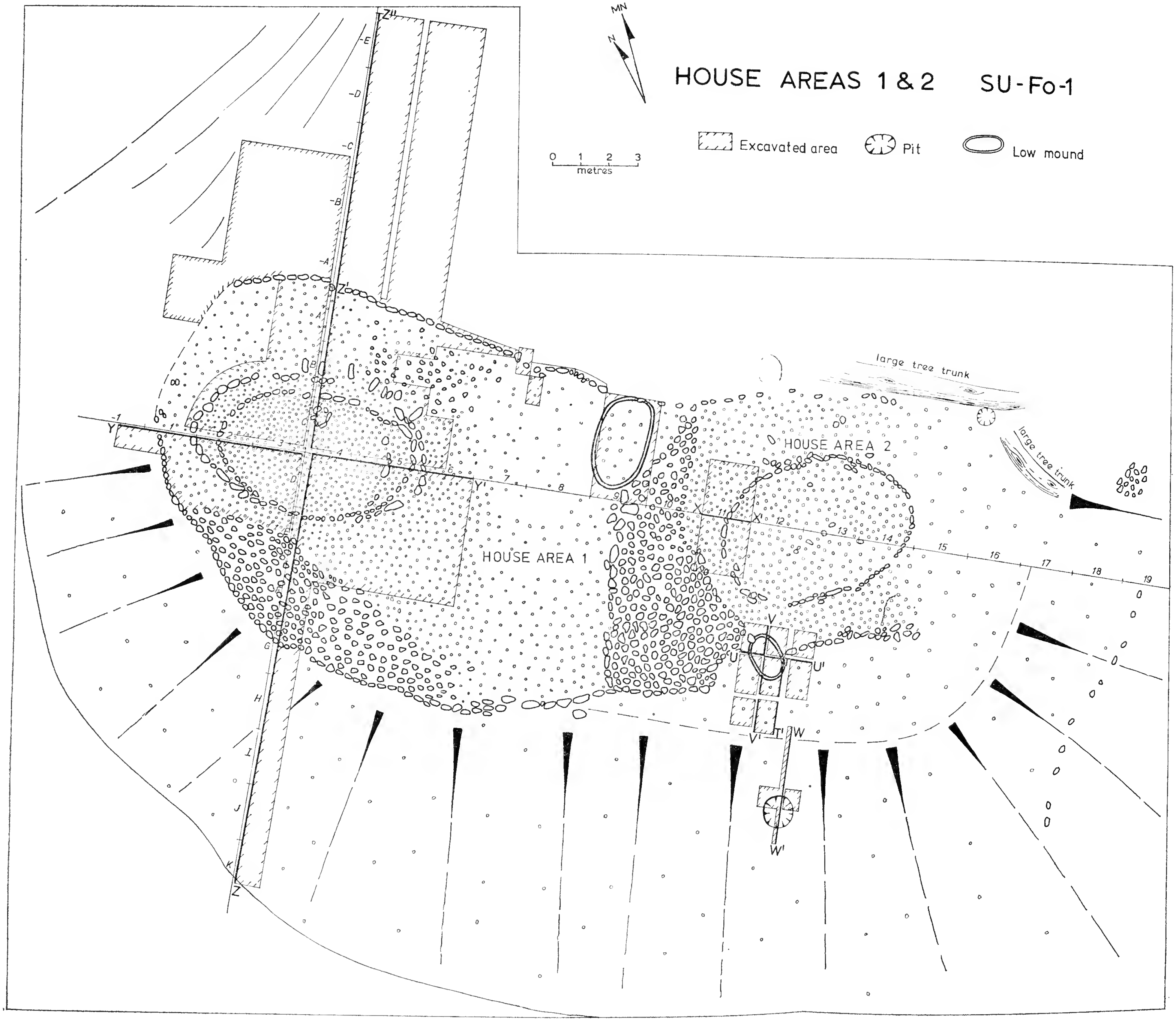
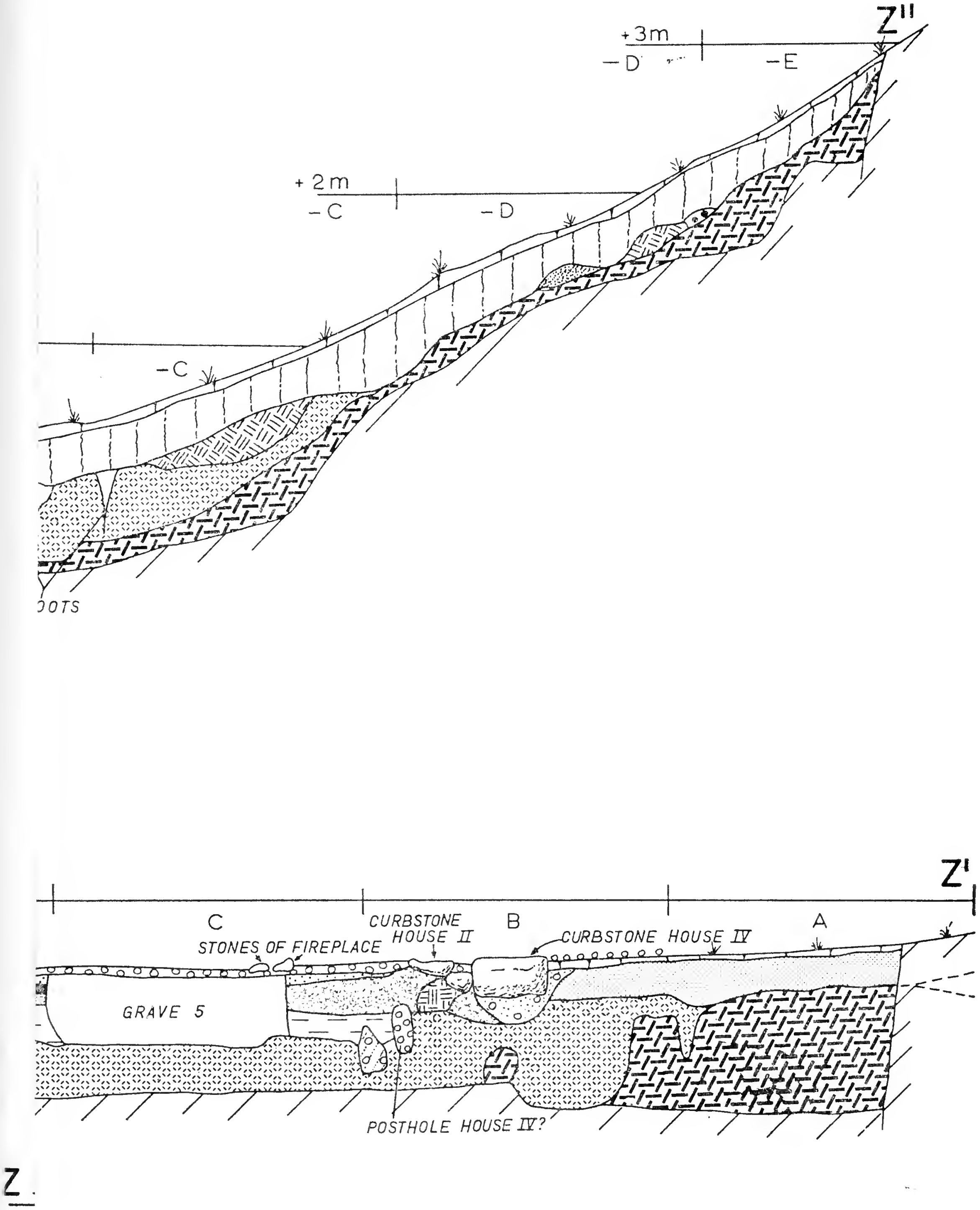


Fig. 19. Plan of SU-Fo-1, showing principal structures and area of excavation.



OF HOUSE AREA 1, ALONG BASE-LINE

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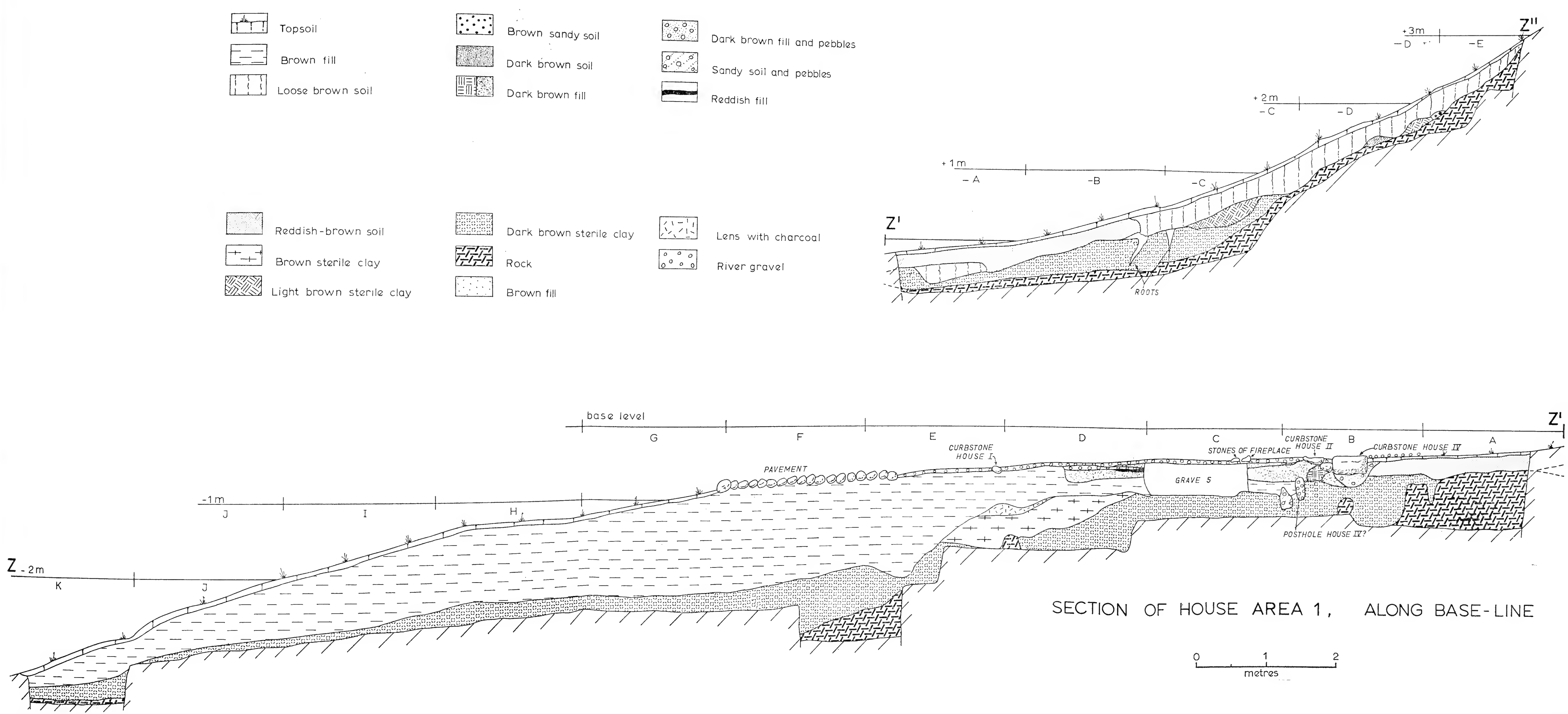

Fig. 20. Principal north-south cross-section, house area 1, SU-Fo-1.

small oval mound less than 2 m long, and it, too, covered a portion of the pavement. Moreover, other small mounds, not as distinct as the former, but again possible graves, were found in squares A7 to B7, and adjacent to the central northern part of the pavement of house area 2.

A shallow pit a little over 1 m in diameter, thought to be an oven, was situated on the southern slope of the main terrace adjacent to house area 2. On the eastern slope of the same part of the terrace a pile of stones consisting of angular pebbles 10 to 20 cm in diameter was encountered. It was impossible to determine its function because it was covered by a large fallen tree trunk.

A row of widely spaced stones extended along the southeastern slope of the terrace. Further to the east, beyond the stone row and main earthen terrace, was an area with no visible surface remains, designated "the lower flat". This was separated from the main terrace by a slight depression. It was 1 m lower than the main terrace and rose in a gentle slope to the east. Before the excavation began, grass and vines were cleared from a wide area in the vicinity of the site. Even so the shape of the lower flat remained uncertain, because its northeastern portion was under the cover of the heavy bush of the forest border.

Clearing of vegetation on the flat revealed a shallow ditch on the upslope side which ran from northeast to southwest. Where this shallow ditch began, a low, thick stone wall made from boulders 20 to 40 cm in diameter extended from the southeast to the east across the upper edge of the flat and disappeared into the forest. Another row of stones using boulders as large as those in the stone wall but more widely spaced, was found in the deeper ditch separating the lower flat from the terrace cluster of Fo-3 (fig. 3).

OUTLINE OF THE EXCAVATION

As Davidson indicates (Report 20), this excavation was part of a comparative study of settlement patterns in Samoa. The selection of Folasa-a-lalo for further investigation depended on two factors. The area mapped by Davidson consisted of an unusual complex of ditches and terraces, both with and without surface indications of houses, which required structural investigation. Secondly, although traditional evidence suggested that the settlement was relatively recent, it appeared to be older than the protohistoric site of Sasoa'a, on the other side of the river, as European trade items were lacking. Thus any differences in features at the two sites would have to be considered in relation to possible changes in settlement pattern. Within the mapped area, Fo-1 was selected for excavation because it consisted of an earthen terrace with visible surface remains of two house outlines, adjacent to a complex of terraces (Fo-3) with no such surface remains.

The excavation concentrated on the structure of the house outlines and their associated features, and on the collection of charcoal samples for radiocarbon dating. However, it was also judged important to investigate the nature of the ditches between the terraces, and to determine, if possible, the function of those terraces without house remains. The excavations, therefore, were carried out with these objectives in mind.

Investigation started with grass and bush cutting on 10 January and finished with the completion of the sectioning on 25 February 1967. An average of four to five workmen, most of them with some previous experience, was employed throughout the work.

At the beginning of the excavations two base-lines were established crossing at right angles at the centre of the intact house outline in house area 1. These base-lines were extended as needed and applied to all excavations at the site. The base-line in the direction of the long axis of the house had its beginning point just northwest and outside of house area 1. Extending to the southeast across the site, it was labelled 1, 2, 3, 4 . . . at 2 m intervals. The base-line crossed not only the middle of house area 1, but also the middle of the main terrace itself. Extensions to the northwest, when required, were labelled -1, -2, -3.

The other base-line, at right angles to the first, was placed across the short axis of the intact house and intersected it between 3 and 4. The lettering began with one of the stones along the border of the pavement on the northwest side of house area 1. Points every 2 m to the southwest of the initial point were labelled A, B, C, D, etc, while those to the northeast were labelled -A, -B, -C, -D, etc, where it was necessary to extend excavation up the mountain slope. The lettered base-line was oriented 23 degrees east of magnetic north. The excavation was carried out in 2 m squares which used the base-lines as co-ordinates. Excavation squares were conveniently labelled A1, A2, D10, D11, or -A4, etc.

A great deal of effort was expended on the excavation of house area 1, in order to determine how often houses were rebuilt in one locality without a significant break in occupation. Initially in this area three sets of curbstones, each outlining a house, indicated at least three periods of occupation. Investigations in B2, 3, 4; C2, 3, 4; and D2, 3, 4, made it possible to distinguish a total of at least five houses overlapping one another (plate 3). The oldest was labelled house V and the newest, which had a complete curbstone outline and a hearth, was labelled house I

As excavation of the five houses progressed, it became clear that there were also five graves within the area of these squares. Four of them overlapped within the squares C2, C3, D2, and D3. The last grave, which lay parallel to the direction of the lettered base-line, was in square C4. It is certain that all the graves are older than house I because the *'ili'ili* from it covered them. Also in square C4, a fireplace which belonged to house I had been constructed directly over the grave pit.

The bones in the graves had deteriorated badly owing to the highly acid nature of the soil. Only parts of the skull, pieces of the mandible with teeth, pieces of the femur and traces of the patella were found. No burial offerings were recovered.

The *'ili'ili* from squares D1, 2 and E1, 2, 3, 4 (an area largely outside that of the houses outlined by stone curbing) was removed, exposing a number of rows of postholes belonging to three additional houses. However, the curbstones to accompany them no longer existed. On this basis, and considering the large number of postholes in the excavation area at house area 1 (178 in all), it is possible to infer that houses were constructed at least nine times, and the area occupied for a fairly long span of time. Although we did not carry out excavations in squares F6, 7 and G6, 7, it probably would have been possible to find more postholes there. Our excavations in squares A3, 4 and B3, 4 revealed no postholes. In square A5 part of a stone pavement, rougher than that on the southwestern portion of the terrace, was found. Thus it appears that an earlier set of houses had occupied a slightly different position on the terrace. During excavations in house area 1, no European materials were encountered.

While the investigation of the house sites and the graves was progressing, trenching was carried out to establish the methods used in construction of the main earthen terrace. First, a trench was dug from square -A4 to -E4 along the lettered base-line on the northern slope just behind house area 1. The postholes encountered in these squares were so numerous that the trench was widened on both sides, with the result that even more postholes were discovered. Two pits containing charcoal, thought to be small ovens, were also found in these excavations. Some of the postholes might, therefore, belong to uprights of a cooking house. However, some of them may also be postholes for fencing, similar to those encountered along the inside and outside of the curbstones outlining the pavement (see below).

Towards the end of our investigations, another narrower trench was dug from squares F4 to K4, a small mound in squares B9 and C9 was investigated, and squares C11 and D11 of house area 2 were excavated. Under the small mound we could identify a grave-like pit which we labelled grave 6, although neither skeletal remains nor burial offerings were found in it. Excavations in squares C11 and D11 revealed part of an older stone curbing of a house associated with an alignment of postholes (plate 4). They intersected the curbstones of the most recent dwelling at house area 2, indicating an earlier dwelling. Three other alignments of postholes were also encountered, one of them inside the western pavement of house area 2. It is certain, therefore, that at least five times a dwelling was rebuilt in house area 2 in much the same fashion as at house area 1. Again, no European material was found in the deposits. In order to draw a cross-section, we dug more deeply along the base-line in square D11. Here a layer of soil containing a large quantity of charcoal was discovered, providing us with a valuable sample suitable for determining a *terminus post quem* for the construction of the terrace.

When the investigations outlined above were completed, only two weeks remained before the close of the entire field programme, and at this point it became difficult to continue the excavations because of increasingly frequent, heavy rains. However, we began digging a small mound in the area of square F12, the soil from which had covered the border stones of the pavement at house area 2, and also a small pit in squares H13 and I13. We initially believed that the mound might represent a grave and the pit an oven because of the stones found scattered around it. A pit beneath the mound proved to have suffered extensive damage from two newer pits dug into the mound so that we could not make certain of its nature. Moreover, a few pieces of a ceramic penguin made in Japan were found in the later of the two more recent pits, indicating them to be modern. Another piece of the same penguin was found in the pit depression adjacent to the mound, which was found to lack the stones and charcoal characteristic of an oven.

The last week was devoted to drawing final sections and to investigating the depression between the main terrace and the lower flat, the shallow ditch at the upslope end of the flat and a part of the flat's surface. For the final sections, trenches through house area 1 were dug to a considerable depth along both base-lines. The long trench, in the direction of the lettered base-line, extended from squares -E to K and at its deepest point was 2.5 m below the surface of the ground. This trench was cut completely through to the base of the terrace scarp. Another trench following the direction of the numbered base-line was dug from squares -1 to 6.

Two other trenches were dug from the main terrace towards the adjacent terraces on the southeast. One trench was laid out and excavated from F20 to F30 and the other, at a right angle to the first, from H27 to M27. The first trench bisected and revealed a ditch 1.5 m in depth and width located in squares F21 to F22, which

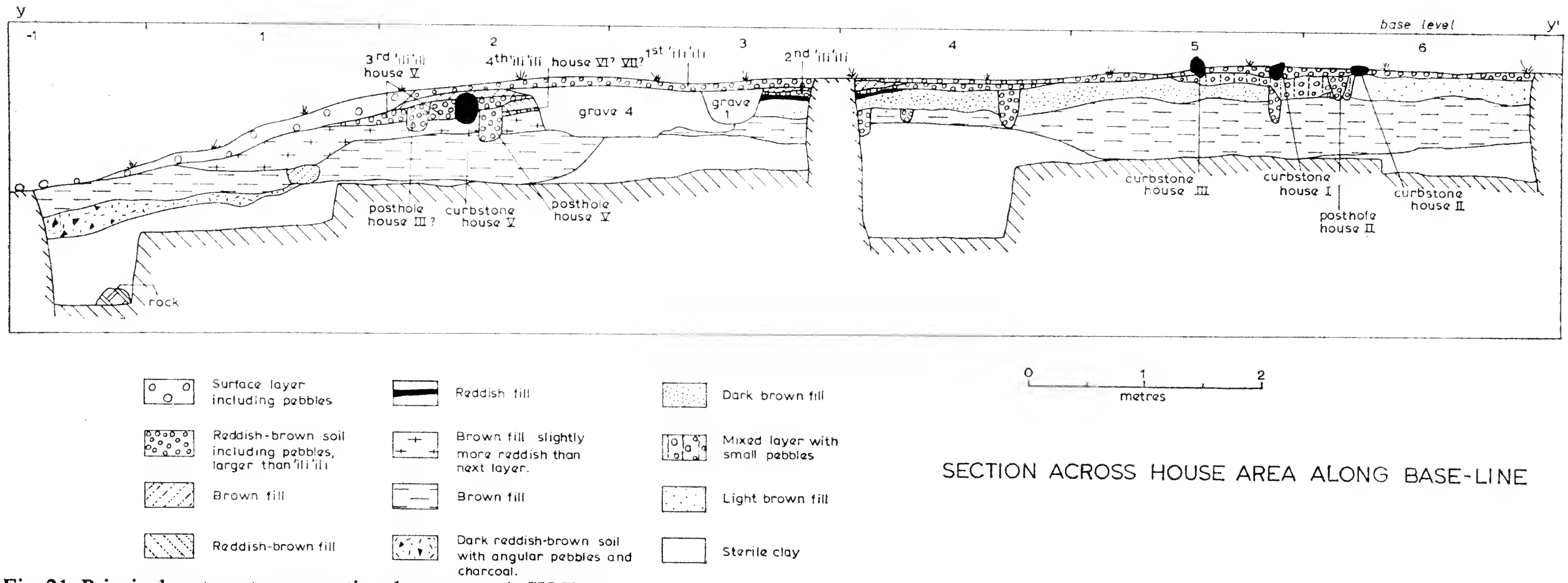

Fig. 21. Principal east-west cross-section, house area 1, SU-Fo-1.

separated the main house terrace from the lower flat. The same trench bisected the shallower but wider ditch running parallel to it in squares F28 to F29. The trench from square H27 to M27 extended over the lower flat and on to the terrace Fo-3A, neither of which possessed visible surface features. While only two of these squares, H27 and I27, were excavated because of limited time, no recognisable postholes were found nor were any materials of European origin encountered.

Each of the main features described briefly in this section will now be discussed in more detail.

PRINCIPAL STRUCTURAL FEATURES

Main Terrace

The setting of the flat terrace on which the two house areas were situated suggested that it had been built by levelling a gentle mountain slope and moving the soil cut from the upper part of the slope to form the outer edge of the terrace. This meant that towards the front of the terrace where we dug the deep trench, it should be possible to distinguish between the natural soil of the former slope and that which had been artificially deposited to level the surface. Moreover, if charcoal samples derived from plants burnt during the clearing of the former slope could be obtained from under the layers of fill, they would provide a means for determining the age of the terrace. The trench dug to observe the stratigraphy provided the expected evidence (figs. 20 and 21).

The basal layers in the trench were a rocky stratum of fairly brittle composition due to weathering, and a clay layer formed by complete weathering of the rock. The clay layer exhibited both an upper dark brown and a lower light brown zone. Although different in colour, both zones seemed to be part of the natural. Generally, the clay layer covered the rock layer, but in areas such as the slope in squares -D4 and -E4, the rock appeared without the clay cover. The layer of fill used to construct the front part of the terrace was deeper in some areas than others, depending upon the condition of the rock or clay layers. Its colour was a comparatively light reddish brown under house area 2, but darker under house area 1. From observation of the sections, especially in the area along squares E to H, it is certain that such a filling layer was often used to broaden the terrace.

Where pavement stones occurred on the surface of the trench walls in squares E and F, the walls often collapsed from the weight of the stones and the frequent rains. This again suggested that the soil in the loosely compacted upper part of the layer had been artificially laid. Lenses containing fragments of charcoal were found sandwiched between the basal clay layer and the layer of artificial fill in the walls of squares 1 to -1, 11, D and E. These layers were probably man made also.

A layer of brown soil in the section wall of squares 6 and 11 also seemed to be one of the fills used in levelling the terrace. Judging from the various sections, it seems that when houses were rebuilt on the main terrace, the *'ili'ili* was sometimes removed and sometimes added. A levelling fill of soil was also sometimes added. These practices often created a very mixed layer of fill, particularly where the digging of grave pits further disturbed the deposits (figs. 20 and 21).

A section of the wall of square D11 revealed a lens of angular pebbles mixed with much charcoal lying between the clay of the basal deposit and the layers of artificial fill. In squares F12 and F13, a charcoal lens appeared between the fill layer and the layer of angular pebbles, which here contained no charcoal. It seems, therefore, that the angular pebble layer covered the surface of the basal clay before construction of the terrace. The fact that the pebble layer contained charcoal might suggest that in burning off the vegetation, charcoal from trees and shrubs became mingled with it at a time just before terrace construction (fig. 22).

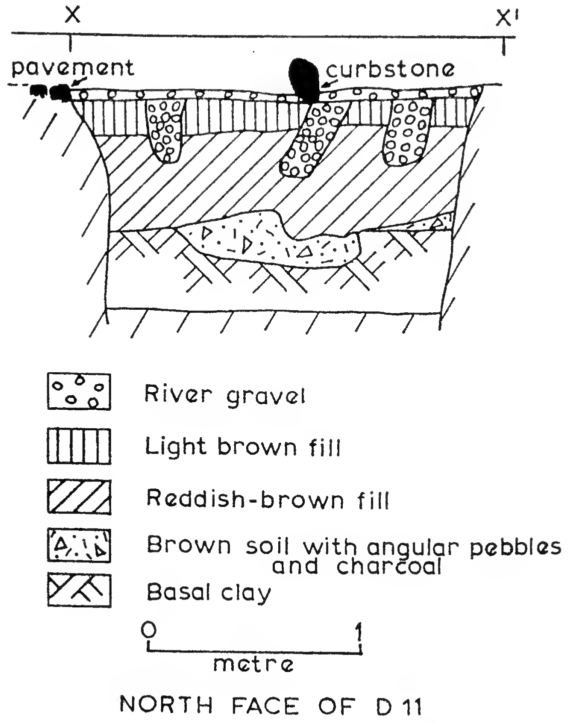

Fig. 22. North face, square D11, house area 2, SU-Fo-1.

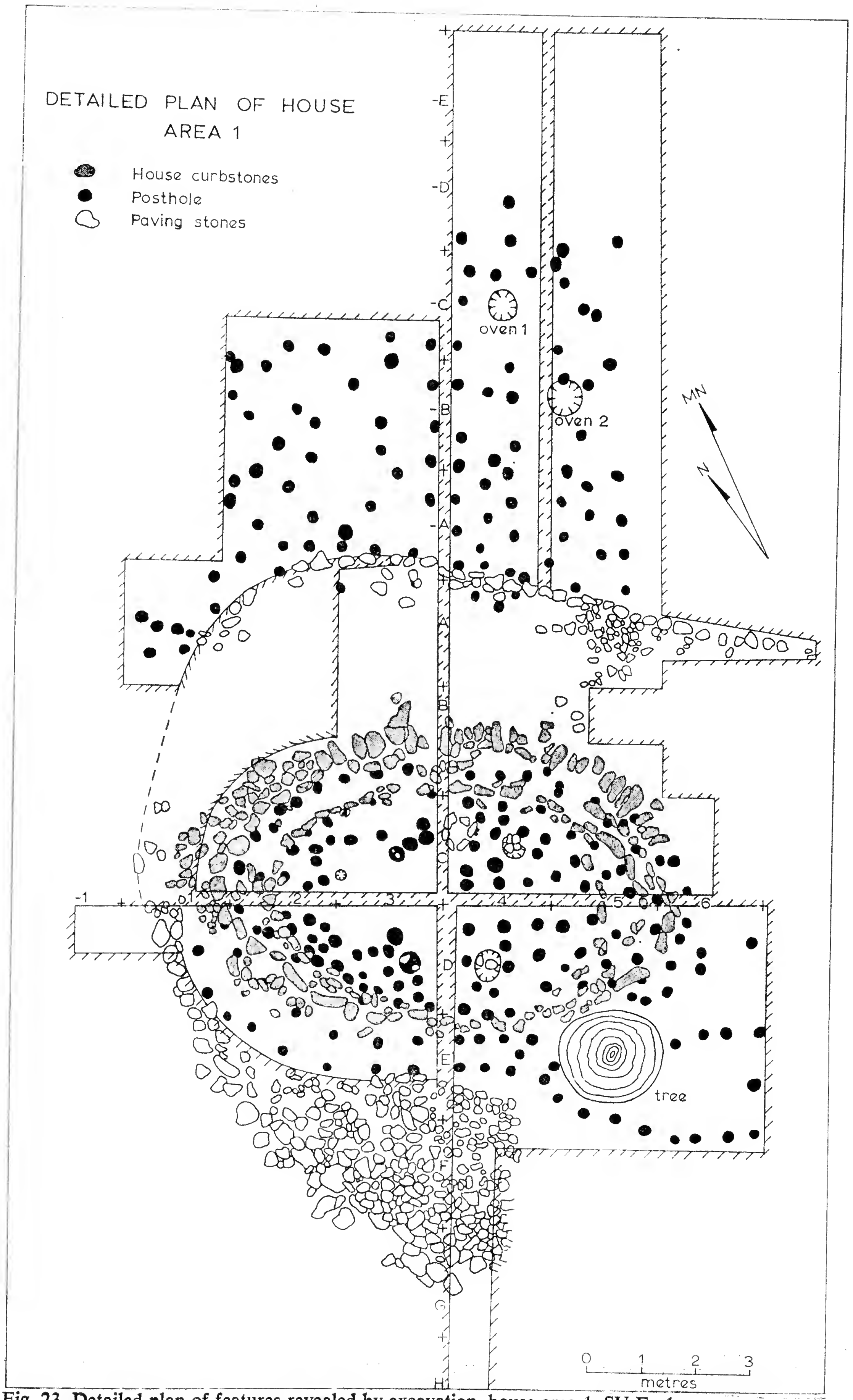

Fig. 23. Detailed plan of features revealed by excavation, house area 1, SU-Fo-1.

Dwellings

House Area 1

Before the excavation of house area 1, surface observations had indicated that several overlapping houses had been built there (figs. 19 and 23). The one intact oval outlined by curbstones appeared to belong to the latest house and was associated with a fireplace. On the outside and completely surrounding this curbing was a row of larger stones, thought to demarcate an older dwelling. Part of another line of stone curbing, also thought to belong to an older dwelling, could be found inside the latest house. Thus, on surface observations alone, it was possible to distinguish three distinct houses.

To the north of the larger stones surrounding the latest dwelling, in the area of squares B3 to B5, several large stones occurred in a pattern radiating toward a point near the intersection of the two base-lines. It seemed possible that these were also part of the stone curbing of another former dwelling.

Excavations began by removing the *'ili'ili* layer in the area which our surface observations showed to contain house sites. Baulks about 20 cm wide were left along the base lines. This was followed by the removal of the *'ili'ili* fill from the entire area inside and outside the intact stone curbing in order to search for postholes. As a result, a number of large stones set in a radiating pattern outside the curbstones of the latest house were more clearly exposed. They formed an incomplete set of curbstones, all arranged in a similar manner, and it was evident they all belonged to a single earlier dwelling.

In addition, in square B3, two stones thought to be curbstones from an even earlier structure were uncovered under the radial arrangement of stones. It is probable that these two stones are to be connected with several curbstones found in squares C2 to D2 associated with a layer below the *'ili'ili* of the latest dwelling.

If we add the partial and almost complete remains of stone curbing, we find that in squares B1 to 6, C1 to 6, and D1 to 6, houses had been built in an overlapping position at least five times. Also, a total of over 130 postholes was found, including those which belonged to the respective sets of curbstones and some which did not. Within this area the pits of five graves were also found.

It can be assumed that some postholes were destroyed by the graves, so that originally there were even more postholes in this area. When one includes the three houses to the west, of which we are certain from the posthole patterns, the conclusion is that at least eight and probably many more houses must have been built on this part of the site. The posthole alignments of the three additional houses extended to the west and south of the five houses whose stone curbing survived in some distinguishable form. However, no evidence of stone curbing belonging to them remained.

All the houses which we can infer from the alignments of curbstones and postholes were of oval shape and all lay along a northwest-southeast axis. Below, I will give a brief description of each of the houses.

House I (fig. 24a)

Because the stone curbing outlining house I was intact and protruded above the surface of the pavement, this house is thought to be the most recent. A fireplace outlined in curbstones near the northern side occurred in a position which clearly indicated that it belonged to this house. As noted above, the base-lines were established so that they would intersect at a point approximately in the centre of house I. The long axis (measurements will be understood to indicate the diameter within the stone curbing) was 6.8 m, the short axis 4.1 m. The stone curbing lay just inside that of house II.

House II (fig. 24b)

The stone curbing outlining house II completely encircled house I. Only a very small part of it along the southwest to south sides was missing, and here the overlap with the stone curbing of house I is probably one cause of the damage. The long axis was 8.1 m, the short axis 4.5 m. This dwelling immediately preceded house I.

House III (fig. 24c)

Within house I, stone curbing extending from C5 to D5, which barely showed through the surface of the *'ili'ili,* was thought to be a part of another house. This was labelled house III. The fact that the stone curbing was partially protruding through the surface of an *'ili'ili* fill which definitely belonged to house I, makes it probable that this curbing derives from a period not greatly predating the construction of house I. Since the almost intact stone curbing of house II apparently occupied the northwestern part of what we called house III, it seems likely that a large part of house III was destroyed during the construction of house II. It is therefore reasonable to suggest that construction of house III immediately preceded that of house II. Because a large part of house III has been destroyed, it is difficult to tell its exact size, but it is estimated that its short axis was from 3.5 to 4 m.

House IV (fig. 24d)

Beyond the stone curbing outlining house II, and radiating from north to west, were about five large stones, 60 to 80 cm in size. As the excavation progressed, numerous similarly oriented

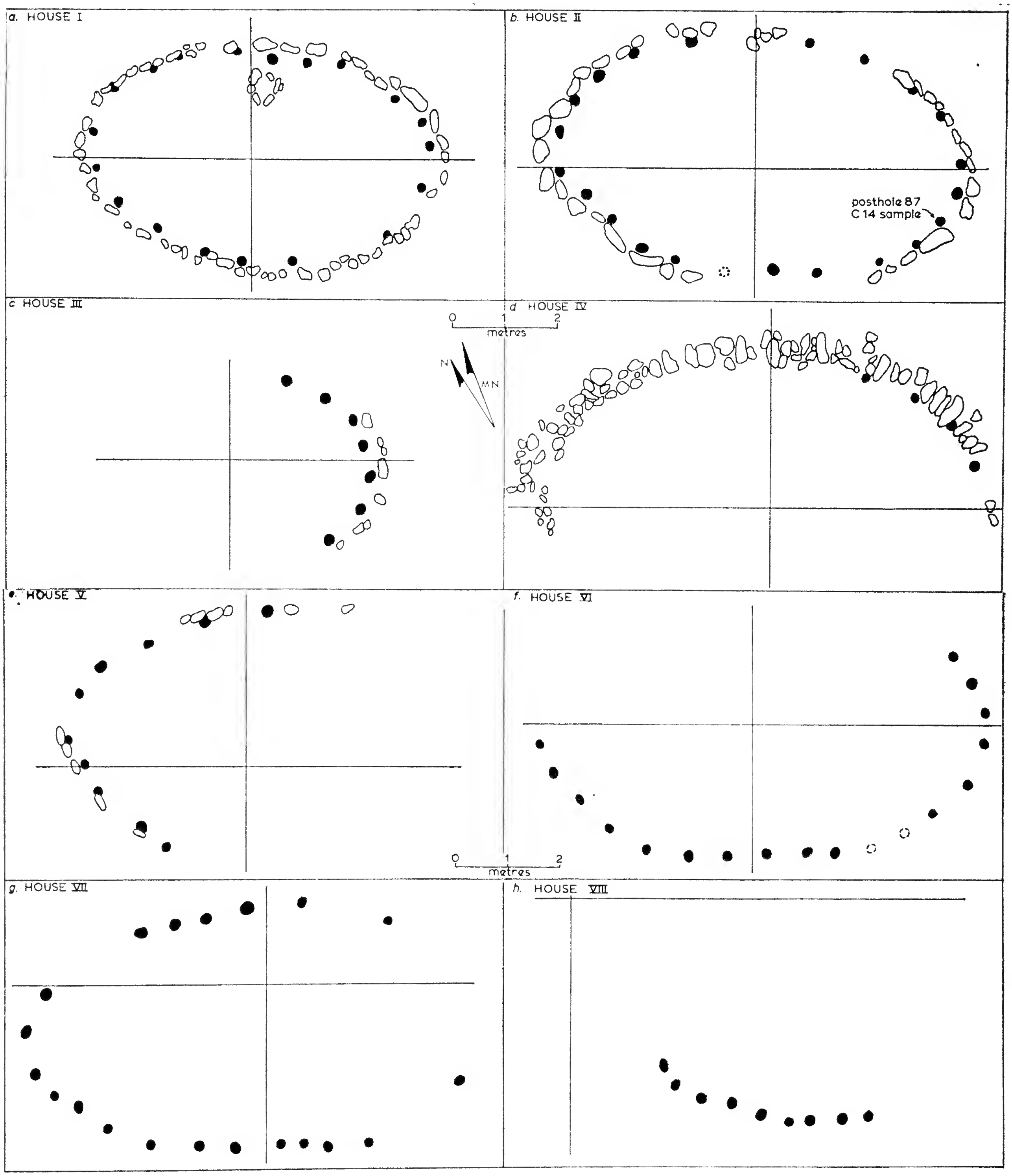

Fig. 24. Plans of houses I to VIII, house area 1, SU-Fo-1.

stones were found near them, making it evident that these were the curbstones of another dwelling. They extended only through squares B2, 3, 4, 5 and C5, or for only about one-third of the estimated perimeter of the house. The rest was probably destroyed when the successive houses I to III, previously described, were constructed.

While the exact size of house IV is no longer clear, its long axis is thought to have measured approximately 8.5 to 9 m. It is possible that the second *'ili'ili* layer found in wall sections 3, 4, 5 and D is to be associated with house IV.

Each dwelling described so far had its floor at about the same level, with only a slight shift in position. While this can be inferred from the position of the surviving curbstones, it is confirmed by excavations at the rear of the terrace. Thus when squares A3, 4, B3, 4, inside the stone border which defines the pavement of house area 1, were dug and carefully examined, neither curbstones nor postholes were found. No houses were constructed, therefore, further to the rear of this section of terrace than house IV.

House V (fig. 24e)

House V was found at a lower level than houses I to IV. This was demonstrated by the recovery of the surviving parts of the stone curbing of house V below that of house I in squares C2 to D2. Another portion in square B3 appeared beneath the stone curbing of house IV.

An interesting observation here is that although the entire terrace upon which these houses were built has a slight slope from east to west, house V was built with a relatively level surface. A shallow depression in the basal clay beneath the stone curbing of house IV in B3, clearly matched the level of the remaining stone curbing of house V. This depression is thought to have been dug for the purpose of embedding the stone curbing of house V. Corresponding depressions were located in the centre of section D along the same lettered base-line and in square 6 on the numbered base-line at approximately the same level. A third *'ili'ili* layer and also a curbstone from the house outline were clearly recognisable in the section of square 2 along the numbered base-line. In the area of squares C2, D2, where the level of the terrace was relatively low, stones for the house outline were simply placed on the existing ground surface. However, in areas where the level of the terrace was higher, holes were dug and the stones set in them in order to maintain the level and make the floor surface as even as possible. The long axis of the interior of house V is estimated to be 7.5 m, the short axis to be about 4 m.

The depressions made to receive the curbstones of house V were later filled. The second *'ili'ili* layer rests on the surface of this filling soil in sections 3 and 4 of the numbered base-line and D of the lettered base-line. As is clear in sections B to D along the base-line, the stone curbing of house IV lies at a higher level than the floor of house V, and as was previously described, a level floor of *'ili'ili* was constructed after the floor of house V was completely covered. It is likely, therefore, that the second *'ili'ili* layer is to be associated with house II, III or IV.

House VI (fig. 24f)

When the *'ili'ili* layers were removed from the areas to the west and south of house II, postholes were discovered aligned in a pattern somewhat parallel to house II. They were labelled house VI. However, no remains of stone curbing could be found in association with the postholes. The long axis was approximately 8.7 m.

The position of house VI in the sequence will be considered along with that of houses VII and VIII. However, it is most likely that house VI is older than house V. It is also possible that the fourth *'ili'ili* layer which was found under the third *'ili'ili* associated with house V, in section 2 along the base-line, belongs to either house VI or house VII.

House VII (fig. 24g)

When the *'ili'ili* layers and stones were removed from the area of house VI's more southwestern exterior, that is, from the portion of the pavement adjacent to the stone border which defines house area 1, a row of postholes inside and under the pavement was readily distinguishable. This was labelled house VII. In view of the fact that it was built along the edge of the pavement, it is conceivable that this was one of the earliest dwellings built on house area 1. The long axis is estimated at approximately 8.5 m, the short axis at 4 m.

House VIII (fig. 24h)

In squares E4, E5, F5, and F6, portions of a row of postholes which formed yet another house were found. Because we did not uncover a wide surface area here, an approximate size for the house cannot be given. Within the area that was dug, no stone curbing was uncovered.

It was previously stated that house VII was probably one of the earliest built within the pavement of house area 1. Judging from the larger space which existed between house VI and the pavement border, house VI was probably built after house VII, and was placed a little more toward the centre of house area 1.

The exact period of the construction of house VIII is difficult to determine, but it is probably appropriate to consider it as definitely older than house V. If this is the case, the problem then arises of whether it is older than house VII. However, no evidence was recovered which will allow us to answer this question. A possible line of argument is that in the occupations following the construction of house VII, the position of each subsequent house moved a little farther back on the terrace in the direction of the lettered base-line. If so, then house VIII is probably the oldest.

The sequence of houses discussed above might be summarised in the following way:

Either

VIII→VII→VI→V→IV→III→II→I,

Or

VII→VI→
VIII——→ V→IV→III→II→I.

Because many postholes were found, not only associated with each of the eight houses, but also in squares D6 and E6, it is reasonable to surmise that many more houses are actually represented. How many is uncertain, but we can say that at least nine houses were constructed.

House Area 2

In house area 2, a test excavation comprising a total area of 8 m² was carried out in squares C11 and D11. Even thorough clearing of the site did not reveal a fireplace, but it did expose the stone curbing of a house in perfect condition. The long axis of this house ran approximately east-west, somewhat different from the long axis of houses at area 1. We dug a trench in a position which included the western edge of the stone curbing of the house (fig. 19).

The excavations revealed an older stone curbing which intersected that of the intact house outline (fig. 25a-c). In addition, rows of postholes belonging to three other houses which were undoubtedly older than the two with stone curbings, were uncovered (fig. 25d-f). Therefore, it is certain that in house area 2, houses were constructed at least five times.

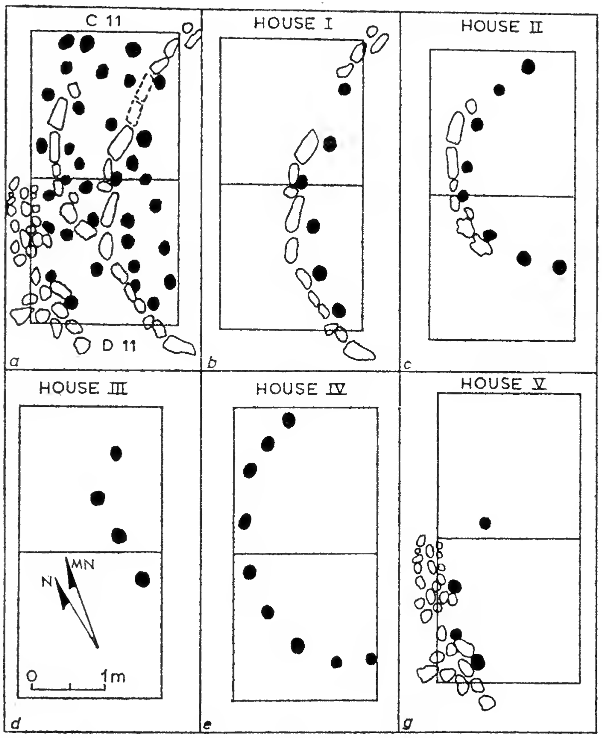

Fig. 25. Curbstones and postholes, houses I to V, house area 2, SU-Fo-1.

However, as noted above, we did not excavate a very wide area, so the size of the earlier houses is unknown. The house with the intact curbing measured 7 m along its long axis and 4.7 m along the short axis. It was not determined whether the direction of the long axis of the structures at house area 2 coincided like those at house area 1. Nevertheless, from the curve of the rows of postholes, we can tell that the other four houses possessed the same oval form, although their exact size and shape cannot be determined.

It is interesting to note that while a fireplace was clearly distinguishable in the surface *'ili'ili* of the most recent house at house area 1, no fireplace could be traced in similar circumstances at house area 2. Because excavation of the entire surface was not carried out, however, it may be incorrect to state that none existed.

Graves

During our excavations at house area 1, we uncovered five graves sealed by the first *'ili'ili* layer. In giving a description of them here, I would like to include the grave-like pit found under the small mound on the surface in squares B9 and C9, although the position of the mound and the nature of the pit below leads me to believe that they belong to a later period.

Grave 1 (figs. 21 and 26)

Because grave 1 was completely buried under the first *'ili'ili* layer, it is certain that it is older than house I. Also, as it was made by cutting through the second *'ili'ili* layer, which as noted above probably belongs to house IV, then the grave is of a later date than house IV.

The grave consisted of a very long rectangular pit with rounded corners, 2.8 m long and 55 cm wide. The bottom of the pit was about 15 or 20 cm below the surface of the *'ili'ili* layer. The orientation of the pit was southwest-northeast.

The condition of the skeletal remains in the pit was extremely poor, and the only pieces discovered were parts from the skull and mandible, and some teeth. The head had been placed in the southwest part of the pit about 50 cm from the end.

Grave 2 (fig. 26)

After removal of the first *'ili'ili* layer in D3, it became clear from the discovery of a mandible and teeth that a very shallow grave only a few centimetres deep had existed here. However, because it was so shallow, we could not distinguish its precise shape. For this reason the chronological relationship of grave 2 and the other graves remains uncertain. The only positive statement which may be made is that the orientation of the skull, judging from the mandible, was in a southerly direction.

Grave 3 (fig. 26)

Part of one end of grave 3 overlaps grave 1, and the skull and part of the mandible with teeth were found directly under those of grave 1. This makes it certain that grave 3 preceded grave 1. The orientation of the pit of grave 3 differed greatly from grave 1, being almost at a right angle

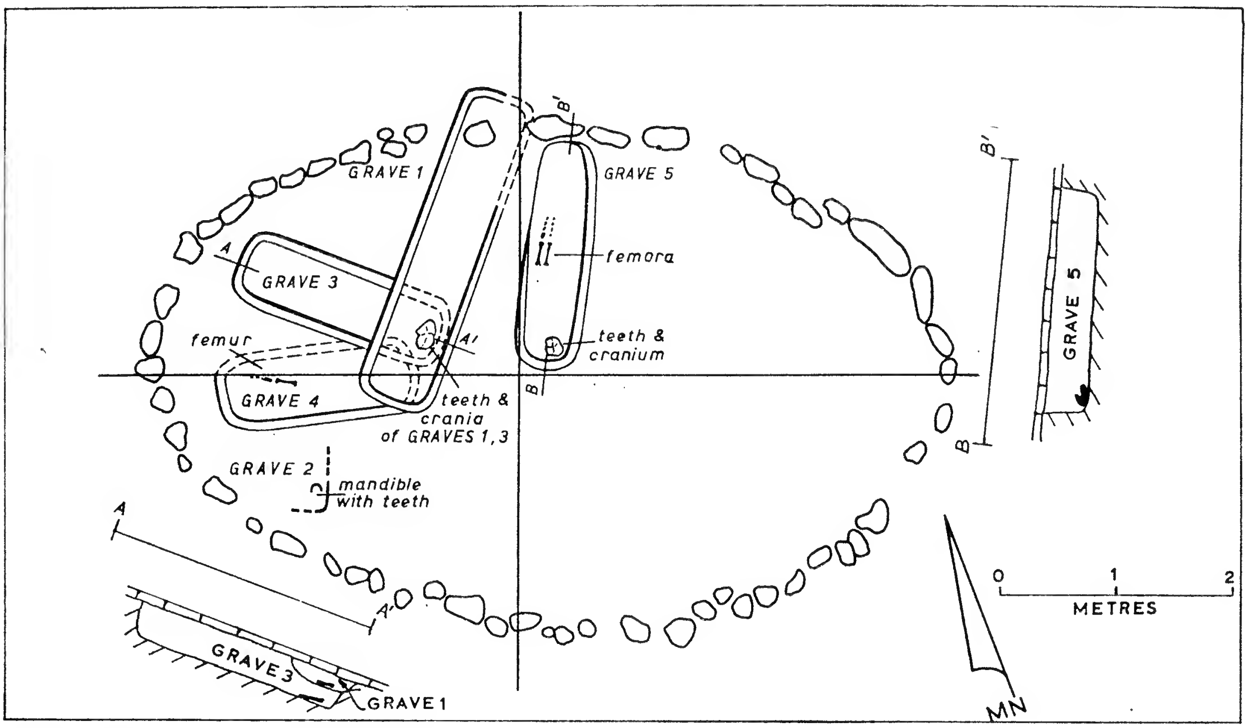

Fig. 26. Plan of graves 1 to 5, house area 1, SU-Fo-1.

to it, and running in a southeast-northwest direction. The length of the pit was 1.9 m and the width 60 cm, with the base being nearly 40 cm below the surface of the *'ili'ili* layer. The skeletal remains were in such poor condition that apart from pieces of the skull mentioned above, very little was found. The skull was very close to the southeastern end of the pit.

Grave 4 (figs. 21 and 26)

One part of the front end of grave 4 had also been intersected by grave 1. However, orientation of its pit along an eastsoutheast-westnorthwest axis was completely different. The condition of the skeletal remains in this grave was again poor, a part of one femur being the only bone recovered. In other graves, portions of skulls were encountered even when femora were not. The fact that skull bones did not appear in this particular grave may be due to the overlap of grave 1 with grave 4 in the area where the skull probably was. Because the graves do not differ greatly in depth, that portion of grave 4 would have been destroyed when grave 1 was made.

The dimensions of the bottom of the pit were length 1.6 m and width 60 cm; the depth from the surface of the *'ili'ili* layer was 20 cm.

As is visible in the section (fig. 21), this grave cuts through the third *'ili'ili* layer. Therefore it belongs to a period after that of house V. What is more, this grave is thought partially to overlap with grave 3, but we could not clearly make out their chronological relationship.

Grave 5 (figs. 20 and 26)

Grave 5, separated by a short gap from the other four graves, was located in square C4. Its northeast-southwest orientation was similar to that of grave 1. Its length was 2 m, its width 55 cm, and its depth from the surface of the *'ili'ili* layer 50 cm.

The condition of the skeletal remains was again poor. Only small portions of the two femora and part of the skull were recognisable. However, it is worth noting that the skull lay at the very southern end of the pit and the two femora were in a fairly central position, but leaning towards the wall of the pit. Whether the skeleton was that of an adult or child can only be determined by examination of a few teeth remains, not a very satisfactory basis. However, using the position of the skull and femora we can estimate that if this was an extended burial, the height of the individual must have been approximately 1.5 m; and if it were an adult, then it is possible that the body had to be slightly flexed at the time of interment. It is also possible that the body was on its side in a flexed position.

In considering the chronological position of the five grave pits uncovered within the stone curbings of house area 1, grave 2, whose existence could only be verified by the presence of the mandible, has to be excluded. On stratigraphic grounds the remaining four graves were certain to be more recent than house V and older than house I. If the second *'ili'ili* layer belongs to house IV as believed, then the four graves are more recent than house IV as well. It is also certain that grave 1 was constructed after graves 3 and 4. But the chronological relationship between graves 3 and 4 could not be clearly determined, and the chronological position of grave 5 with respect to the others remains unclear. If we consider the orientation of the graves, we note that grave 1 has approximately the same alignment as grave 5, and grave 3 as grave 4. These groupings may have chronological significance. In other words, we can postulate that graves which are similarly aligned belong to the same chronological group. If that is so, then graves 1 and 5 are both more recent than graves 3 and 4.

No offerings were found in these graves in association with the skeletal remains. Thus it appears that unperishable personal belongings of the deceased were not buried with the body.

Grave 6 (fig. 27)

Grave 6 covered the area from square B9 to C9; its small mound was 3.5 m long, 1.8 m wide, and 20 to 40 cm high. As the soil of the mound had covered the stone borders defining house areas 1 and 2, and the pavement of house area 2, it was evident that this grave was of relatively recent origin.

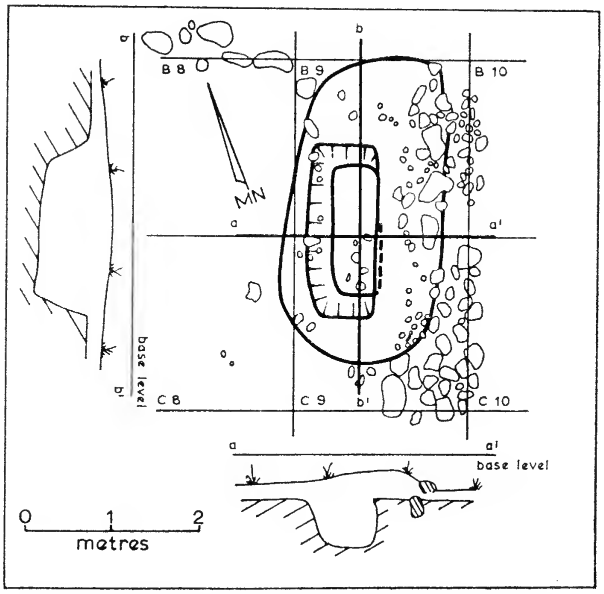

Fig. 27. Plan and sections, grave 6, SU-Fo-1.

Below the mound, a pit was found which was rectangular in shape at both top and bottom. The top of the pit measured 2 m in length and 0.8 m in width, while the bottom measured 1.5 m in length and 0.5 m in width. From the top of the mound, the depth of the pit was about 80 cm or about 50 to 60 cm below the original surface. The pit was oriented almost parallel to the lettered base-line.

Because no skeletal remains were recovered in the pit, we hesitate to interpret it as a grave. However, the nature of the mound and the form of the pit, which are similar to historic graves at Sasoa'a (Report 21, p. 31) make this a likely interpretation. But chemical analysis would probably be necessary to provide further supporting evidence.

A hammer stone and a fragment of an adze were recovered from the mound, but their position in the fill makes it unlikely they had been buried as offerings with the dead. No European material was discovered in either the mound or the fill of the pit.

It is clear that grave 6 is recent and differs in several ways from the other five graves. The latter were all found within the stone curbings of the houses, had very shallow pits and were chronologically earlier than the first *'ili'ili* layer of house I. On the other hand, grave 6 was at one end of the pavement of house area 1, with part of its mound actually covering the row of stones in the border. This implies that grave 6 was formed after house I was constructed and, probably after it was abandoned.

A small mound in F12, also thought to be a grave, was investigated. The destruction of the original pit by the digging of later pits, however, leaves little scope for discussion here and the feature will be described below in the section on pits.

Ovens and Cooking Houses

Two pits on the northeast slope of house area 1 in squares -C4 and -B5 (fig. 23) were probably ovens, as they contained a large quantity of charcoal. Following the order in which they were discovered, the pit in -C4 was labelled oven 1, and that in -B5 was labelled oven 2. Both were bowl shaped with shallow bottoms. They were cut from a level about 20 cm below the ground surface. The diameter of oven 1 was about 1 m; that of oven 2 about 1.15 m. Both were very shallow, averaging 30 cm in depth.

It is not difficult to imagine that some of the postholes which were found around the oven pits represented either a fence-like construction or a cooking house which contained these ovens. But if such cooking houses once existed, it is now impossible to infer their shape because of the number of postholes and the complexity of their arrangement.

Fence-Like Features

Intermingled among the postholes associated with the ovens are some thought to have formed a fence-like structure rather than a cooking house. Although it is impossible to describe the exact shape of the fence, because of the complexity of the postholes, evidence of posthole alignments was found in each square from -A1 to

-A5, while in each square from A1 to A4, there was a series of postholes along the inside of the stones in the pavement border. This appears to be sufficient evidence to infer the former existence of a fence (fig. 23).

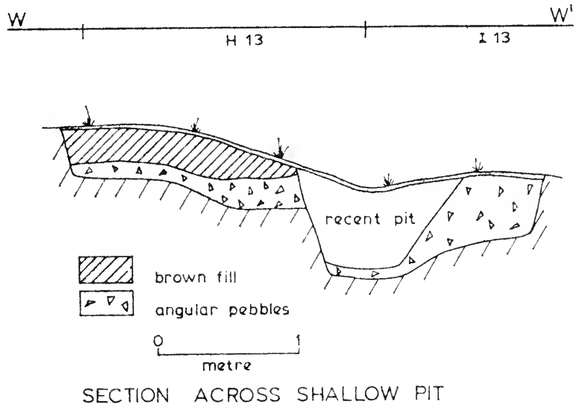

Fig. 28. Section through recent pit, squares H13, I13, SU-Fo-1.

Recent Pits

A shallow pit in H13, I13, initially classed as an oven, was found to be 1.2 m in diameter and 50 cm deep. Investigation revealed that it was very recent, because the fill contained a broken ceramic penguin. The stones scattered round the pit, thought to be from the oven, turned out to be from a reddish brown layer, containing many angular pebbles, which constituted one of the underlying terrace fills penetrated by the pit. No charcoal was found in the pit (fig. 28).

Additional examples of recent pits of this type were found in the area of squares F12 and F13. In F12 was a small mound measuring 1.8 m long and 1.3 m wide, whose long axis ran approximately north-south. Excavation showed that two

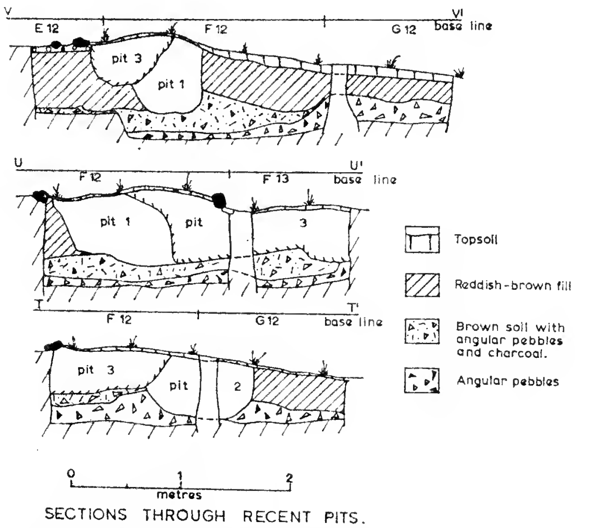

Fig. 29. Sections through recent pits, squares F12, F13, SU-Fo-1.

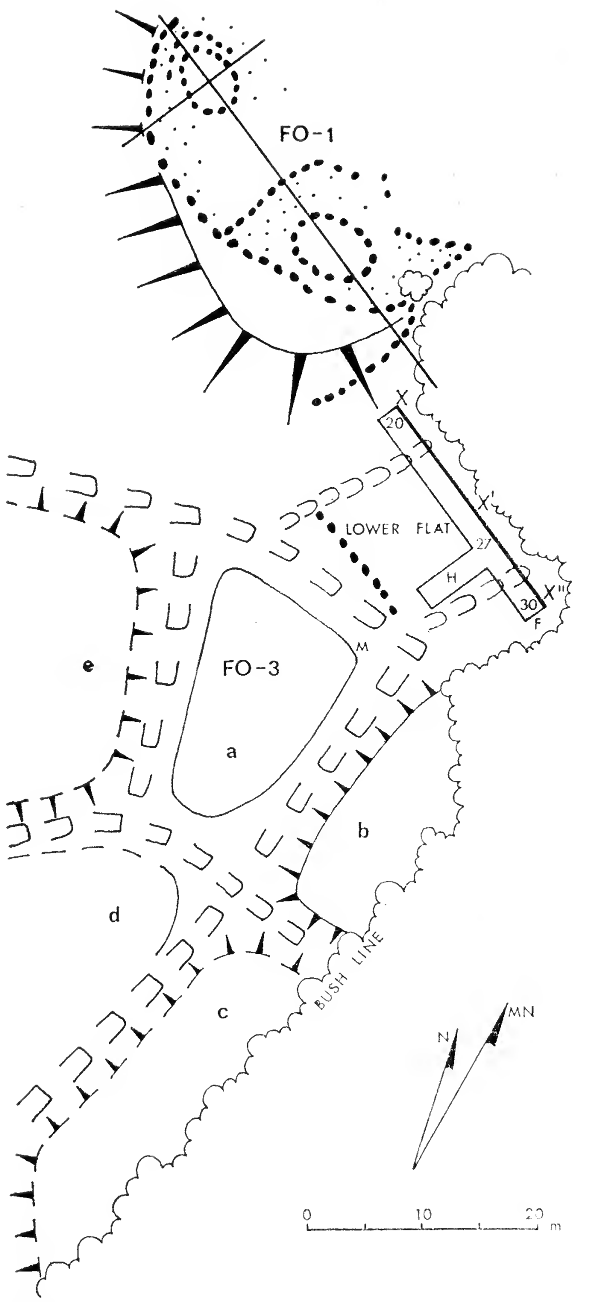

Fig. 30. Plan of sites SU-Fo-1 and SU-Fo-3, showing area of excavation on the lower flat adjacent to SU-Fo-1.

recent pits had been dug into the top of this mound, and in one of them another piece of the ceramic penguin mentioned above was found (fig. 29).

Below the mound was a pit (pit 1) whose area probably originally coincided with that of the mound. At first it was thought to be a grave, but its dimensions could no longer be clearly established because of the considerable damage caused by pit 3 (fig. 29). It might be possible to determine whether this was actually a grave from a chemical analysis of the soil sample collected from it, but at present no interpretation is possible.

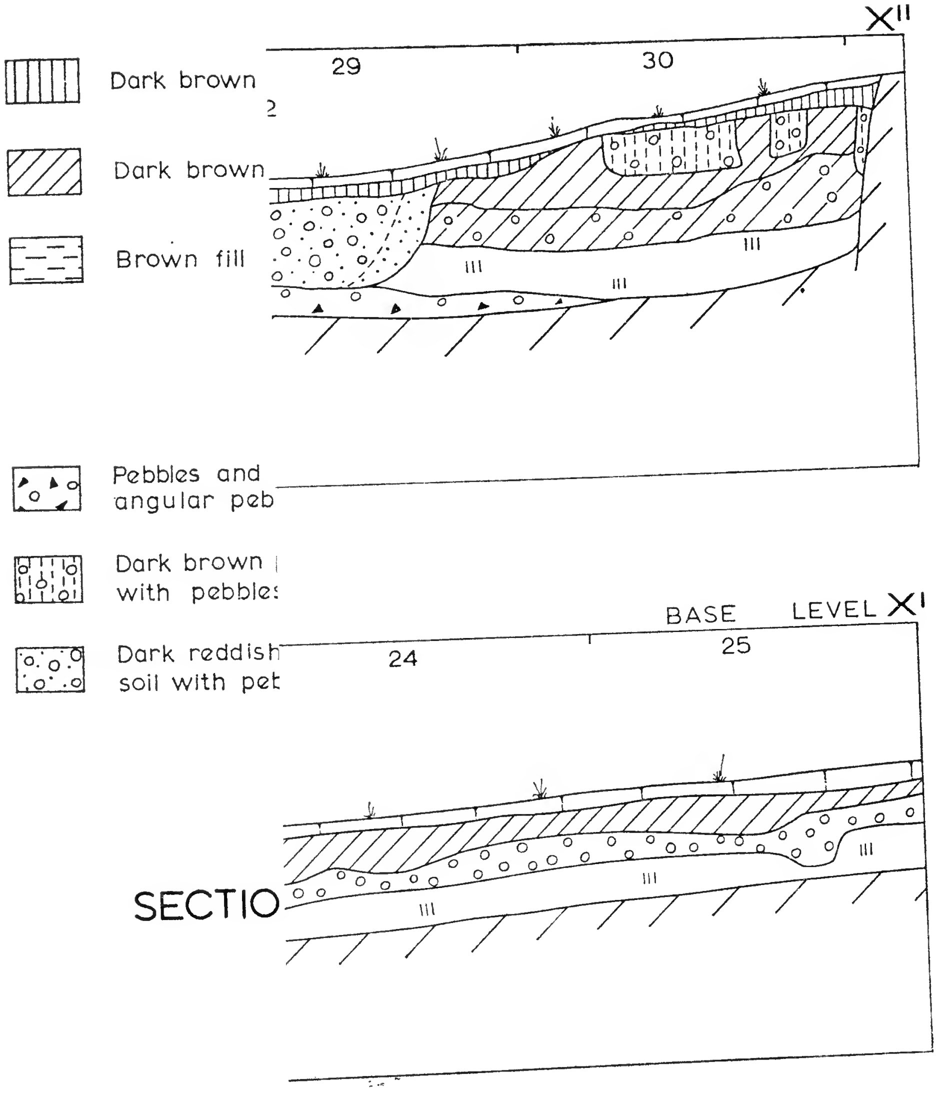

Fig. 31. Cross-section thr

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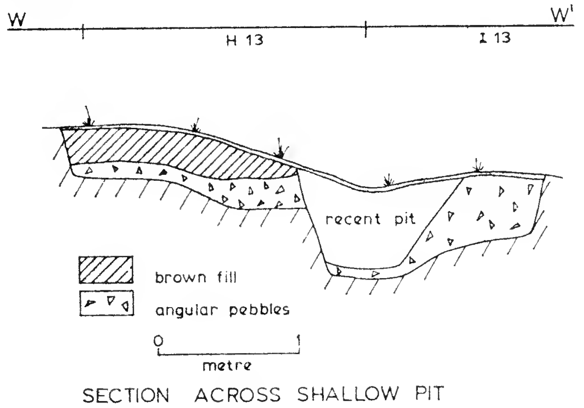

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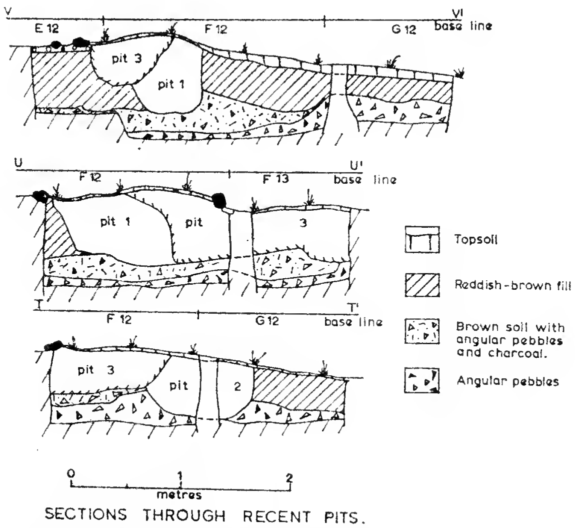

Fig. 29. Sections through recent pits, squares F12, F13, SU-Fo-1.

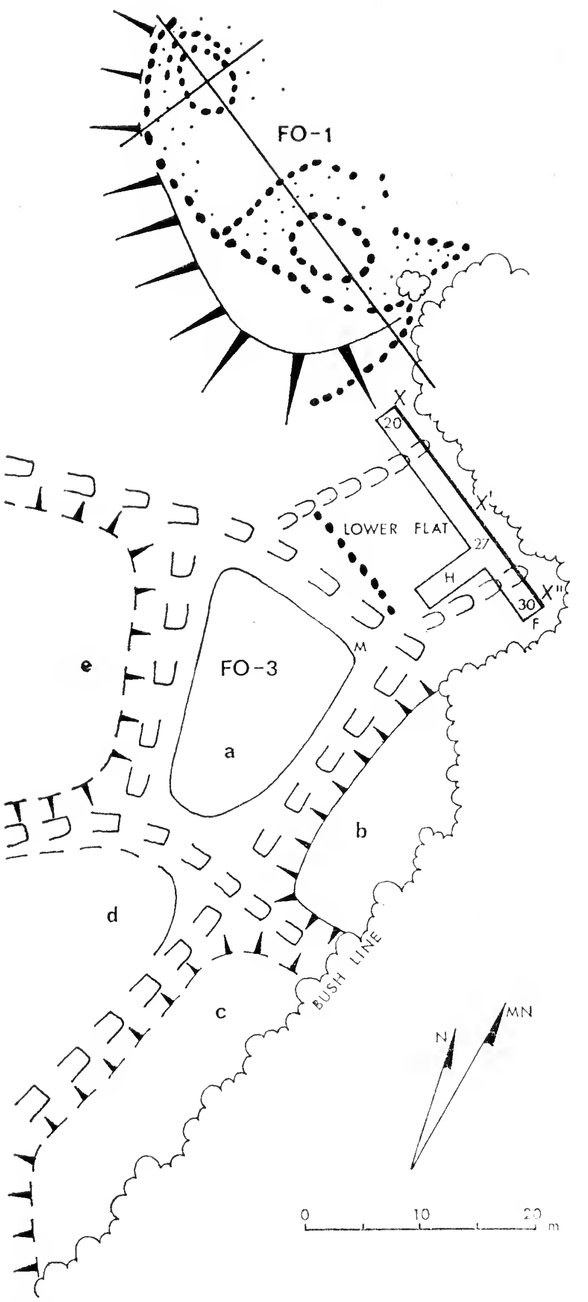

Fig. 30. Plan of sites SU-Fo-1 and SU-Fo-3, showing area of excavation on the lower flat adjacent to SU-Fo-1.

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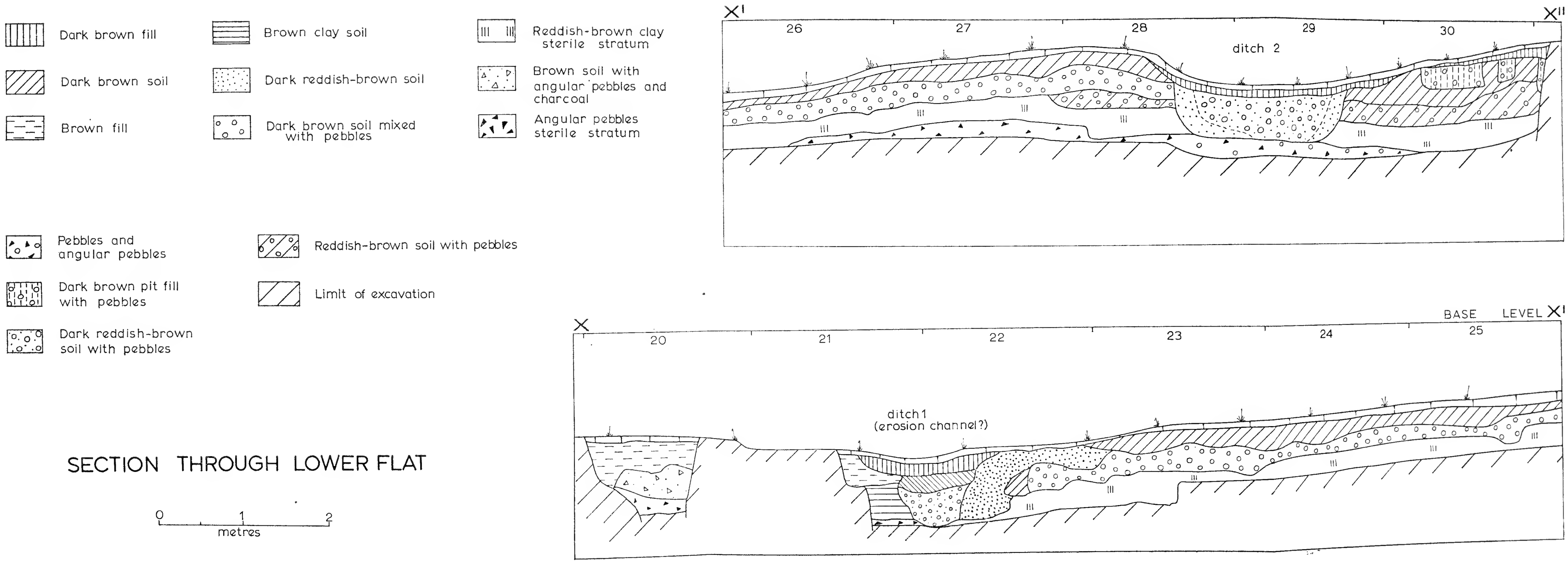

Fig. 31. Cross-section through lower flat, SU-Fo-1.

The pieces of a ceramic penguin found in the two different pits matched almost perfectly. The artifact is clearly very modern. As the area up to the present bush line has been extensively cultivated in recent times the presence of such an item is scarcely surprising.

Ditches and Terraces Without House Remains

As noted above, the lower flat without house remains was separated from the main terrace by a depression and was itself further divided into parts by a shallow ditch. In fact this flat continued further to the east, but because the east side was covered by bush, its exact size and shape were not easy to discern. Despite extensive clearing, only a small portion of the flat and adjacent terraces of Fo-3 were exposed.

A trench which began in F20 and extended to F30 cut across the depression and ditch mentioned above. Another trench at a right angle to the first extended from F27 to I27. It had been hoped to extend this trench to K27 and thus on to the neighbouring terrace to the south but lack of time limited it to C27, H27 and I27 (fig. 30).

In squares F21 and F22 a ditch (ditch 1) was discovered running in a northeast-southwest direction and separating the lower flat from the main terrace. The ground surface in this area was about 1 m lower than the central portion of the main terrace. From here the surface sloped gradually upward, rising to approximately the same level as the main terrace at F28 to F29, where the shallow ditch (ditch 2) was encountered. Beyond this point the surface continued to rise to an even higher level. Ditch 2 ran almost parallel to ditch 1. Between the ditches the ground surface sloped considerably downwards in the same direction as the ditches. In cross-section, ditch 1 was 1.7 m wide and about 80 cm deep with an open U shape relatively wide at the top. Ditch 2 was 2.25 m wide, and about 50 cm deep with a shallower and wider U shape (fig. 31).

After removal of the surface layer of soil (layer I), which was about 10 cm thick, the surface of a dark brown layer (layer II), presumed to be a living surface, appeared. However, in F30 a sub-layer (layer I^1) about 10 cm thick was found between layers I and II. No postholes were found in either of the excavation trenches. In F30, three irregular pits were found, but there is no reason to suppose these were related to dwellings (fig. 31). Therefore, as predicted from our surface observation of this area, it is probable that no houses or other structures were built on it, though the excavated area was perhaps too small to justify a definite statement to this effect.

If they were not house terraces, what then was their purpose? On the basis of their position, slope, surface and composition, the answer would seem to be agricultural plots. This would be compatible with the fact that the ditches are best described as drainage ditches.

Adze fragments were found in two places: on the border between F29 and F30, and in F21. A stone grater, previously an adze, was found in F27. All were found in layer I fairly close to the surface. An adze was also found on the surface of the neighbouring terrace to the south (Fo-3A) and another on the surface of ditch 1. A *Cassis* shell was found in I27 in the upper portion of layer II, about 10 to 20 cm from the ground surface.

ARTIFACTS

Adzes

During the excavations, 19 adzes, including one classified as a chisel and one later used as a grater, 4 adze flakes and 6 adze blanks were encountered. Excluding one waterworn adze fragment so weathered it cannot be typed and the unclassifiable flakes and blanks, the remaining 18 adzes, including the grater, can be divided into the following types in the Green and Davidson classification of Samoan adzes (I, Report 2).

Type I

The cross-section of Type I is trapezoidal. Three adzes with this cross-section were recovered, and they correspond in this and other respects to Type I (fig. 32a-c).

One of these adzes, A 17/143 (fig. 32a), is very small, having a width of only 3 cm. Its exact length is difficult to judge, because it has been broken approximately in the middle. The remaining half measures 4.8 cm in length, and the thickest portion only 2 cm. The front is smooth, grinding having obliterated all traces of flake scars produced during the manufacture of the adze. The sides and back are not ground, with the flake scars clearly visible. However, the small bevel surface is smoothly ground. It is clear that the cutting edge had chipped during use, and had been reground and reshaped several times, and that the right side of the cutting edge had suffered the heaviest wear.

The specimen was found in square D2 at the base of the first *'ili'ili* layer, between it and the underlying layer of reddish brown soil. If it was incorporated in the *'ili'ili* after its deposition as a pavement, it is possible that it belongs to the same period as house I. However, since it was found at the bottom of the layer, there is a greater possibility that it was part of the deposit when it was carried in from another location. It is then possible to assign its production to a period earlier than that of house I. Because of

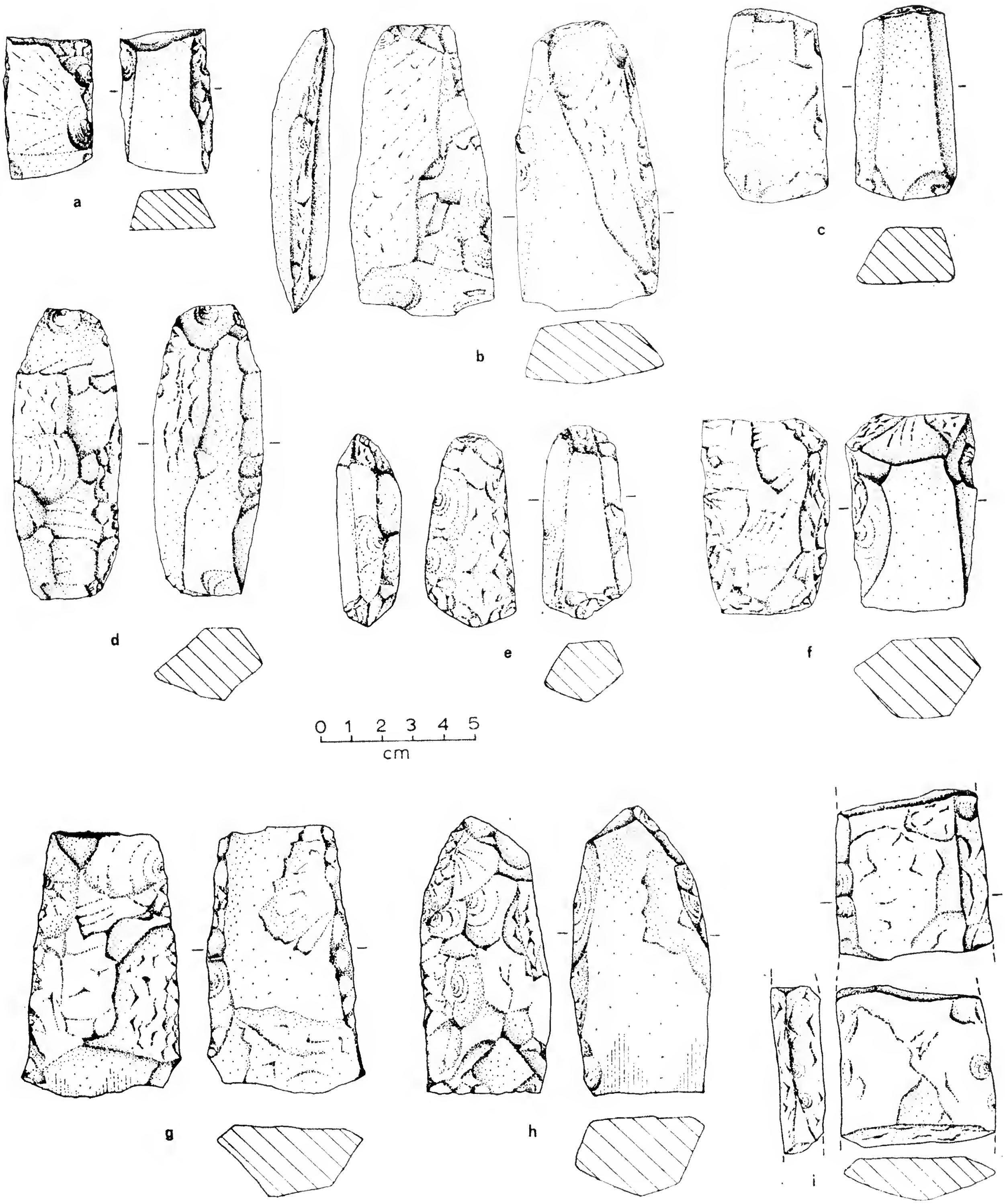

Fig. 32. Adzes from SU-Fo-1. a. Type I, A 17/143. b. Type I, A 17/164. c. Type I, A 17/171. d. Type II, A 17/115. e. Type II, A 17/142. f. Type II, A 17/145. g. Type II, A 17/191. h. Type II, A 17/114. i. unclassifiable, A 17/165.

its position on the surface of the first reddish brown soil layer, it is from a more recent period than house IV, for this layer covered not only the curbstones, postholes and *'ili'ili* of house V, but also the postholes belonging to either house III or IV. It is therefore probably appropriate to assign it to the interval between houses II and IV.

The adze in figure 32b, A 17/164, remains in perfect shape. Its length is 9.4 cm, the width of the cutting edge 4.1 cm, and the width of the poll 2.3 cm. The greatest thickness is 2.0 cm. The bevel and roughly half of the front are smoothly ground, while the rest of the front still bears traces of flake scars. The back and sides are largely unground.

This specimen was uncovered in the first *'ili'ili* layer in E4. It is possible that it was carried in with the *'ili'ili,* but the fact that it has remained in such perfect shape suggests it may equally well derive from the occupation of house I.

The adze in figure 32c, A 17/171, was uncovered in square D11 in house area 2. It was discovered in a vertical position in the *'ili'ili* layer between two stones of the curbing of the most recent house. Judging from the weathered and defaced appearance of the back and broken edges, it may have been used in an earlier period, thrown away, and then carried to its present position as part of the *'ili'ili* deposit.

Both ends of this specimen are broken, the remaining piece measuring 6.2 cm in length. The greatest width is 3.4 cm, but the width of the front ranges from 1.5 to 2.1 cm. The thickness is 1.9 cm. This specimen is considerably weathered and defaced.

Two of these adzes certainly belong to the later part of the occupation sequence on this site. This is consistent with the fact that Type I adzes are the most common late form in Samoa.

Type II

Ten specimens identified as Type II were found (fig. 32d-h). Although this type is the next most common to Type I in Samoa (I, Report 17, p. 263), and is characteristic of late assemblages, it is not usual for adzes of Type II to outnumber Type I to the extent encountered in this site.

The adze in figure 32d, A 17/115, was overlooked during excavation, but later found in the *'ili'ili* deposit after it had been removed. Nevertheless, it is certain that it was found in house I, that is, in the first *'ili'ili* layer. This specimen does not have the weathered appearance usually present on adzes that have undergone abrasion as part of an *'ili'ili* deposit, and the probability is high that it belongs to the same period as house I. Even if its position preceded house I, it would not date much before that occupation.

Its length is 9.5 cm, the greatest width 3.6 cm, the greatest thickness 2.6 cm, and the width of the cutting edge 2.1 cm. The front is ground, but the back and sides display almost no signs of grinding. The cutting edge has been chipped, probably through use. Although a bevel probably existed originally, a distinct bevel surface is no longer present.

Both ends of adze A 17/142 (fig. 32e) are chipped and somewhat defaced, so that the specimen was once longer than its present 6.3 cm. The maximum width is 2.9 cm and maximum thickness 2.0 cm. The front and both sides are well ground. This specimen was found in the surface of the *'ili'ili* of house area 2, square D11. The broken and weathered appearance suggests that the adze was part of the *'ili'ili* when it was transferred to this location, and therefore is older than the most recent dwelling at house area 2. On the other hand the weathering is not great, and there are no grounds for placing the specimen in a period too remote from the occupation of house area 2.

The adze in figure 32f, A 17/145, was found on the ground surface of the nearby terrace Fo-3A. Therefore, it is likely that it belongs to the final period of occupation of these sites. The adze had been broken in half, and only the blade end was recovered. The cutting edge has been badly damaged, and only a very small ground surface, thought to be part of the bevel, remains. The front and left side have a flat, well ground surface. The right side is unground. The existing length is 6.3 cm, the greatest width 4.0 cm, and the width of the cutting edge 3.0 cm.

A possibly unfinished example of Type II, A 17/191 (fig. 32g), was found on the surface of the shallow depression which separated the terrace with house remains from the lower flat. It is probably to be associated with the very close of the occupation of the house area.

The length of the adze is 8.5 cm, the width of the poll 3.4 cm, the width of the cutting edge about 5.3 cm, and the greatest thickness 2.3 cm. In shaping this tool, flaking was carried out along both front edges, after which the entire front surface was ground. There is little trace of grinding on other surfaces, including the bevel. The specimen is slightly weathered.

Although the cutting edge of the adze in figure 32h, A 17/114, has been damaged, the rest is almost perfect. Thus it is likely that the edge damage resulted from use. The entire front is well ground, but there are only traces of grinding on the sides and back. The length is 8.9 cm, the width of the cutting edge 3.7 cm, and the greatest thickness 2.5 cm.

This specimen was also discovered in the *'ili'ili* deposits after their removal. Its original position is therefore uncertain, although it is most likely to be part of the occupation associated with house I. Even if the *'ili'ili* in which it was found did not belong to house I, the intact nature of the specimen and general context of these *'ili'ili* deposits would place it towards the late end of the house sequence, somewhere between houses II and IV.

In addition to the above, there are five other specimens belonging to Type II which are not illustrated.

The first, A 17/121, is a broken adze fragment taken from the surface of the *'ili'ili* associated with houses II to IV. Its location immediately inside the curbing of house IV may indicate that it belongs to that house. On the other hand, there is also the possibility that it was part of the *'ili'ili* brought in when house II was being built. It may even have been made and used at the time of that occupation. It is now impossible to determine which is correct, but there can be little doubt that it belongs to the latter half of the house sequence (I-V). The existing length is 5.5 cm, the greatest width 4.5 cm, and the width of the cutting edge 4.1 cm. The back and sides show very few signs of grinding, but the front is fairly well ground. There is no grinding on the bevel, and it may be assumed that the adze had broken, and was being reworked.

A second and badly damaged adze fragment, A 17/144, was found in D2, between the *'ili'ili* layer and the adjacent reddish brown soil layer which filled the pit of grave 4. This specimen is either to be associated with the first *'ili'ili* layer, or interpreted as having come from the grave pit. Whichever is correct, the specimen definitely belongs to the later half of the house sequence, because grave 4 is thought to be more recent than house V. The specimen measures 6.6 cm in length and 4.1 cm in width. The two ends have been badly scarred and chipped, and the bevel is missing. The front and one side are ground but the other side, and remaining surfaces, are unground.

The third fragment, A 17/169, was found in the covering soil of the small mound over grave 6 in square B9. It could not have been a grave offering because of its position in the mound fill. Moreover, the extensive weathering and damage indicate that it has been part of a deposit which has been moved several times.

Another fragment, A 17/183, was found between the curbstones of house IV in square C5. Although "between the curbstones" is accurate, it is worth noting that the *'ili'ili* used in either house I or house II had spilled over and covered the curbing of house IV in this area, so that the specimen lay in the *'ili'ili* rather than between the stones of the curbing. Thus, although it is possible that the specimen came from house IV, it is more plausible that it derives from the occupation of either house I or house II.

The specimen is broken approximately in half, and measures only 6.2 cm in length and 4 to 4.3 cm in width. There is no trace of grinding. However, a flake scar on the bevel suggests the possibility that the cutting edge had broken and was being reworked. The specimen is weathered.

The last fragment, A 17/184, was uncovered beneath a stone in the curbing of house II in square D2. It is also 6.2 cm long. There is only a small area of grinding. It appears as if this specimen, too, may have been in the process of being reworked after breaking.

In summary, most of the adzes of Type II appear to belong to the later half of the house sequence, dating to the period after house V. The majority, moreover, are probably to be placed toward the end of the occupational sequence. The weathered specimens, however, may have been introduced to the site in the *'ili'ili* deposits.

Unclassified Specimens

Two specimens, relatively thin for their width, whose cross-sections are lenticular and plano-convex, are small fragments consisting only of the central portion of the adze. They might be classified as Types Ic or Va, although not with certainty. Both have the weathered surfaces characteristic of the long-buried early stone assemblages, and one, and perhaps both, have been water rolled.

The specimen in figure 32i, A 17/165, is 5.2 cm at the widest point and 1.3 cm thick, with a shoulder index of 27. Its distinctive features are its thinness, and flaking at an angle to the front and back surfaces along each side forming a medial line along each lateral edge. Adzes with these features have been classified as early forms of Type I, under variety c (Report 29, p. 133). The fragment was recovered from the first *'ili'ili* layer in square E5. It is likely, however, that it was part of the gravel brought to the site, in view of its broken state and rolled appearance. This and its typology suggest it derives from a much earlier period than that of house I with which it was associated.

The other specimen, A 17/188, is 4.8 cm wide and 1.9 cm thick, yielding a shoulder index of 40. This, together with its plano-convex section, would assign it to Type Va. It was found on the surface of the lower flat in square F30, but its weathered appearance and battered state are an indication of derivation from an earlier context than that in which it was found. Thus, unless it and the specimen above were carried some distance, which seems doubtful, their typology and condition indicate an early age for at least some activity in the locality, perhaps of the same order as the mid-fifth to seventh century A.D. date from the terrace (see below).

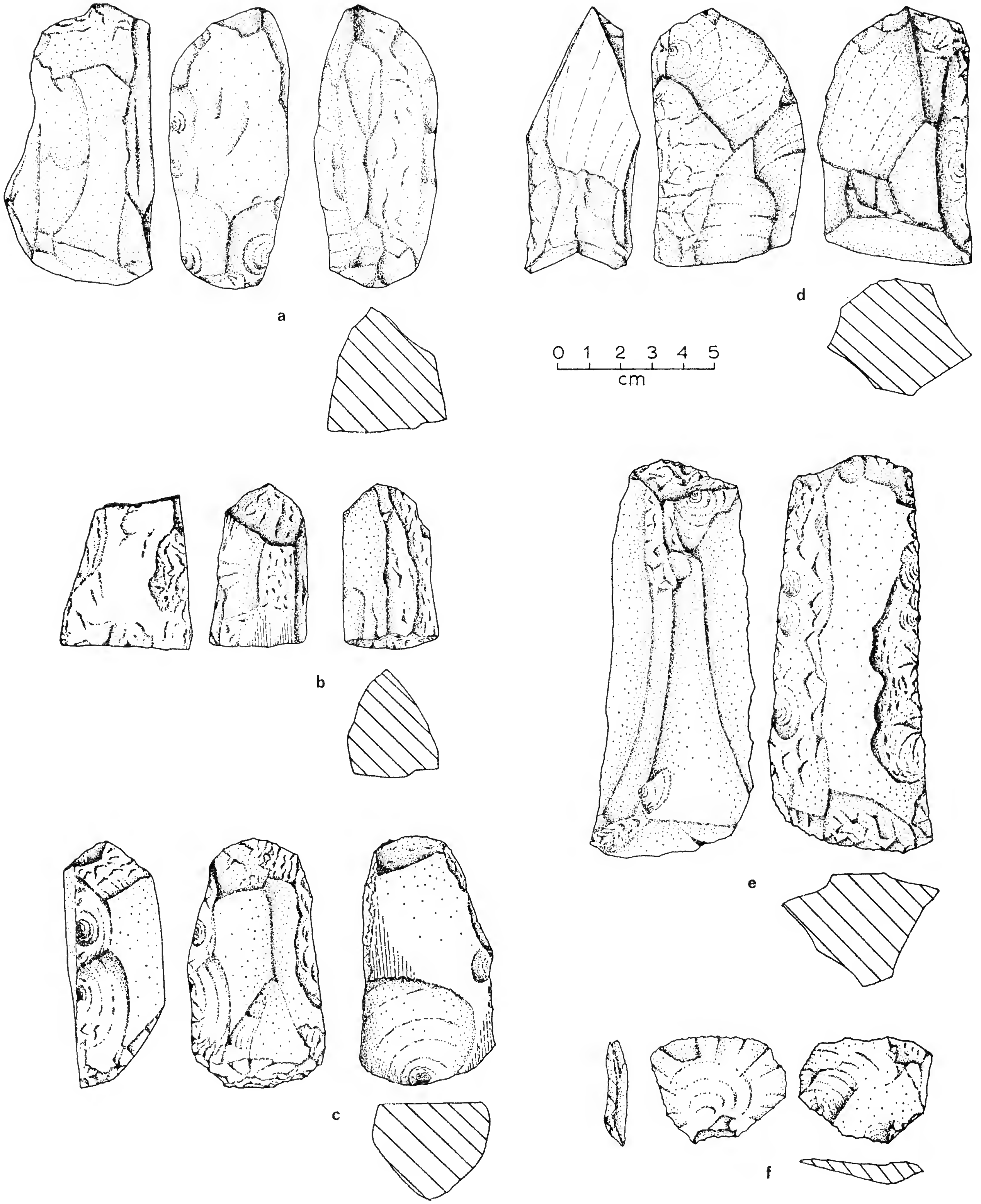

Fig. 33. Adzes, adze blanks and flake from SU-Fo-1. a. Type VI, A 17/126. b. chisel, A 17/146. c. Type VIIIa, A 17/189. d. adze blank, A 17/170. e. adze blank, G 17/852. f. flake, G 17/847.

Type VI

The butt end of an adze, A 17/126, was uncovered in the *'ili'ili* layer in square D6 (fig. 33a). It is triangular in cross-section and has a width of 3.9 cm and a maximum thickness of 4.8 cm. It is clear that the back has been ground, but the total extent of grinding cannot be determined from the surviving fragment. Because of the small size of the fragment, it is not clear to which type it belongs, but Type VI (I, Report 2, p. 26) is most likely.

Chisel

One specimen, A 17/146, 4.7 cm long, is a fragment of a much longer adze-like implement with a triangular cross-section (fig. 33b). The thickness varies from 2.7 to 4.0 cm, and the width of the back from 2.1 to 2.5 cm. The back and right side have been ground but the left side has not.

The specimen was recovered in either the first or second *'ili'ili* layers in the area of squares C2, 3 and D2, 3. A more precise context cannot be given, because the item was recovered from the deposits after their removal from these squares. However, there is little doubt that it belongs to the time span between houses I and IV, at the later end of the house sequence.

Although it would be possible to consider the fragment a piece from the butt end of a Type VI adze, in this case I have decided it is better classified with the long triangular chisels identified by Buck (1930: 365-366). However, the possibility that this specimen might be included among the adzes of Type VI cannot be dismissed altogether.

Type VIIIa

The broken adze in figure 33c, A 17/189, had its cutting edge retouched in order to make it into a grater. However, the original bevel of the adze is still evident. The retouch flaking done in making the grater is visible not only on the cutting edge but on both sides and across the butt as well. It is clear that the adze had been so well ground initially that nearly all flake scars due to manufacture of the original implement had been obliterated. The present length and width are 8.0 and 4.1 cm respectively, although there is no doubt that both dimensions were once larger. The mid-section is 3.0 cm thick.

The specimen was found on the ground surface in square F27, so it was probably used as a grater towards the close of the occupational sequence at the site.

Adze Blanks

Six specimens classified as adze blanks were found during the excavations. Of these, five are broken fragments which exhibit numerous flake scars and possess an adze-like shape. But as they are unfinished, it is not possible to classify them by type with any degree of precision. Upon completion, most would probably have corresponded to one of the types already described for this site, however.

Specimen A 17/170 (fig. 33d) is about 8.0 cm long, 4.7 cm wide and 3.3 cm thick. It was found in square C11, associated with the remains of the second to last of the five houses in house area 2. Of the remaining specimens, one, G 17/346, was found in the first *'ili'ili* layer in square D2; another, A 17/186, in square -C5 on the slope behind the main terrace; another, A 17/185, on the ground surface of the lower flat in square F23; and the last, A 17/182, in the *'ili'ili* beside the curbing of the most recent house in square C11, house area 2.

A blank, G 17/852, with less flaking and a less convincing shape, was also found (fig. 33e). Its length is 12.5 cm, maximum thickness 3.7 cm, and width at the ends 3.6 and 4.9 cm. The cross-section is an irregularly shaped trapezoid, and flake scars are visible on only three surfaces. It was found in square C5 in the *'ili'ili* layer which spread under the stone curbing of house I and was associated with houses II to IV.

There is no doubt that adze blanks as well as adzes of several types belong to the later half of the house sequence.

Flakes

Eight flakes were found. Four have ground surfaces, indicating their derivation from adzes. Two were found in the *'ili'ili* in square D6, outside the houses of house area 1, one in the *'ili'ili* in C11, outside the older house at house area 2, and one on the surface of the lower flat. None of the remaining four flakes exhibits the fine flaking or grinding indicating derivation from finished adzes in use, so it is likely that they had been flaked from blanks in the process of manufacture. G 17/847, the fan-shaped specimen illustrated in figure 33f, has a fine feather edge, a narrow striking platform, a bulb of percussion and a bulbar scar. There are no signs of retouch or edge damage to indicate that it had been used as an implement, such as a scraper.

Grater

The single grater found has been described in the section on adzes.

Hammer Stones

Three hammer stones were discovered, all round in shape and made from fist-sized stones of fairly fine-grained basalt.

An elongated specimen, G 17/381, found in a posthole of house II in square C2, is 17.1 cm long, 7.5 cm wide, and 4.9 to 6.2 cm thick (fig. 34a). Areas pitted by use are visible on the apex

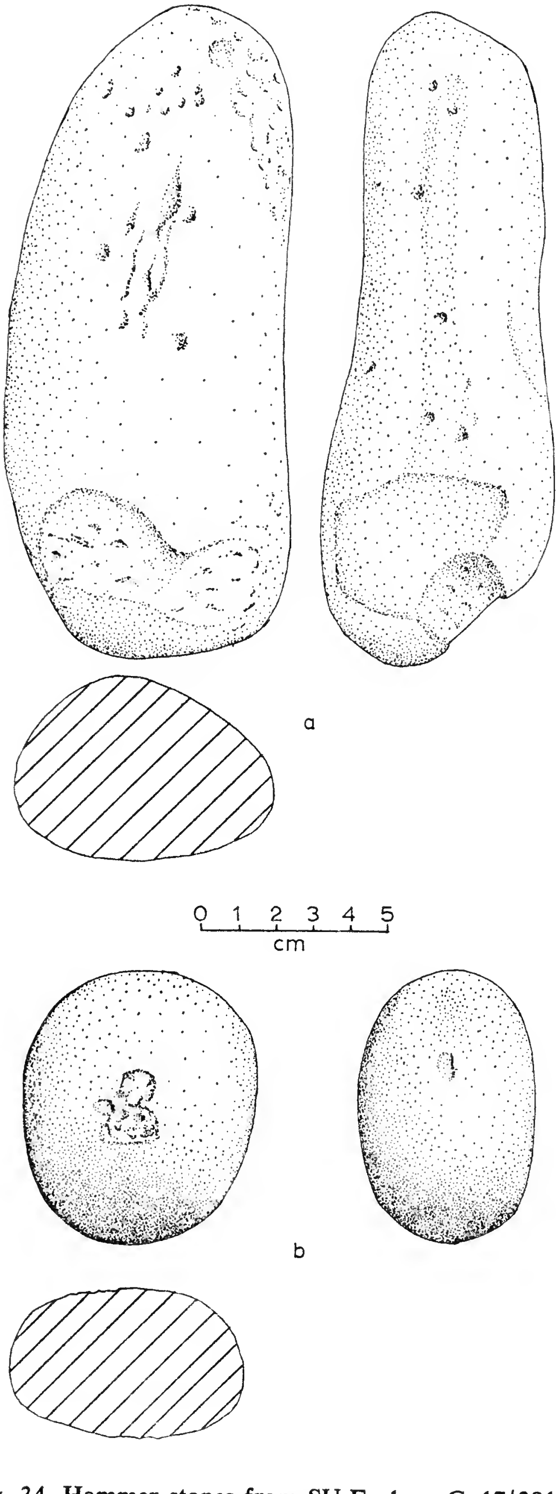

Fig. 34. Hammer stones from SU-Fo-1. a. G. 17/381. b. G 17/793.

of the narrow end and on the flatter central body surfaces. It had evidently been mixed in with other stones or *'ili'ili*, for the part damaged by use had also been abraded. Judging from the fact that it was found in a posthole with another round pebble, broken in half, it had probably been placed in the hole to support the post.

The other two specimens are rounder in shape with flatter central surfaces. Readily visible pitting from use is present on the end of one specimen and both ends of the other. Lesser areas of pitting are present on other surfaces of both specimens. One, G 17/793, was found in the mound of grave 6, and the other, G 17/342, on the surface of the *'ili'ili* layer belonging to house I. The former is a round pebble, 7.7 cm long, 6.4 cm wide and 5.2 cm thick (fig. 34b).

Grinding Stones

Three fragments of grinding stones were uncovered. All the specimens are made from olivine basalt; one is more fine-grained than the others. All of them have been used only on one surface. One of the grinding stones, G 17/848, was found in square C1 and the remaining two specimens, G 17/540, G 17/732, in square D6. All three were found in the first *'ili'ili* layer forming the surface outside the curbstones outlining houses I to IV.

Ceramic Penguin

As was mentioned previously, fragments of a glazed ceramic penguin were uncovered from two recent pits and glued together. On the bottom the letters JA—— can be seen, signifying that it was made in Japan. It is 9.4 cm high, 5.1 cm wide and 2.7 cm thick. Similar objects are available in Apia shops at present.

OTHER PORTABLE REMAINS

Ochre

Altogether, 20 specimens of red ochre thought perhaps to have been used in dyeing tapa and other materials were found in the various *'ili'ili* and fill layers. It is not certain that these specimens had all been brought to the site intentionally, nor is there sure evidence that they had been used as ochre. It does seem clear, however, that their occurrence is not to be explained solely by natural circumstances.

Shell

A *Cassis* shell, 16 cm long, was found in square I27, about 10 to 20 cm below the surface of the lower flat. The use of *Cassis cornuta* shells as trumpets with an artificial perforation about 1 cm in diameter in the apex is reported ethnographically (Buck 1930: 579 and Plate L-A). A break nearly 3 cm in diameter in the apex of the specimen recovered makes it impossible to tell whether it has been used as a trumpet.

RADIOCARBON DATES

Three specimens from among the charcoal samples obtained from the site were dated by measurement of their radiocarbon activity. The results were as follows:

GaK-1436 210 ± 70 B.P.
Oven 2 on the slope behind house area 1, square B5

GaK-1434 470 ± 180 B.P.
Post no. 87 belonging to house II square D5

GaK-1435 1410 ± 110 B.P.
Charcoal in brown soil layer with many angular pebbles, square D11

The radiocarbon determination for the post-hole belonging to house II indicates that it is almost certainly prehistoric and probably dates to the seventeenth century A.D. or before. This is consistent with the fact that no early European trade materials, such as were found at the nearby village of Sasoa'a (Report 21, p. 33) were encountered on this site. House I, the only house more recent than house II in the sequence, would on this basis be of eighteenth century date, as would the most recent house in area 2. This interpretation is further supported by the determination for the oven on the slope behind house area 1. This again suggests that the most recent occupation belongs to the eighteenth century and, since European trade items are lacking, is certainly no later than A.D. 1820 to 1830. The age estimated from the charcoal in the layer underlying the terrace fill and overlying the basal clay layer suggests that activities associated with clearing the slopes of bush, and so disturbing the soil, took place in this locality between the mid-fifth and mid-seventh centuries A.D. What is not certain, however, is how this charcoal came to be incorporated in this lens which was followed almost immediately by the construction of the terrace. As an indication of first human activity in this locality, the time span is quite acceptable, and consistent with other early dates for such activity well inland. But a time span of over 900 years for occupation on the terrace seems too long, even for an uninterrupted sequence of at least nine houses. It is, however, reasonable to say that the date of the formation of the terrace is limited by the date of the underlying material.

CONCLUSION

Extensive excavations carried out on an earthen terrace with two stone pavements containing remains of several houses revealed a sequence in which at least nine successive houses had been built in house area 1 and at least five in house area 2. The smaller figure for successive houses in area 2 results from the more limited area excavated, and should be interpreted as reflecting the same situation as was encountered in house area 1. No major breaks were noted in either house sequence and the position of the various houses remained relatively constant, only a slight shift toward the more central portion of house area 1 being in evidence. No change in the size or shape of houses is evident, although a lack of stone curbing for the earlier houses in the sequence should be noted. Nor is there any evidence of change among the portable artifacts, the whole assemblage being a typical one for the later prehistoric periods in Samoa. On this basis the series of occupations, without major breaks, each associated with residence in a permanent dwelling, is indicative of a high degree of continuity in function and time throughout the sequence. Over what span of time the entire sequence stretches, however, is more difficult to judge. If, for instance, a house lasted for up to 20 years and one was reconstructed in every generation, a time span of from 200 to 300 years would be implied. On the other hand, a longer time span would require greater intervals between each house, and there is little evidence for this.

Insufficient evidence was obtained to determine the precise relationship between the house sequences in areas 1 and 2. Although it can be demonstrated that the pavement of house area 2 was constructed before that of house area 1, this does not mean that the houses in area 1 were occupied only after those in area 2 had been abandoned. It is far more likely, in fact, that both areas were in use at the same time, given their dual positions on the one terrace, and that the two sequences in some way coincide, so that at any one time two dwellings of similar shape and size were usually present on the terrace.

The sixteenth to eighteenth century radiocarbon dates for house II and oven 2 and the lack of early European trade goods firmly place the end of the sequence immediately before the period of regular access to such items in the 1820s and '30s. On the evidence detailed above, it would be reasonable to infer that the site had been regularly occupied over the course of the last several hundred years, but probably not before the fourteenth century A.D. This makes it difficult to accept the mid-fifth to mid-seventh century date for cultural activity on the slope as also dating the construction of the terrace, although this date may well represent the first disturbance of the area by man. The date, therefore, should not be indiscriminately accepted as marking the beginning of the house sequence.

The earthen terrace on which the house remains rested, nevertheless, must be of some antiquity, which implies that the dispersed community of which it was a part, must also possess a reasonable time depth. This is consistent with the date for the oven at Fo-2 (Report 28, p. 106) and the historical traditions about Folasa-a-lalo as an important prehistoric centre (Report 20, p. 5). The terrace itself was formed by the usual practice of cutting into the slope and using the fill to form the front of the terrace.

While there is continuity between the house forms at this site and those of the early historic site of Sasoa'a (Report 21, p. 35), both sites provide evidence of a change in the position and type of grave in historic times. Five graves, some of them overlapping, were encountered within the confines of the houses later than house IV and earlier than house I. They were of shallow rounded rectangular pit form, and though it was difficult to tell from the scant skeletal remains, the burials appear to have been extended inhumations. A more recent grave out on the pavement had a deeper straight-sided pit and was marked by a surface mound. A similar type of change has been better documented by McKinlay (1969: 11; Report 21, p. 31) for the graves in the sites at Sasoa'a.

One difference between the houses at this site and those of Sasoa'a is the frequency with which fireplaces outlined by curbstones are encountered. Thus, only one such fireplace, in association with house I in area 1, was discovered at Fo-1. In contrast a large number of such fireplaces, especially for the most recent houses, was found at Sasoa'a. The function of these fireplaces seems to have been chiefly to provide light; cooking was conducted in an adjacent area. The discovery of the ovens and postholes on the slope behind the terrace is important in verifying this point, for excavations at other house sites have often been too limited to discover them. One should note, however, the rather similar position of the large ovens excavated by Davidson (Report 28) at Fo-2 and Vam-3 in relationship to the adjacent house terraces.

Excavation of two trenches at right angles on the lower flat revealed a ditch along all but the upslope side of th's area. However, no signs of domestic activity or house remains were encountered, and the best interpretation of the area would seem to be as a field for crops such as taro, the ditches acting as drains for excess water.

As is usual in Samoa, adzes comprised the majority of the portable artifacts obtained during the course of the investigations. Sixteen specimens capable of classification were placed in four main types: ten as Type II, three as Type I, two as Type VI, and one as Type VIII. The last of these adzes had been refashioned for use as a grater, while I have chosen to identify one of the Type VI specimens as a chisel. There were also two weathered fragments which may belong to Types Ic or Va. The remainder of the assemblage consists of adze blanks, flakes from adzes, several hammer stones, and grinding stones. From their context most of the artifacts are to be associated with the later end of the house sequence. The higher than usual frequency of specimens of Type II seems to be the only remarkable feature in an otherwise typical late assemblage.

In view of the purpose for which these excavations were conducted, the results have been reasonably satisfactory. First they have made it possible to define archaeologically a series of fairly continuous prehistoric domestic occupations at one site in the traditionally important named settlement of Folasa-a-lalo, at a distance more than 2 miles (3.2 km) inland from the coast. They have also established a sequence of prehistoric dwellings which exhibits remarkable continuity in its house form and which can be associated with a typical late assemblage of prehistoric portable artifacts. Moreover, this continuity is carried on by some of the dwellings in the early historic village of Sasoa'a which can be associated instead with typical early European trade goods. The excavations at Fo-1 have also demonstrated the reliability of extending ethnohistoric references to burials within house sites back into the prehistoric period.

On the basis of these excavations, then, it would be difficult to deny the existence in Samoa of dispersed prehistoric settlements with a pattern of permanent residence and burials within the house area for localities that are well inland. Moreover, it is possible to see a general continuity between this type of settlement and more nucleated but small early historic villages such as that at nearby Sasoa'a.

MAPPING AND TEST EXCAVATION OF MOUNDS AT PUNA

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At the conclusion of the first major season of field work in Western Samoa in 1964, Green proposed several major projects for further examination (I, Introduction, p. 6). One was the investigation of a group of earth mounds in an area other than Vailele where several earth mounds had already been excavated (I, Reports 6-11). The purpose of such a project was to add information to the Vailele data about the age, method of construction, and functions of earth mounds, which had proved to have a somewhat restricted distribution in Western Samoa, occurring mainly on the north coast of Upolu.

Davidson's survey of the upper part of the Falefa valley in 1965-66 revealed only one cluster of earth mounds, along the road to Lalomauga on the northern boundary of her survey area (Report 20, fig. 1). Investigation of one or more of them was desirable as part of the study of the prehistoric settlement pattern in the valley; at the same time it offered an opportunity to fulfil the more general aim of conducting a systematic examination of another group of earth mounds.

The mounds are strung out across the central part of the valley at a point about 2 miles (3.2 km) inland from the coastal village of Falefa and roughly parallel with the Lalomauga road. This part of the valley is flat, fairly low lying, and subject to flash floods. One of the two main arms of the valley's river system is close by on the south side of the road. At least nine mounds occur in the area, but the present study concentrated on a small complex of three near Lalomauga, only one of which (Lam-1) was excavated (fig. 35). The mounds are small to medium-sized, large enough for a single house and pavement. The two larger (Lam-2 and Lam-1) are connected by "causeways", while one side of the base of Lam-3 almost touches that of Lam-1. On the other three sides Lam-3 is surrounded by flat land, which is occasionally inundated from the river. Before the building of the modern road, which acts to some extent as a dyke, water would also have lapped about the base of Lam-2. Both Lam-3 and Lam-2 are partly eroded as a result. Other surface features worthy of note were a shallow depression or ditch around part of Lam-1, and an elongated depression north of the mounds.

These mounds are part of an area of settlement whose name is hazily recalled as Puna. A small plantation house was built on Lam-1 in 1959 and removed in 1965. Actual settlement previous to this is not remembered. The grandfather of the present holder of the Le Fao title (one of the principal titles in Lalomauga village which also confers control of this land) is said to have planted the existing coconut trees in this vicinity when the mounds were no longer in use, so the earlier house remains on the surface of Lam-1 would appear to antedate the late nineteenth century.

THE INVESTIGATIONS

Investigations were conducted over a period of six weeks from 9 January until 23 February, 1967. I supervised the excavations up to the last week and a half. In my absence at the end, the completion of a section excavated through the ditch was carried out by Donn Bayard, then of the University of Hawaii, and R. C. Green, to both of whom I am indebted for their notes.

Initially only one mound, Lam-1, was cleared and mapped, after which excavation on it began. The other two mounds, Lam-2 and Lam-3, the interconnecting causeways, and the low depression to the north were gradually cleared by about an hour's work each morning. When the clearing was complete, the whole complex was mapped with a plane table and telescopic alidade, and cross-sections were taken of the three mounds and associated features (fig. 35).

Although excavations were limited to the one mound, the three were considered to be closely related, and were treated for some purposes as one unit. The fact that Lam-1 and Lam-2 were connected by two causeways is ample evidence of their contemporaneity, at least during a late stage in their occupation. As Lam-3 had been built closely adjacent to Lam-1, it is reasonable to expect that it was also contemporary with the others.

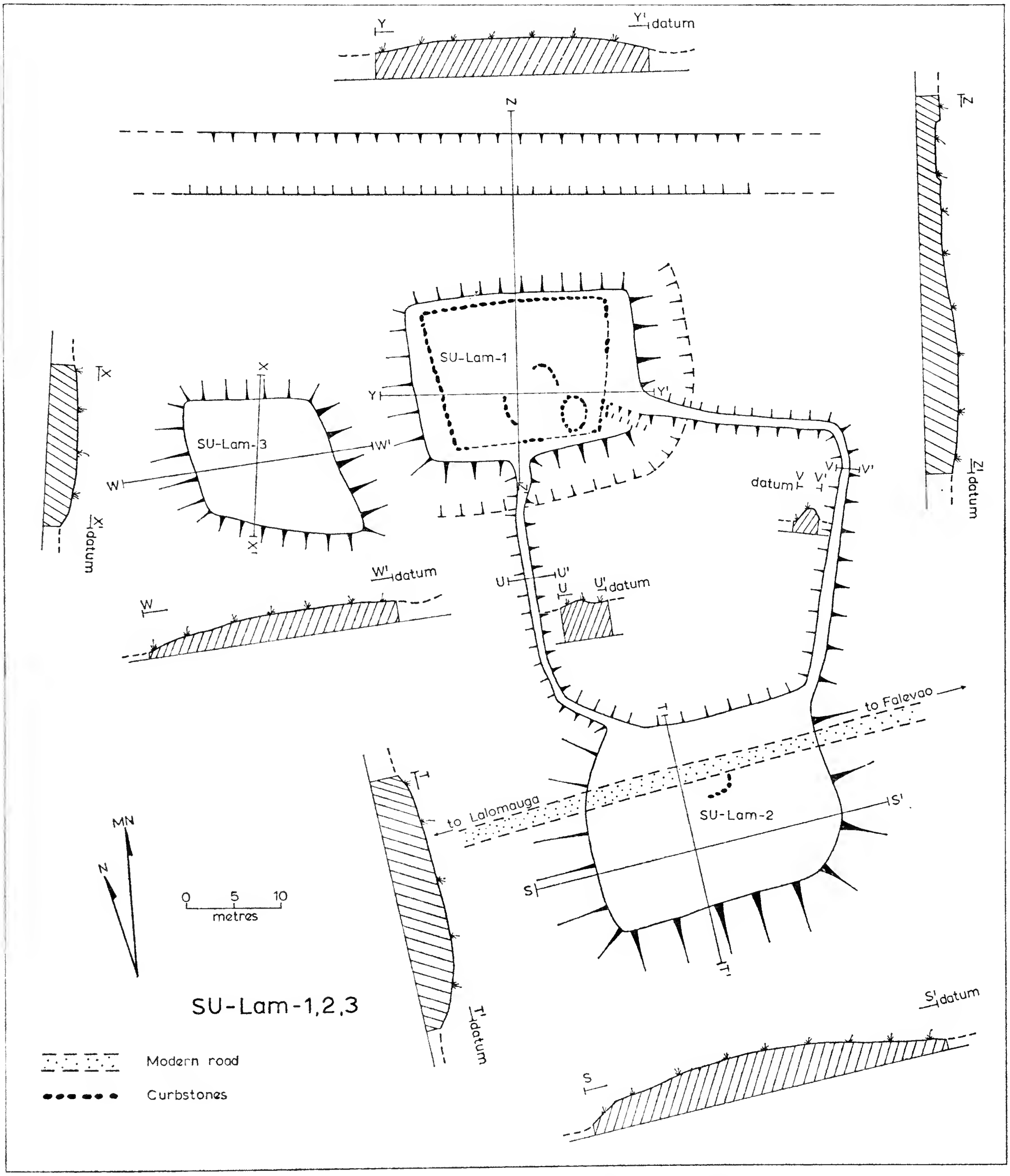

Fig. 35. Plan of sites SU-Lam-1, SU-Lam-2 and SU-Lam-3 at Puna, near Lalomauga.

The first task was to clean thoroughly the whole surface of Lam-1, exposing surface remains of houses and a pavement. Partial remains of several houses were thus made obvious, the most noticeable being a small outline on the southeast corner, easily identifiable by the stones which defined its perimeter (fig. 36). This outline was said to be that of a structure which had been built as recently as 1959. It had been abandoned and the materials removed in 1965. Associated with it were the only European artifacts found on the site. Apart from identifying the postholes of the house by placing sticks in the still unfilled holes and photographing them (plate 8), this area was not further investigated.

When Samoan houses are demolished the procedure often seems to be one of removing the roof and posts, and leaving the outlining curbstones in place. On the surface of this mound portions of such curbstone outlines could be seen. After intensive scraping and brushing of the pebble spread in their vicinity, the remains of two and possibly three almost wholly overlapping house outlines were quite plain (fig. 36). They can be associated with the evidence for a multitude of postholes which had penetrated into the mound fill and were revealed by excavation. They, too, indicated that there had been many houses on this mound, of which the present surface remains represented only a fraction. Thus during each successive occupation of the mound a spread of river pebbles was laid which eliminated most signs of the previous dwellings, particularly as all but the modern houses were built in a rather similar position at the centre of the mound. Judging from the size and positioning of the curbstone outlines and the posthole evidence on the mound, it can be inferred that only one house had existed on it at any given time.

After cleaning, the extent of the pavement, especially at the edges, was also quite plain. The north edge appeared to have been refaced at one stage to prevent sliding and erosion. Excavation revealed that on the south side of the mound a similar edge in a different position and of earlier date had been quite badly damaged. In grid square G-7, the rock outline of a fireplace was

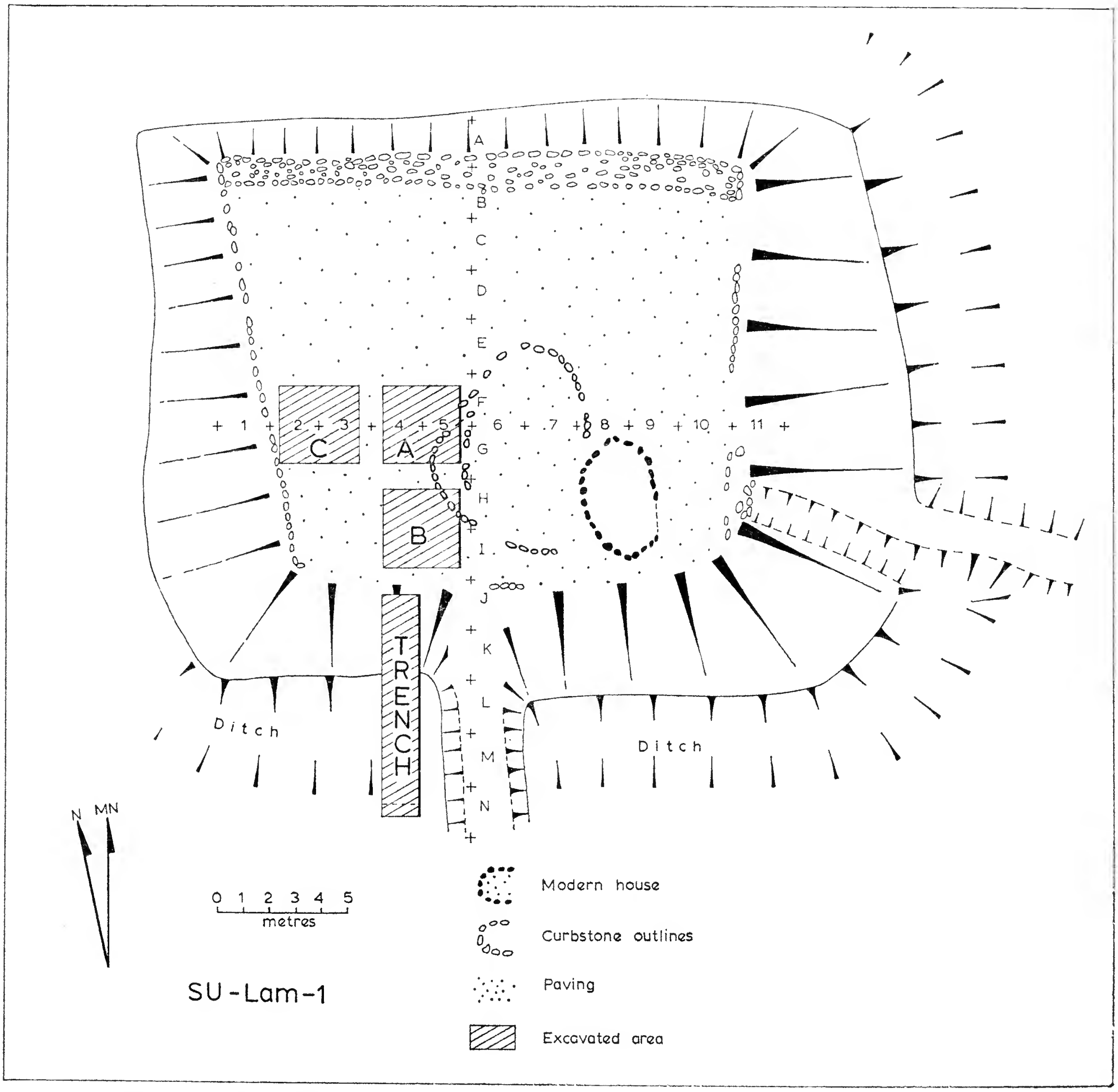

Fig. 36. Detailed plan of SU-Lam-1, showing extent of excavation.

uncovered, the only one encountered on this mound.

Method of Excavation

A grid of 2 m squares which covered an area of 484 m^2 was laid out on the mound (fig. 36). The base-line designated AK ran magnetic north-south while that numbered from 1 to 11 ran east-west. Excavation took place on the western part of the mound. It was decided that excavation would be facilitated by using larger squares than those in the grid as working units, because each would eventually be dug to a considerable depth. Therefore, three large squares each comprising four of the 2 m grid squares were marked out for excavation. In order to leave a 1 m baulk between each of the excavated squares a reduction of 50 cm on each side of the large squares was made. There resulted a working area of 27 m^2. The first large square near the centre of the mound and made up of grid squares F, G, 4, 5, was labelled square A. Square C lay to the west of A and comprised grid squares F, G, 2, 3, while square B lay to the south and comprised grid squares H, I, 4, 5 (fig. 36).

About two weeks after the commencement of the excavation a trench was extended from square B to the low ground on the south side of the mound to investigate the nature of mound construction in relationship to the surrounding area. It was 1.5 m wide and 8 m long. A proposed investigation of the raised pathway which ran parallel to the trench did not take place because of lack of time.

During the first two weeks four men were employed. This was increased to five for most of the excavation and to six in the closing stages. All of layer I, the principal occupation layer, was excavated by hand trowel. When all of the post-holes belonging to this layer had been defined and recorded, shovels were brought into use for layer II, which constituted the fill of the mound. Shovels were not used exclusively, however, as a good deal of care was still required. Although this was not an occupation layer, the bulk of the artifactual material found came from it in the form of occasional potsherds spread throughout the 35 m^3 of fill which were removed. Natural, designated as layer III, was generally excavated to a depth of about 30 cm. Two test pits in selected areas of squares A and B were driven to a depth of well over 1 m in search of a possible occupation layer underlying the mound.

The northern end of the trench on the south edge of Lam-1 could be excavated with reasonable care using a shovel, with a trowel being employed on suspected features and in test areas. Similar methods were employed on the south end of the trench and in the ditch features as these were discovered.

In the squares, layer I, composed of the gravel spreads *('ili'ili)*, was removed in two levels. The first was between 15 and 20 cm in depth; the second took the layer down to the extremely uneven surface of layer II. Layer II was excavated in each of the three squares in a series of four levels, each approximately 30 cm deep.

Stratigraphy

The stratigraphy of this site is best described in terms of a mound sequence on the one hand and a trench sequence on the other. For the mound the description is based on the section in the east walls of squares A and B, and for the trench also on its east wall (fig. 37). The layers have been numbered from the surface down.

The layers distinguished in the mound sequence are as follows (fig. 37).

Layer I: (7.5YR 2/3) an occupation layer at the surface of the mound, consisting of a very concentrated deposit of small waterworn river pebbles *('ili'ili)* in a matrix of very black soil. The pebbles of this paving varied in size and formed no set pattern. A number of large rocks included in the layer were recorded but fell into no set pattern except at the surface, where the remains of at least two structures partially outlined in curbstones were evident (fig. 38). Associated with the gravel materials were a small number of stone flakes, adze fragments, and a grinding stone, described below. Within the layers, some small segments of areas where fires had occurred could be identified by patches of ash and charcoal. Several samples of charcoal were collected to be submitted for dating.

Layer II: (10YR 3/3) a brown compact clay with no rocks or river gravel. It constituted the fill with which the mound was built. At lower levels within this fill concentrations of decomposed volcanic materials were widespread. Near the base and the contact with the underlying layer of the original ground surface, were a number of pockets and two distinct lenses of charcoal. The lower part of the layer was compact and numerous soft patches were encountered toward the base.

Layer III: (7.5YR 4/4) the hard compacted yellow-brown clay which constituted the original ground surface. This layer was penetrated by test pits to about 1.4 m (i.e., a depth of over 3 m from the surface of the mound) at which point patches of decomposed Fagaloa Volcanics began to appear.

Another series of lenses was identified in the trench, where they constituted the sequence of deposits filling two features on this side of the mound. The lenses may be assigned to two layers

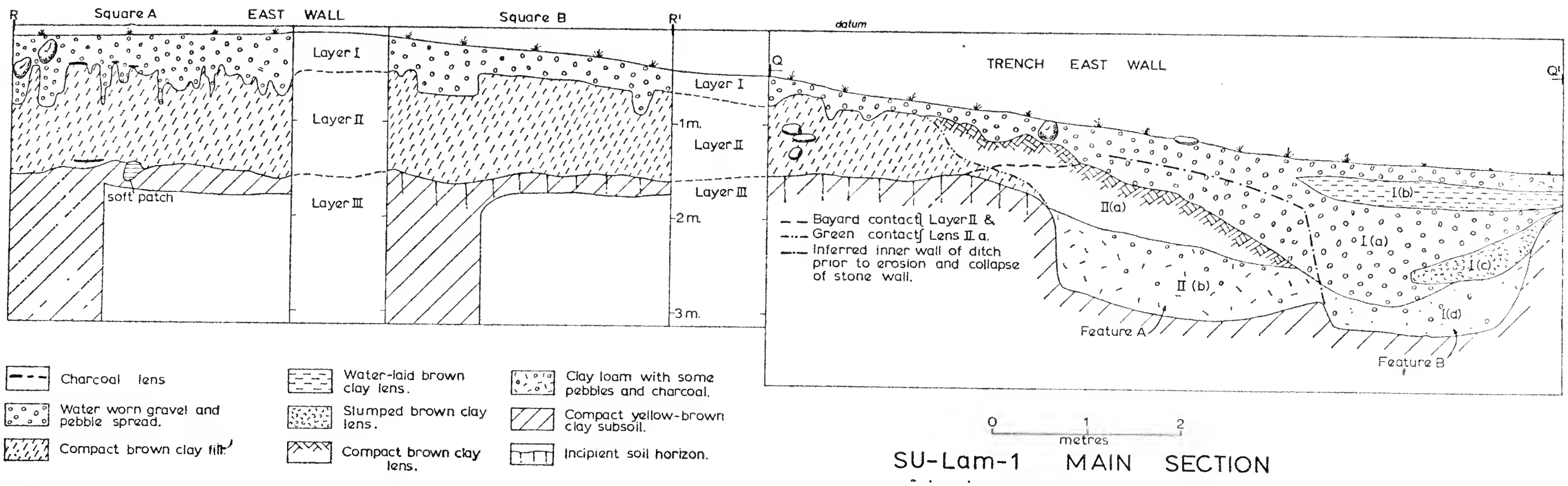

Fig. 37. Principal cross-section, SU-Lam-1.

constituting the separate periods of infilling of the features. After description, an attempt will be made to correlate these lenses with the layers of the mound. The principal lenses encountered in the trench were as follows (fig. 37).

Layer I: consists of four lenses infilling a feature thought to be a ditch.

Lens I(a): the same physical composition as layer I in the mound sequence, i.e., a blackish matrix with a high concentration of waterworn river pebbles. Many rocks were encountered along the interface of this layer with the termination of layers I and II of the mound series. Some of the boulders formed alignments along the ditch more or less parallel with the possible edge of the mound at its latest stage (fig. 38). Lens I(a) yielded some stone artifacts, principally flakes.

Lens I(b): brown clay lens containing few pebbles and no stone artifacts. Its position over the later ditch suggests that its presence was due to sedimentation during a period of heavy rains or flooding, when all that remained of the ditch was a shallow dip.

Lens I(c): another brown clay lens similar to (b), but in a position which suggests that it resulted from a small slip along the edge of the later ditch at a time when that ditch was already beginning to fill with debris. It contained no cultural material.

Lens I(d): a clay loam less compact than (b) or (c) above or the sterile subsoil below. Throughout it were encountered flecks and pieces of charcoal, a few potsherds and occasional river-worn pebbles and larger rocks.

Layer II: includes two lenses which derive from an earlier series of events before the infilling of the ditch.

Lens II(a): a compact brown clay matching layer II of the mound sequence in form and composition, except that it lacked artifacts. This composition and the position on the inner side of and at a higher level than deposits in the ditch, are probably best explained by viewing the lens as the upthrown deposit from the digging of the ditch.

Lens II(b): a less compacted clay loam containing some river-worn pebbles, pieces of charcoal, and some pottery fragments. Its position and composition indicate a fill which probably accumulated naturally in this earlier feature.

For purposes of reference the inner of the two features, which can be demonstrated to be the earlier, will be labelled A and that to the south, and later, will be designated as B.

Interpretation of the Stratigraphy

Among the various layers, only layer I of the mound sequence clearly derives from occupation. The others are either constructional fills, or deposits which are the result of features being infilled by natural or artificial means. Given the presence of an earlier and a later feature on one side of the mound and the incorporation of potsherds in the fill of both features as well as in the fill forming the mound, an earlier and a later period of prehistoric occupation in the vicinity are strongly suggested. The later occupation is clearly that associated wtih the construction of the mound, and layer I is the principal living surface belonging to this period. A late date in the Samoan sequence is consistent with a relatively recent radiocarbon date for a sample from this layer and the lack of any pottery or adzes of an early type in association with it (see below, p. 64). The correlation of the later occupation with feature B, the ditch, is demonstrable from the stratigraphic evidence. The only question which arises is whether feature A belongs to an earlier occupation, or is to be placed with the later one and used as evidence of an earlier stage within it. The issue is best reviewed by first considering the interpretation of the mound sequence, and then relating it to several possible interpretations of the trench sequence.

Layer I: No stratigraphic pause or interface within layer I could be identified. The loose composition of the river gravel spreads which provided the pavements for successive houses permitted them to amalgamate into a single entity that effectively obscured separate surfaces. The continual disturbance of the layer in the course of digging postholes for each new house further enhanced this process. Again, because of the composition of layer I, dozens of the postholes dug through part or all of this layer and penetrating into that below could not be defined in layer I, but only where they entered the solid underlying clay fill of layer II. Finally there were no thin bands of clay or other fill between any of the gravel spreads, in contrast to other sites such as those at Vailele (I, Reports 7, 10, 11) or Luatuanu'u (I, Report 14). All this evidence suggests a process of rather continuous occupation over a period of relatively short duration.

In the absence of a substantial quantity of artifactual material from layer I, the number of postholes concentrated within the area of excavation is the best indication of prolonged occupation on the surface of the mound. This is in keeping with other evidence noted below. All features identified as postholes appeared in layer II as parallel-sided features which possessed a definite bottom. The surface from which they were cut, as had been noted, was impossible to determine. Only a few holes with sloping sides were encountered, and they were also interpreted as postholes where they had a definite bottom at the same general level as the other postholes. Many postholes contained rocks which had once helped to brace the wooden posts. For the most part, root and animal holes could be easily distinguished which is near the centre of the mound. There centration of postholes occurred in square A, from the above features. Sizes of postholes varied greatly, but because of their great number, their tendency to overlap, and the difficulty of determining from what point in layer I they had been cut, hopes of inferring house plans from them were frustrated. Only one possible grouping was identified in square C where three postholes of similar dimensions were encountered at appropriate intervals.

As might have been expected, a greater conwere more than 50 readily definable postholes in square A as well as a number of suspected ones which had been obscured by the creation of later ones (fig. 38). Squares B and C had slightly fewer postholes, while on the evidence of the north end of the trench and the west edge of square C, the number then fell off rapidly toward the edge of the mound (fig. 38).

Information on the thickness of layer I supports the evidence of the postholes. In the middle of the mound, where most of the structures were built, the pebble gravel spread or *'ili'ili* of layer I was thicker, with an average depth of 35 cm. At the south end of square B, however, the layer was no deeper than 20 cm and became thinner in the north end of the trench (fig. 37). This contributed greatly to the now rounded aspect of the mound surface. When the mound was first built and the surrounding ditch (about 2 m deep) was intact, the profile would have been of a fairly rectangular structure with a much flatter upper surface.

Again, the distribution in the three squares of the larger rocks, many of which were possible remnants of curbstones from former houses, was consistent with the distribution of the postholes and the thickness of layer I. Thus the greatest concentration of such rocks was encountered in square A. It was also toward the centre of the mound that all the surface alignments occurred, except for the modern house. Its slightly off-centre position was, of course, partially dictated by the coconut tree now growing in the middle of the mound (fig. 38). Although possible curbstones within layer I of the three squares were plotted, they did not form any obvious alignments.

Only one fireplace was defined, although a number of areas with lenses of burned material were encountered within layer I. This fireplace, in grid square G-7 (fig. 38) was revealed by the thorough scraping of the mound surface, and is probably to be related to the house outline to the north of it.

Because of the small assemblage of portable artifacts in layer I, the main information obtained from the excavations concerns the use of the mound to support a series of house structures, and some details on the methods used in constructing a mound in this part of Samoa. The few portable items recovered from the excavation of layer I, consisting of a number of small stone flakes and adze fragments, some broken adzes and a piece of a grinding stone, are typical, however, of those recovered from similar living surfaces on other sites in Samoa. Such assemblages have all been relatively small and their range limited. The bulk of these items either came from square A or lay on the surface toward the centre of the mound.

Although a number of very recent European objects were found on the surface in and around the modern house outline, only one European object was found in layer I. It was an iron bolt in an upright position in square A with the top some 20 cm below the surface. It appeared to have been pushed into the ground as it was in good condition and had not suffered the usual rusting even of pieces not more than seven or eight years old. It will not be included, therefore, in the description of the artifact assemblage. No pottery was recovered in any context which would allow it to be associated with the occupation of the mound's surface.

Several charcoal samples were taken from the postholes and lenses that occurred in association with layer I. One from a pit or large posthole in square B (grid square H-5) at a depth between 25 and 75 cm below the mound's surface yielded a radiocarbon estimate of 350 $\pm$ 100 years before 1950 (Gak-1437). This result is supported by a date of similar age from charcoal at the base of layer II (see below, p. 66).

Layer II: The mound appears to have been constructed in a single operation using as fill the brownish clay derived from layer III. As a result, the core of the mound was less compact, especially near the base, presumably because it had not been as directly affected by the occupation on the surface. Some decomposed volcanic material was also present in this fill over quite a wide area, but it occurred at only one level, 110 to 115 cm below the surface, and was particularly evident as a reddish brown discolouration at that depth in squares B and C. The largest patch, in the southwest corner of square B, continued into the wall outside the square. The area exposed in the square measured 1 m by 95 cm.

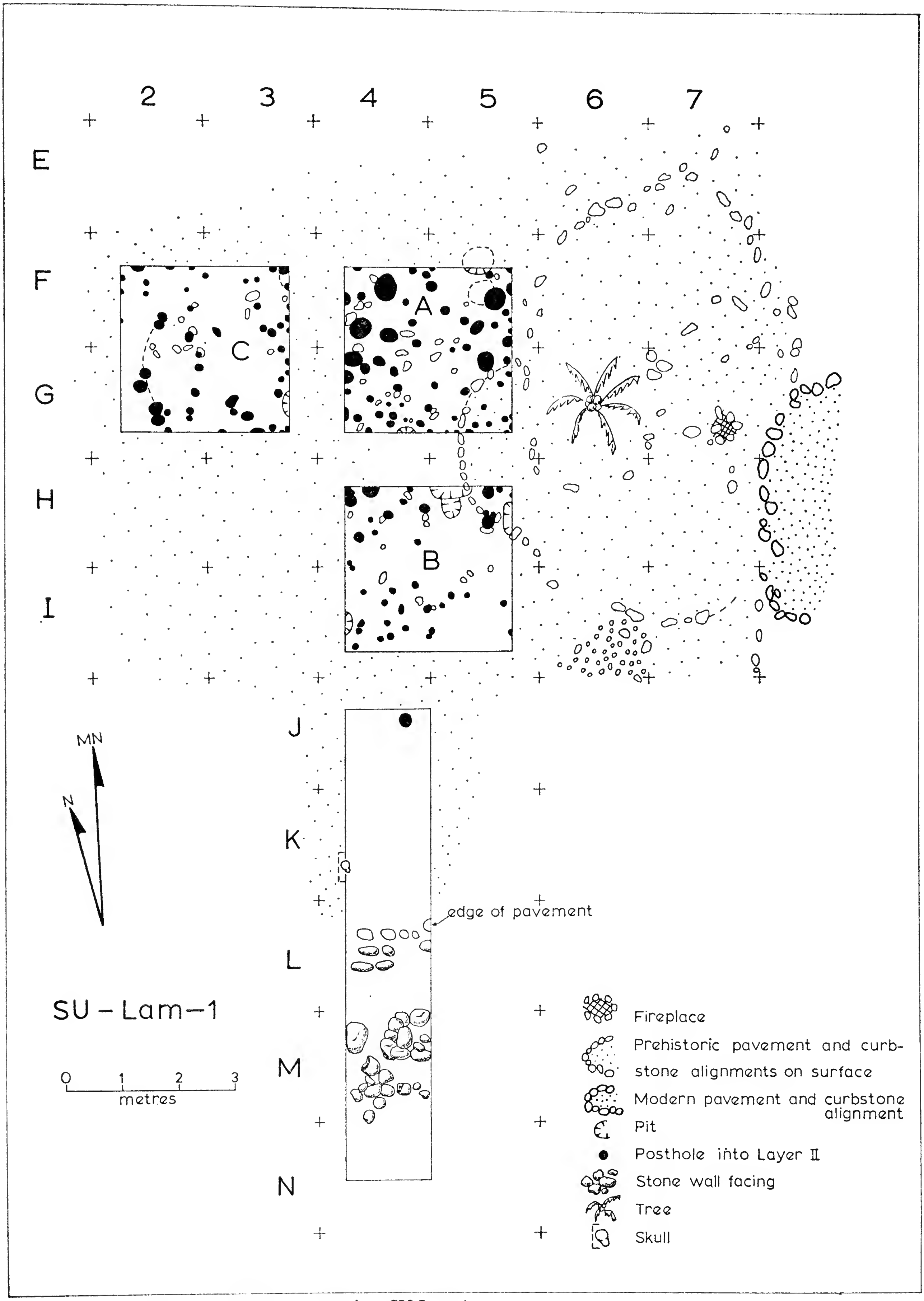

Fig. 38. Plan of features revealed by excavation, SU-Lam-1.

Charcoal lenses on the former ground surface were suspected of being the remains of a previous occupation. They could equally plausibly be interpreted as the result of burning off the area before beginning the construction of the mound, particularly as they seemed not to be associated with any well-defined feature. Finally, some features could be the result of one event and some of the other. A charcoal sample was taken from one such lens in square C (grid square G-3) from 118 to 120 cm below the surface, and this yielded a radiocarbon result of 1050 $\pm$ 80 years before 1950 (GaK-1438). Another charcoal sample was taken from a lens in square A (grid square F-5) at 135 cm below the surface. It yielded a radiocarbon result at one standard deviation of less than 352 years. The first sample, which implies a date between the ninth and eleventh centuries A.D., could well derive from an earlier event in the vicinity, while the second result, which probably implies an event after the fifteenth century, could quite easily belong to the burning off of the area just before the construction of the mound. As such it fits in well with the date obtained for occupation of the surface of the mound. In all cases the date of the initial occupation of the mound would almost certainly appear to fall after the twelfth or thirteenth century A.D., while in the light of our general knowledge of the Samoan sequence it appears unlikely that either of the two samples from the layer II-III interface can be used to date the much earlier occupation associated with the pottery.

Some of the speculation about the source of the spoil which constituted the fill of the mound was relieved when the depth of the surrounding ditch was discovered, for on surface evidence it appeared to be very shallow. However, a simple calculation will demonstrate that even with generous allowances, a ditch of the size actually encountered could not supply the total volume of fill needed in construction of the mound. For example, on the available evidence it is possible to infer that the ditch measured approximately 3 m in width and in depth did not greatly exceed 1 m. Assuming that it encircled the whole mound (not considering the two causeways or the lack of surface evidence for the existence of a ditch on the west side) it could have yielded approximately 320 m^3 of spoil for the mound. Yet if the average depth of the fill of the mound is taken at 1 m, it will be clear that at least 700 m^3 of spoil would be required. Therefore, additional spoil was obtained from some other source.

One such source may have been the elongated depression to the north of the mound. This feature was said by the workmen to be part of the "roadway" between the prehistoric sites of Folasa-a-lalo and Folasa-a-luga, claimed in local traditions to have been the dwelling places of one of the Tui Atua. This interpretation of the feature may be doubted, for although it is oriented in a reasonable direction, it peters out at either end of this cluser of mounds. In my view it is equally reasonable to explain it as one of the likely sources of the spoil for the mound. The depression now has an average depth of 45 cm and was originally probably much deeper. It is nearly 10 m wide, and has an effective length of about 60 m. This could supply at a minimum some 270 m^3 of fill and probably a great deal more. Another low area at the northeast corner of the mound might have supplied additional fill. In sum, it is likely that the fill for the mound was scooped up from the immediate surroundings and there are in evidence several likely areas which could have been the source not only for this mound, but for the other two as well.

An unexpected feature of layer II was the appearance in low frequencies throughout the deposit of artifacts, in particular pieces of pottery. This initially gave rise to speculation that a pottery-bearing occupation might be trapped under this mound, as had been found at Vailele. However, this proved to be untrue. Rather, the occurrence of pottery provided definite evidence that it had once been in use in the immediate vicinity before the building of the mound. This is useful in assessing the age of the mound, because it would appear that remains from this earlier period lay scattered about, and were scooped up during the building of the mound along with the spoil from the ditches and depressions. Other materials, mainly fragments from adzes, no doubt were similarly incorporated in the mound fill and may also have been the work of those who made the pottery (see below p. 69).

Layer III: A few sherds of pottery were found incorporated in this layer, lending support to the belief expressed above, that their presence in the mound fill is to be explained by their presence in the surface deposits of this layer. Their frequency, however, was not sufficient to justify identification of an "occupation" layer, nor was there any other indication that the surface of this layer had served in that capacity. Rather, a number of irregular soft patches with pockets of hard clay were encountered, most of which, when excavated, gave the impression of being ancient root and animal holes. None could be interpreted as postholes. Soundings at some depth in this layer disclosed patches of decomposed volcanic rock, again suggesting the source of these items in the mound fill, and indicating that this fill had come in part from the excavation of features down to this level.

TRENCH: While layer I in the trench has several lenses, lens I(a) is the only one of the same composition as layer I on the mound. Although this lens now correlates stratigraphically with layer I of the mound sequence, its deposition is natural, and not artificial, as is indicated by its internal stratification, its position in the section and its great thickness. Because the source of this deposit is almost certainly layer I of the mound sequence, it must be of later date than the earliest part of that deposit, though it could have begun to accumulate any time thereafter. The lens is best interpreted, therefore, as a deposit that has accumulated slowly from the erosion into ditch B of the gravel from the pavements on the mound. In particular, the evidence for an edge to the mound constructed of large aligned boulders resting on lens II(a), and the presence of other boulders in positions suggesting that the stone wall which they once formed had fallen into disrepair, indicate that with their collapse the process of erosion would have been fairly continuous until the ditch was well filled. That the process was protracted is shown by lenses I(b) and I(c), both of which represent discontinuities in this gradual process. While the computation of volume of lens I(c) is difficult, the amount is not large and it may be assumed that the most likely source is a slip from the southern edge of ditch B, into this already partially filled feature. A time lag in the final filling is more clearly indicated by lens I(b). At this point it would seem the erosion of the pebble layer from the edge of the mound into the ditch had slowed down considerably as the slope became less and some other event occurred, which introduced fine material from another source, before the slow process resumed. An event which would meet most of the requirements and one known to have occurred in the past, is a flood. This could have introduced the finer clay sediment in the lens which would have been trapped in the low-lying depression as water backed up against the nearby causeway. Less likely is the theory that the clay lens represents locally derived deposits as the result of surface run-off and ponding. Presumably, then, this lens reflects a brief event followed by a return to the former situation, in which the remaining deposits of lens I(a) were laid, a process still going on at present.

No precise measurement is available for the span of time covered by the events represented by layer I (a, b, c) in filling the ditch. It can only be stated that the lenses have all been deposited naturally, and while the process probably began during the time the mound was occupied, it almost certainly continued after its abandonment. The collapse of the stone wall into the ditch, for instance, probably marks a point after the mound had been abandoned. If so, it would indicate that the abandonment had occurred fairly early in the history of the infilling of the ditch, though not at the beginning of the deposition of lens I(a), because large stones from the wall in grid square M-4, unlike those on the edge of the mound, lay as much as 50 cm above the base of the lens.

A satisfactory explanation for lens I(d) is more difficult. This is because this lowest lens contained potsherds, some charcoal fragments, and a few scattered river pebbles, all of which suggest nearby occupation. Habitation on the surface of the mound would explain the last two, but not the pottery. Moreover, because of the low gravel and high clay content, layer I on the mound cannot be the sole source for it. Yet the nature of the deposit and the uneven slope of its surface, imply that lens I(d) is a natural and not an artificial fill. This is reinforced by the fact that artificial infilling would have been to little purpose. A more likely assumption is that natural accumulation in the ditch began almost immediately, the materials being derived from lens II(a) and II(b), and particularly the latter, as this would be the principal source for the pottery. There was also a substantial contribution of material from the area on the outer edge of the ditch, as the surface of the I(d) lens on this side indicates. Finally there would be a few pebbles and bits of charcoal from the activities of the inhabitants of the mound.

The possibility that the ditch was kept open and clean by the occupants until the mound was abandoned seems unlikely. Also if lens I(d) did not begin to accumulate until abandonment of the mound, it should have had a much higher gravel content, for by then layer I had reached its maximum thickness and extent, and could be expected to have made a greater contribution.

Lens II(a) appears to be a clay subsoil derived from the excavation of ditch feature B. The material, which also sealed feature A, was used to form the edge of the present mound. This view is supported by the fact that the volume of materials that would have been removed in digging ditch B equates fairly well with that which now forms lens II(a). Alignments of stones in grid squares K-4 and L-4 resting on the surface of this deposit and running parallel to the edge of the mound provide additional support for this interpretation. Moreover it means that the mound originally had stonework defining both its north and south edges, and not simply the north one as appears on surface evidence.

The problem of the stratigraphic relationship between layer II of the mound sequence and lens II(a) was never resolved with any high degree of satisfaction. The contact is certainly an ephemeral one, and therefore difficult to identify. Two interpretations, one arrived at by Bayard and the other by Green, are indicated in figure 37. Green's is slightly more likely as it was made when the final section was drawn and the problems presented by the section had been more fully explored.

On Bayard's interpretation of the contact between these two layers, ditch feature B was dug before the mound was begun, some of the spoil from it sealing in feature A. Next the mound was formed by bringing in the fill of layer II from the surrounding area. In this interpretation feature A and its fill would both be clearly pre-mound in time and could even plausibly be associated with the earlier pottery occupation. On Green's interpretation feature A can either be contemporary with an early stage of mound occupation or it can be of earlier date than the mound as in Bayard's interpretation.

While feature B is easily correlated with a surface depression running along this side of the mound and therefore can reasonably be interpreted as a ditch, this is not the case with feature A. It may be either an earlier ditch along this side of the mound or simply a large storage or spoil pit, or some other similar feature. Only further excavation would clarify this matter.

If feature A is interpreted as representing the original ditch on this side, lens II(a) may be viewed as an event in the renewal and extension of the edge of the mound by digging a new surrounding ditch. As a ditch, feature A would have remained open during the initial habitation of the mound, and activities there could account for some of the organic debris and the occasional concentrations of pebbles which accumulated in this feature, forming part of lens II(b). However, as with lens I(d), the presence of occasional pieces of pottery in a fill consisting largely of the same clay as in the mound, suggests that the principal source of lens II(b) was layer II of the mound. This conclusion is supported by the evidence in the section drawn by Green, which indicates that the edge of the mound had broken away. Such an event would also explain the need to dig a new ditch, facing it with stone, this being a simple means of renewing the mound's edge on this side.

In fact whether feature A is interpreted as a ditch, spoil pit, or otherwise, its filling with lens II(b) could have occurred naturally under the conditions described above if the edge of the mound was originally in this position. The excavation of ditch B and the formation of the present edge of the mound could then have taken place without seriously interrupting its continued occupation. An alternative, but less likely view, is that feature A stood open and was filled on purpose with some of the same fill that went into making the mound, after which ditch feature B was dug, the material from it (lens II(a)) being used to form the edge of the mound.

It is equally difficult to postulate really satisfactory conditions under which feature A could have been filled with a deposit like lens II(b) before construction of the mound. Also, its function is difficult to visualise because a storage pit, for instance, would not be practicable in this location. If feature A is pre-mound in date, a spoil pit or depression for fill for one of the other mounds seems the most likely explanation. Least likely is a feature associated with a period when pottery was in use in this vicinity.

Artifacts

The artifact collection is limited, and this, regrettably, makes it impossible to provide a reasonable description of the material culture of the pre-European occupants of the mound. In fact, the bulk of the artifacts can be attributed either to those who occupied the small house which stood on the southeast corner of the mound from 1959 until 1965, or to those who frequented the vicinity before the mound's construction.

Pottery was apparently once a part of the cultural assemblage of the inhabitants of the area before the construction of the mound, and was recovered in greater numbers than any other artifact. Most of it was found in the earth fill of the mound (layer II) and the rest among the debris in the basal lenses of features to the south of the mound.

Sixty-three potsherds were recovered, including four rim sherds (table 3).

Although all sherds were small, several separate pots could be detected. Most of the sherds belong to the thick, coarse and heavily tempered variety of Samoan pottery and closely resemble sherds found in layer V at Va-1 (I, Report 7), and layer 4 at Sa-3 (Report 29). Both of these layers have been radiocarbon dated to between the first and third centuries A.D. (Davidson *et al.* 1967: 227 and Report 38). The four rim sherds were of this variety and measured 10, 12, 14 and 18 mm in thickness respectively. Three of the four almost certainly represent three different pots, although all are of similar design, having a flat lip with an incurved orientation when the lip is placed in a horizontal position. The inner edges of all but the thickest sherd are rounded. Of the total number of sherds, some six were demonstrably of a thinner, more finely tempered variety which predominates in the early layer at Sa-3. In thickness the body sherds at Lam-1 measured between 4 and 17 mm, the thick coarse sherds ranging between 6 and 17 mm and the thin ones between 4 and 10 mm. Average thickness of the coarse sherds was 11 mm.

TABLE 3

DISTRIBUTION OF POTSHERDS IN SU-LAM-1

(a) Mound sequence:

	Sq. A	Sq. B	Sq. C	Trench
Layer I	—	—	—	—
Layer II	21	8 (1)*	9 (1)	7 (1)
Layer III	4	—	2	—

(b) Ditch sequence:

Feature A (basal lens II(b)) — 4
Feature B (basal lens I(d)) — 8 (1)

* Figure in parentheses indicates rim sherds.

Table 3, showing the distribution of the potsherds within the site, reveals a marked difference in the numbers of sherds collected from each square. The bulk of the collection was found in square A, and this is also true of the flake industry. It is to be expected that more flakes and adze fragments would be recovered from square A as this was located near the centre of the mound where most of the houses had been built, and about which a certain amount of stone-working appears to have occurred. However, an even distribution of potsherds throughout layer II could be expected as their deposition was due to chance. But the number of sherds recovered from square A on one hand and squares B and C on the other, is quite disparate, and as no sieve was used may reflect more vigilance on the part of the workman in square A. In support of this is the fact that of 11 items collected as sherds, which on inspection turned out to be rocks, 10 came from this square. On the other hand, concentrations of sherds might occur where the mound fill was composed of surface occupation debris rather than spoil derived from one of the surrounding excavations into natural subsoil and it is more likely that such deposits would have been placed toward the centre of the mound. This, for instance, seems to have been the case with the sherds in secondary position in the mound of Va-3 (I, Report 9, p. 157).

Some fragments of stone tools, possibly of the same age as the pottery, were also found in layer II. They consist of the following.

(1) The butt end of a Type III adze (I, Report 2) in which the front, back and both sides are well ground. The fragment was found in grid square J-4 and is 50 mm long, 17 mm thick and 38 mm wide at the point where it was broken, somewhere near the centre of the adze.

(2) Two fragments, each with three well ground surfaces, from the cutting edges of adzes. The cutting edge on one fragment from square C has a narrow facet on the bevel indicating that the adze had been resharpened before breaking. The surfaces of the other fragment from square B are deeply weathered. Two other adze fragments with a single ground surface were found in grid square L-4.

(3) One flake with a deeply weathered surface similar to that exhibited by materials from the basal layers of Va-1 and Va-4.

(4) One small fragment (25 by 20 mm) of a thin flat grinding slab very similar to pieces found in layer 5 of the Sa-3 site (Report 29, p. 149). The same chalky white stone has been used, and the worked surface of the fragment slopes in from an outer edge some 17 mm thick to a base only 6 mm in thickness. It was found in square A where the pottery was concentrated. Three other rocks were saved as possible grinding stones, but close examination reveals no evidence that they have been used, although the type of stone in all cases is that normally employed in grinding stones.

Besides pottery, little was found in the layers filling features A and B. An adze fragment was encountered in the surface mud at the south end of the 8-m-long trench. It is 68 mm long and appears to be the butt end of a Type I adze. It shows some evidence of grinding on the back, as well as the front, but the sides are roughly flaked and bear only slight traces of grinding. The cross-section is a low trapezoid typical of Type I. The other possibly significant item is a very reddened pebble, whose discolouration is due to conversion of the natural iron in the rock as a result of its having been in a very hot fire.

As indicated above, the assemblage from layer I is small and is composed largely of flakes. Eight of these are flakes or very small fragments on which there are one or more well ground surfaces indicating their probable derivation from adzes. Presumably they were broken off during use, as none of the flakes appears to have been retouched or used. In size all the flakes measure between 18 and 48 mm along their longest dimension.

Among the 31 other flakes recovered, 6 were judged to be natural. Fourteen are typical struck flakes in materials identical to those encountered in most adzes. Among the 11 remaining flakes, either the type of material or the fractures of the surface of the flake makes their identification as artifacts somewhat less sure, but still probable. None of these flakes exhibits signs of retouch or use. In size they are very like the flakes with ground surfaces, the size range being between 14 and 54 mm.

The butt end of an adze was found in layer I of square B. It appears to be of Type X, though this is by no means certain. The assignment is based largely on the thick trapezoidal section and the fact that traces of former finely ground surfaces exist on the poll and back, as well as sides and front, despite fairly extensive defacement of the poll.

In addition, several items were found on the surface of the mound which may also be asso-associated with its prehistoric occupation. They include the butt ends of two broken adzes and a large fragment from a grinding stone. One fragment, 70 mm long, is the butt end of a Type IX, or less probably, a Type VI adze. Except for a narrow ground ridge on the front, the surfaces are all flaked. It was found in the *'ili'ili* of layer I in grid square F-6. The other fragment, 78 mm long, is the butt end of a Type I adze which was found on the surface of grid square I-6. A piece of a grinding slab, with one very smooth flat surface, was recovered in the same grid square where it had been used as part of the paving on the mound. It measured 16.9 by 12.1 cm in length and width and was up to 3.7 cm thick.

Only one European object, an iron bolt, was found below the surface and reasons for rejecting its association with any of the successive occupations reflected by layer I have been given above. The other European derived objects were all surface finds. Most were found within the curbing which still remained from the 1959-1965 house, and the others were found close by. Thus it may be reasonable to assume that these items were discarded by the occupants of this house. They comprise:

(1) Several pieces of a broken iron pot, oval in shape, and with a flat, removable base plate. The dimensions of the pot are 27.5 x 23 x 16 cm.

(2) The handle of the above pot. This clearly belonged to the same pot, as it covered a suitable span, and the loops at each end fitted the lugs on the pot.

(3) An iron bar measuring 51 x 5.5 cm x 4 mm.

(4) The blade of a bush knife.

(All the above items were badly corroded.)

(5) One dessert spoon.

(6) The percussion cap of a 12 bore Imperial Chemical Industries bullet.

(7) A large hammer stone, 20 cm long, such as is used for pounding cocoa.

Other Remains

No natural remains of bone or shell were recovered, probably because conditions for their preservation were not favourable. However, a very badly decomposed fragment of a human skull and a tooth were noted in the west wall of the trench (fig. 38) at a depth of 25 cm. They probably occur in a shallow grave although this could not be defined in the section.

Interpretation

In this section the inferences drawn above regarding the prehistoric occupation of Lam-1 are applied by extrapolation to Lam-2 and Lam-3 also. This is seen as reasonable when such factors as proximity, the linking "causeways", and the physical resemblances of the three mounds are taken into account.

Some time after the eleventh century A.D. Samoans built a cluster of three mounds at Puna on which to site some of their houses. At this time the use of earth mounds for dwellings was a characteristic of the Samoan cultural tradition (I, Reports 6-11) and the evidence of this cluster at Puna shows that some of those in the Falefa valley, like Lam-1, had a similar function. However, as earth mounds are rather uncommon in this valley, and their use seems to be contemporary with the more usual low house platform (Report 25, p. 91) and the earthen house terrace (Report 22, p. 56) it appears doubtful that they were ever a major dwelling type here or that their use dates back to the earlier part of the occupation sequence.

The spoil used in construction of these mounds incorporated items left by former occupants who had used pottery as well as stone adzes at this locality, although an actual habitation layer of this earlier period was not discovered. The similarity of this pottery to the thick coarse ware from layer 4 of nearby Sa-3 (Report 29, p. 118) and from layer V at Vailele (I, Report 7, pp. 112-113, 128-130) implies a similar age of before the third or fourth centuries A.D. However, one can be no more precise for this particular locality than to say that the potsherds belong to a time prior to the construction of the mound, which should correspond reasonably closely with the time of layer 4 at Sa-3. Thereafter this locality may have been deserted for some hundreds of years, as neither a developed garden soil nor other features were found below the mound.

By the time the locality was resettled, pottery was no longer in use but mounds for habitation had become a feature of Samoan culture. At this time the occupants presumably proceeded to clear and cultivate the surrounding land. Whether the construction of the "causeways" linking Lam-1 and Lam-2 was an early or late project, at some stage the need was felt for an enclosed area, possibly for certain social activities or for the cultivation of crops which would require conditions not met in the open. These "causeways" also facilitated ease of communication between the mounds, particularly in wet periods, by serving as raised pathways.

Occupation of the mounds appears to have been continuous until a late prehistoric date, although it ended before the early nineteenth century introduction of European trade items. A radiocarbon date suggesting that occupation had begun by the fourteenth to sixteenth centuries A.D. may antedate by up to 200 years the actual termination of occupation. During this period one side of Lam-1 seems to have fallen into disrepair. For this reason one or more edges, which had been destroyed, were renewed by excavating a deep ditch along the sides of the mound and facing them with stone. The use of stone facing on the side of a house mound has been recorded once before, in the final dwelling occupation of Va-2 (I, Report 8, p. 148).

The single phase of building and occupation on the mound as well as the construction of a surrounding ditch may reflect the fact that the occupants had a motive ancillary to that of creating a raised house site. What this was is difficult to ascertain. For example, one might speculate that they wished to site their house so that it would not be as vulnerable to the periodic flooding which affects this area.

During the nineteenth century the present inhabitants of Lalomauga village settled the district and one of its chiefs planted coconut trees over the then uninhabited mounds and the surrounding area. The final occupation was by a Samoan family who built the small house on the southeast corner of the mound in 1959. It was demolished in 1965 when they shifted elsewhere, discarding their broken and unwanted property.

Conclusion

The excavation of Lam-1, while producing no spectacular results or portable artifacts of great moment, has achieved some of the objectives set out in its selection, namely an indication of the age, method of construction, and function of earth mounds in another area of Samoa besides Vailele. Indeed, at the present stage of the investigations, projects like this are of value not only in providing additional information for comparisons within and without Samoa, but also for the incidental data they provide. One important result, is, therefore, the discovery of pottery at Lam-1, even though its recovery was due to its fortuitous placement in the mound and ditch, and none was discovered in an undisturbed situation in an occupation layer.

One main objective of the Samoan programme was "the development of some typological and functional interpretations of earthen mounds as a result of excavations in selected examples" (I, Introduction, p. 5). In this respect the Lalomauga evidence extends the typology of mounds by providing excavation data on a type with a deep surrounding ditch. Functionally, the mounds have been shown to be raised house sites, but any further interpretations are conjectural. Thus it is not possible to comment on any specialisation of this type of house mound. Typologically Lam-1 is similar to mounds such as Va-3 and Va-4 in that it was built in a single operation, rather than growing to its final size in a series of stages like Va-1 or Va-2. Only a few mounds at Vailele possessed well-defined ditches around them (I, Report 6, p. 101). Va-2 possessed ditch features but these were shallow and broad, whereas those at Lam-1 were narrow and deep. In this respect Lam-1 is analogous to a site on Savai'i where house platforms surrounded by deep ditches with a short causeway across them were recorded (I, Report 3, p. 48), and to Va-54 at Vailele. Such mounds, while not common in Samoa, are therefore not unknown. What is uncommon is the linking of two of these mounds by "causeways" which seem intended to define a large square enclosure between the two mounds.

The very limited nature of the results derived from nearly a month's work on this mound provides fairly convincing evidence that the Vailele experience is not unique (I, Report 6, p. 101). Again it has been demonstrated that the recovery of fuller information about structures on the surface of earth mounds is going to be difficult, even where larger scale area excavations are attempted. Moreover, solutions to other problems presented by mounds — surrounding ditches, linking causeways and sunken "pathways", earlier habitation layers, or features sealed underneath — will involve expenditure of greater amounts of time and labour than have so far been available. Still, it is obvious that a continuation of the investigation of some of the problems presented by this cluster of sites, for instance, would have been very profitable and could well have yielded new information on the typology and function of mounds and various features associated with them. This reinforces Green's previous conclusion (I, Report 6, pp 101-102) that such a full-scale investigation of mounds in Samoa must now be performed at some stage. In view of the importance of mounds of a number of different types and functions in Tonga and Fiji as well as Samoa, the results of such a project should prove significant not only in understanding Samoan prehistory but also in relating it to the prehistory of the entire area.

EXCAVATIONS AT SU-LE-12, LEULUASI

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The area known as Leuluasi extends for some distance over flat, relatively well drained, fertile land in the interior of the Falefa Valley, backing against the mountain slopes. Much of this land is now grazed by cattle, so that excellent conditions exist for the recording and mapping of the prehistoric structures that exist there (plates 5 and 6). To the north is a dense and little used area of swamp between Leuluasi and the protohistoric sites of Sasoa'a and Ulua'e'a, broken only by a hilly outcrop, Olovalu, on which prehistoric sites also occur.

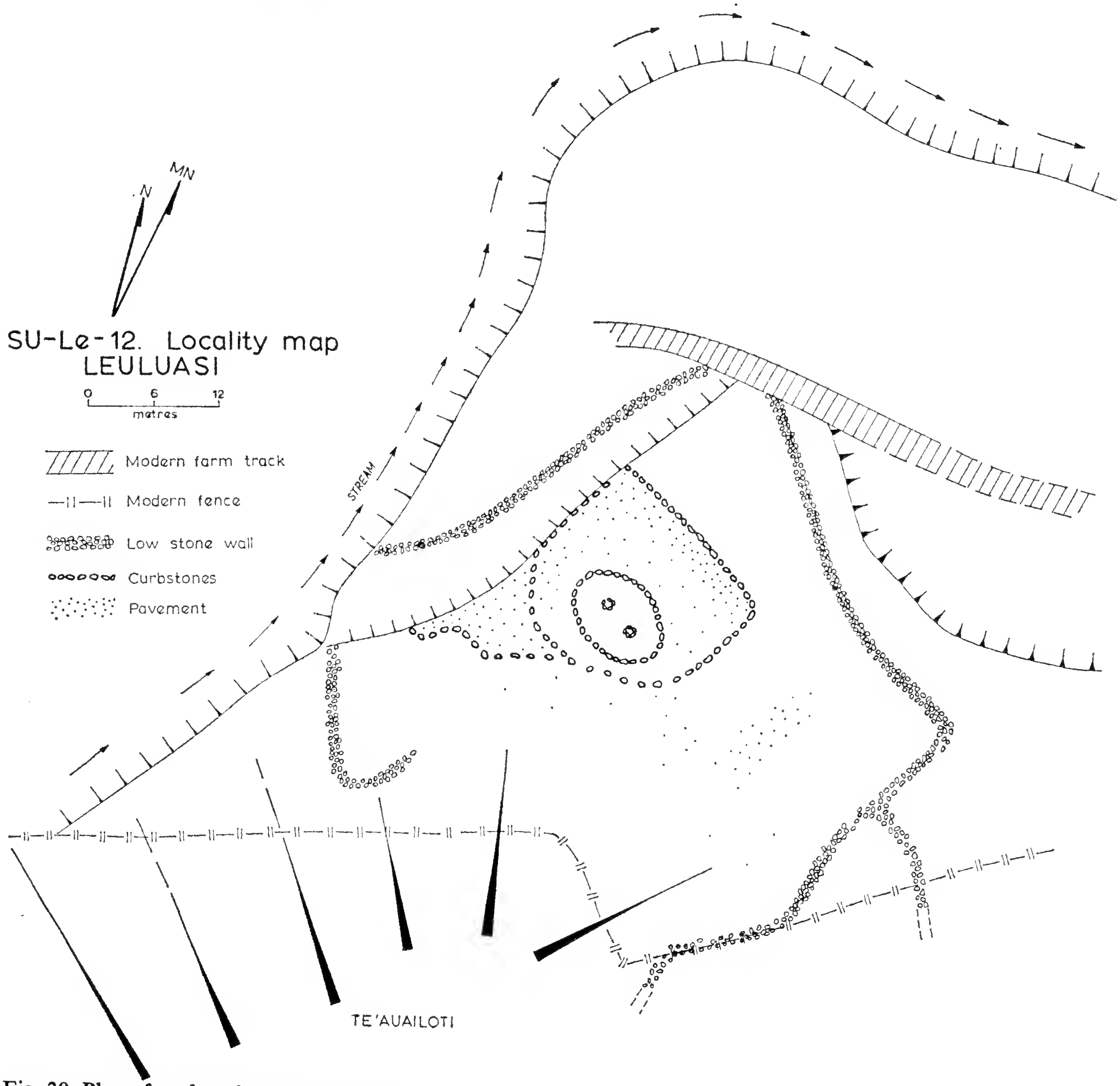

Fig. 39. Plan of surface features, SU-Le-12.

The largest and most dispersed settlement recorded by Davidson in her survey of the valley occurs at Leuluasi. Close by to the southeast is the historic settlement of Falevao-i-uta, whose remains can barely be distinguished amid a dense tangle of undergrowth. The sites that exist at Leuluasi, however, are traditionally believed to have been inhabited in the immediately prehistoric period, before the development of the nucleated settlement at Falevao-i-uta which united several previously dispersed family groups. Leuluasi is believed to have been the domain of one of these groups.

The archaeological surface remains at Leuluasi are described in more detail elsewhere (Report 20, p. 8). Because of the extent and nature of these remains, and their traditional associations with the most recent part of the Samoan prehistoric sequence, excavation of one or more sites at Leuluasi was deemed essential. Le-12 was the site chosen for intensive excavation, while Le-3 was tested at a later stage to check some of the results obtained from Le-12 (Report 25).

Site Le-12 lies at the base of the long narrow ridge known as Te'auailoti on which sites also occur (Report 26), and occupies part of a small piece of flat land between the base of the ridge and one of the numerous small meandering streams of the upper valley (figs. 5, 39). A low stone wall surrounds the site except at the foot of

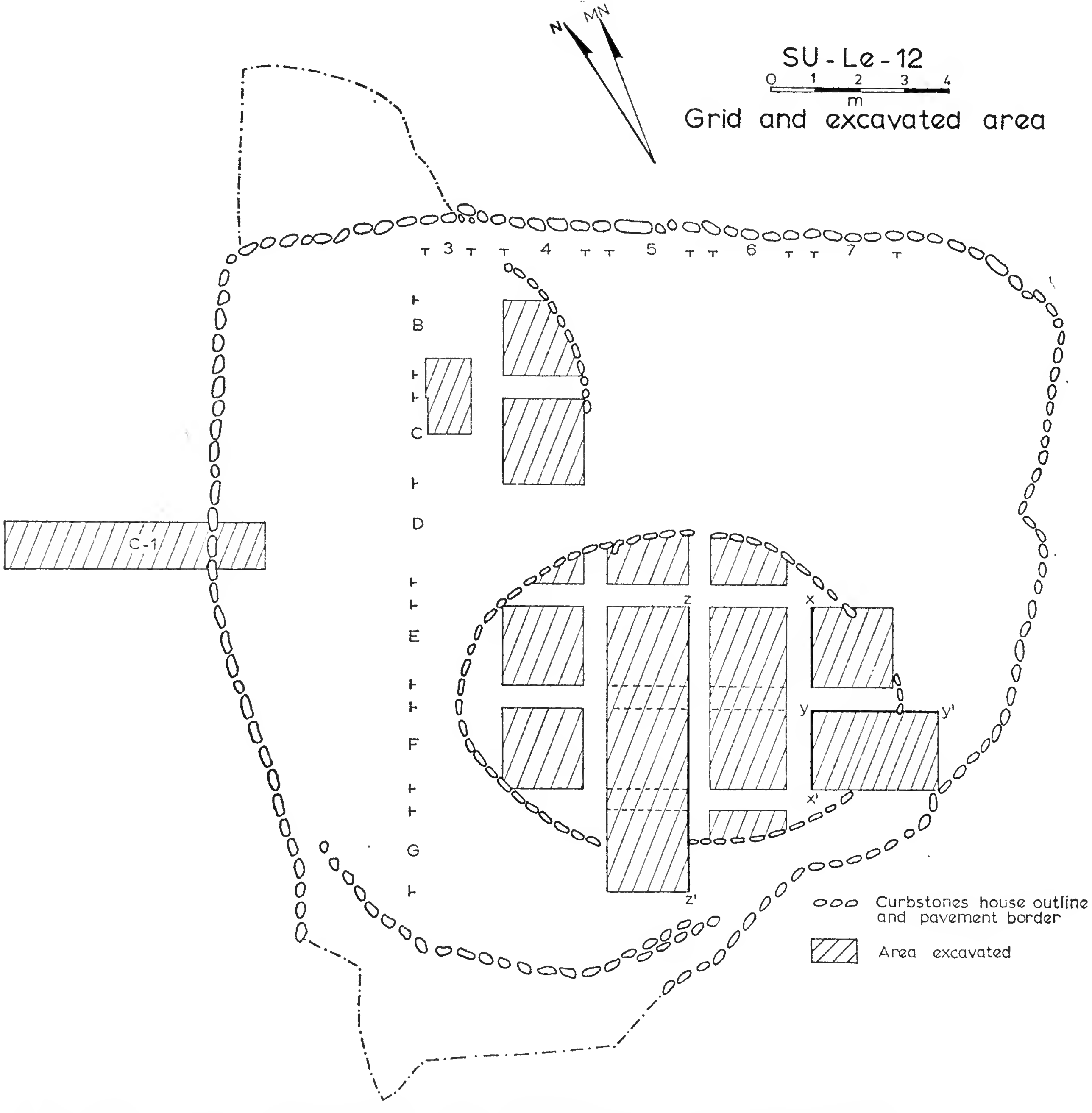

Fig. 40. Plan of house I and associated pavement, showing area of excavation, SU-Le-12.

the ridge and two points on the lowest extremities where the wall has apparently been damaged by a vehicular farm track and by the stream. A well-defined pavement is situated towards the western edge of the area defined by the stone wall. Scattered stones elsewhere may be the remains of earlier pavements. Within the existing pavement, curbstones outlining a large house are clearly visible. This house was one of the largest recorded at Leuluasi, and was also unique in this settlement in having two small curbstone outlines, presumed to be hearths, within.

The Excavations

Method of Excavation

Investigations at this site began on 25 January 1967 and continued until 24 February. A varying number of workmen was employed, all of whom had some previous experience. Day to day direction on the site was by Fagan, with occasional assistance from Green throughout the excavation, and from Davidson in the later stages.

A grid of 1.75 m squares with 50 cm baulks was set out on the pavement. Initially, excavations were confined to the structure, designated house I, whose outline was visible on the surface, and a major part of its interior was excavated (plate 7). At a later stage, parts of three grid squares were opened up on the northeast part of the pavement to investigate a line of curbstones showing faintly among the paving stones, which was thought to represent an earlier house or a grave. Evidence to support its interpretation as a house was obtained, and it was designated house II. Finally, a trench 4 x 1 m was excavated outside the area of the grid and referred to as C-1. It was designed to check the stratigraphy of the platform on its steep western side. All excavated areas are shown in figure 40.

Stratigraphy

The principal layers observed in the site are described below, starting at the bottom of the sequence. The layers were first defined in the area of house I, but a similar sequence was also observed in squares B-4 and C-4, and in the trench C-1. Principal cross-sections are illustrated in figures 41 and 42. Similarities in the composition of some of the layers and the shallowness of the deposits, made it extremely difficult to distinguish layers during excavation.

The colour within layers varied considerably. Where colour descriptions are given they refer to the Munsell soil colour chart.

Natural: river gravel which varied from fine gravel in the south to largish boulders in a matrix of fine river gravel to the north. Dark clay soil from the ridge to the south extended into the area of the excavation in square F-8. In several areas of the site patches of concentrated charcoal occurred on the surface of the natural gravel and silt. These concentrations were particularly evident in squares F-6, F-7, F-8, G-5, B-4, C-4 and trench C-1.

Layer 7: a relatively dense sticky soil with variable amounts of charcoal and lumps of red material, possibly ochre. This layer was restricted in distribution and occurred in patches mainly in the south part of the excavation. A discrete deposit of layer 7 in squares F-7 and F-8 lacked the distinctive stickiness, and concentration of red material. The distribution of layer 7 suggested that it may have derived from the slope to the south of the excavated area.

Layer 6: (10YR 3/4, 7.5YR 4/4, 7.5YR 4/3) a thick deposit of yellow-brown clay forming a low platform or terrace extending out from the base of the slope. There was considerable variation of colour and texture in this layer; in particular it was more yellow towards the north, and in the south contained scattered cultural material.

Layer 5: a dark sticky deposit similar in composition to layer 7, restricted to the southeast of the excavation, where it filled a depression in the surface of layer 6. It was composed of two distinct zones, the lower of which, 5b, lay at the base of the depression in a distinct pit-like feature. Lens 5b was stickier than 5a with a greater concentration of charcoal and red ochre.

Layer 4: (10YR 4/6 in squares E-7 and C-3) a comparatively bright yellow clay found on the north, east and west of the excavated area. It appeared to be an artificial fill which extended the area of the original platform composed of layer 6.

Layer 3: (10YR 3/4 and 7.5YR 3/4) brown clay soil of even colour and texture but variable thickness covering the southern part of the excavation. It was thought to be a constructional fill or series of fills to level the surface of the platform and provide a fresh surface on which occupation could take place.

Layer 2: (7.5YR 3/3) dark brown soil consistent over the entire site, although more easily distinguished in some areas than in others. It contained a scattering of *'ili'ili* pebbles and a few concentrations of larger stones. It seemed possible that this "layer" reflected, at least in part, a soil horizon which had developed on the surface of layer 3, rather than a separate deposit.

Layer 1: (7.5YR 3/3 for soil matrix) the *'ili'ili* or pebble paving of the most recent occupation. The soil matrix was the same as layer 2. The stone paving of the platform was also included in this layer.

Topsoil: a thin layer of topsoil developed on top of the 'ili'ili of the most recent house, but largely absent from the pavement area.

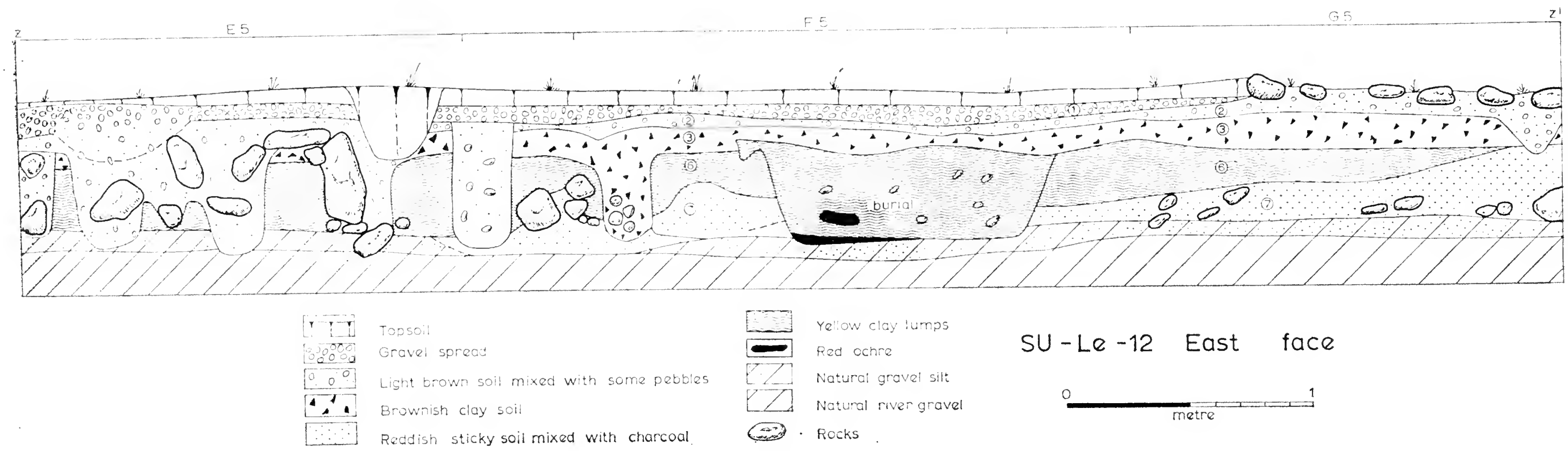

Fig. 41. Principal cross-section, SU-Le-12.

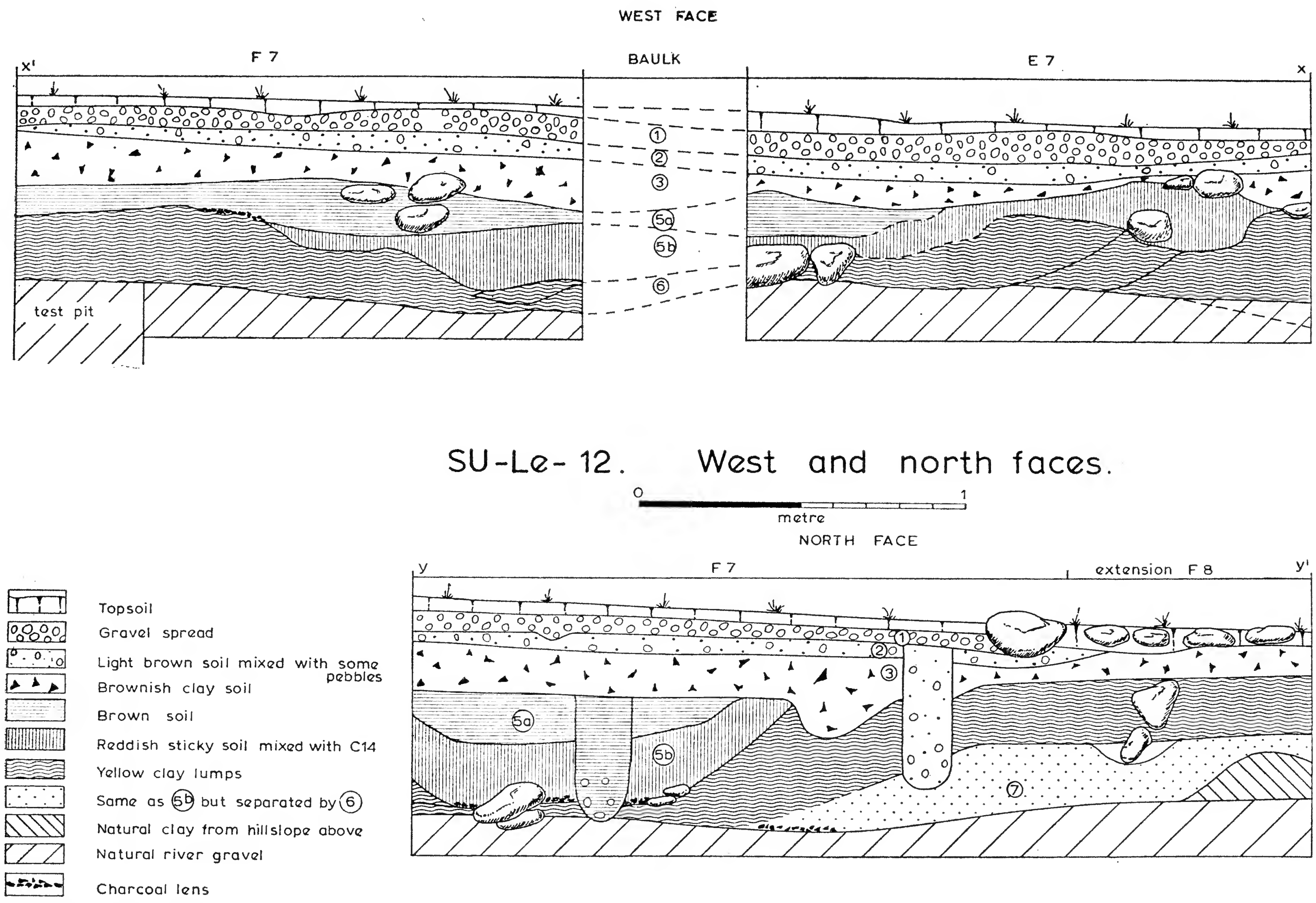

Fig. 42. Principal cross-sections, SU-Le-12.

Occupation Sequence

The occupation sequence in the excavated part of the site can conveniently be divided into three major units: occupation of the natural ground surface before the building of the platform; the building of the platform and its initial use; and a series of occupations on the surface of the platform associated with successive floors represented by layers 3, 2 and 1. Within these major units several subdivisions can be distinguished, suggesting a minimum of six and a maximum of perhaps ten successive occupations. It is important to remember that the excavation encompassed only a small part of the total site area, and did not include the centre of the platform. If houses were built on different parts of the platform at different times, the total number of occupations of the site could be considerably larger than ten.

Vestigial remains of what may have been several different activities were encountered beneath the platform. In several places concentrated patches of charcoal were discovered resting on the natural gravel at the base of the mound. This charcoal could represent clearing of the site either as a preliminary to platform construction, or at an earlier stage.

Layer 7, while not an actual build-up from habitation, contained some cultural material, particularly in squares F-7, and F-8 at the very foot of the ridge. It is likely that layer 7 itself and its associated artifactual material result from occupation to the south of the excavated area. The structural remains which occurred on the surface of layer 7 provide the only evidence of actual habitation in this part of the site before the platform was built. These remains, concentrated in squares G-5 and F-5, are designated occupation A. They consisted of a fine scatter of *'ili'ili* pebbles in the soil which indicated a "floor", and a rather disturbed curving line of stones bordering the northern edge of the deposit. A depression about 90 cm wide and 30 cm deep was traced in layer 7, but it was filled with very similar material to that surrounding it. A distinctive pile of pebbles was partly embedded in the deposit and partly raised above it. Individual pebbles averaged 2 to 3 cm in diameter. Dimensions of the pile were 64 cm by 82 cm by 22 cm in depth and it was hollowed in the centre.

Another possible occupation floor was encountered in squares F-7 and F-8 associated with a pile of pebbles similar to but smaller than the pile described above. It had probably been disturbed by the building of the platform. These pebble heaps were initially thought to be fireplaces but showed no signs of having been used as such.

Features associated with occupation A are illustrated in figure 43.

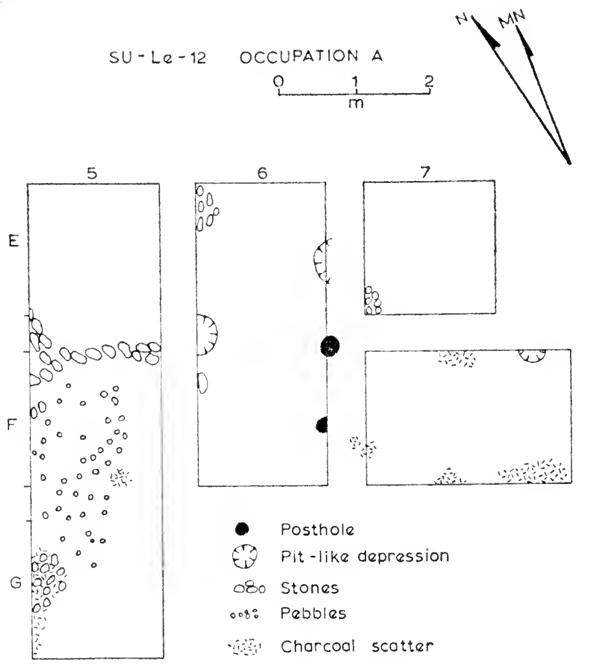

Fig. 43. Features associated with occupation A, SU-Le-12.

Possible events which may have taken place on the site before the construction of the platform may be summarised as follows.

1. Initial clearing of the site, reflected by patches of charcoal at the base of layer 7, and in the river gravels in trench C-1.

2. Occupation in the vicinity, probably immediately south of the excavated area, reflected by layer 7.

3. Occupation A, the first direct evidence of habitation within the area of the excavation.

4. Further clearing and burning on the site before building the platform, reflected by more charcoal lenses on the surface of layer 7 at the base of the platform.

On the gently sloping ground which led to the stream, a platform or terrace was built which covered occupation A and lapped against layer 7 at the foot of the ridge in square F-8. The platform covered three-quarters of the excavated area and was built with the mixed brown and yellow clays of layer 6. The cultural materials found mixed in the fill of the mound near the base of the slope were probably in secondary position and derived from soil taken for the platform from another occupation area. The area of the platform can be roughly estimated as about half that of the later pavement.

In its initial stage the platform appears to have had a large depression in its surface which was later filled with layer 5. There is some doubt whether this depression was a deliberate feature, or whether layer 5 is merely a part of the

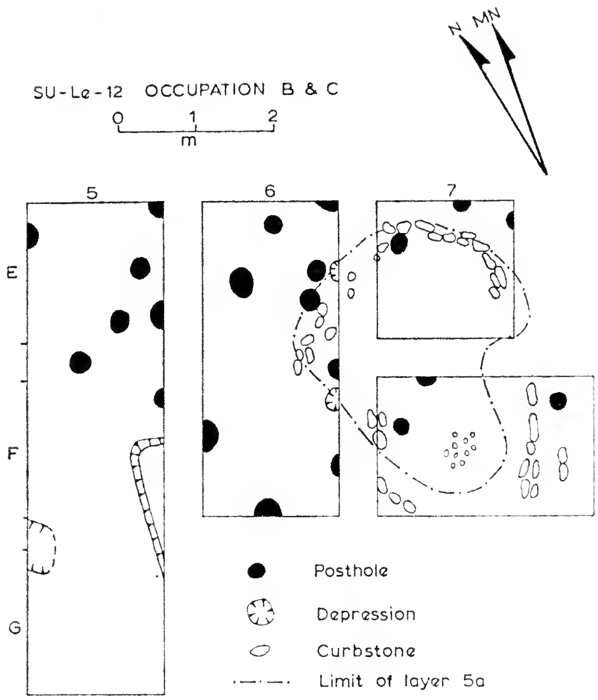

Fig. 44. Features associated with occupations B and C, SU-Le-12.

original mound fill. The more clearly defined base of the depression measured approximately 3 m by 3.50 m. Around its rim was a ring of largish stones similar to the curbstones of later houses (fig. 44). There were no associated postholes, however.

The ring of stones lends support to the view that the depression was a deliberate feature, rather than a stage in construction of the platform, and accordingly an original platform with a stone-outlined depression has been distinguished as occupation B. There is, however, no evidence of habitation at this stage, and other possible uses of the platform must be considered. Pits or depressions, often stone-lined, are a not uncommon feature of ceremonial mounds in West Polynesia, particularly in Tonga, where they are often alleged to have been associated with the sport of pigeon snaring. Occupation B at Le-12 must be considered a possible although not well defined example of this type of structure.

Whether the above interpretation of the depression is accepted or whether it is regarded merely as an interlude in platform construction, layer 5 seems to have been a fill deposited in the depression to cover it up and provide a level surface for the next occupation of the platform. The restricted area of layer 5, and the peculiar nature of its cultural content, which consisted of weathered stone artifacts and potsherds, support this interpretation. The source of this fill must remain uncertain, but it is possible that it was the same earlier occupation area (probably upslope from the excavation) which is assumed to have provided the cultural content of layer 7.

Occupation C, which took place on the now level surface of the original platform, was the first of a series of similar occupations during which houses were built on the site. A structure or structures represented by large deep postholes (averaging 18 cm wide and 38 cm deep) was built on the surface of layer 6. There were no curbstones or *'ili'ili,* however. Other smaller and shallower postholes were also associated with this occupation (fig. 44).

A rectangular pit with a loose soil and pebble fill lay to the west of the postholes. It proved to be a grave, only a portion of which was excavated, as it lay partly in a baulk. Its dimensions were at least 1.50 cm by 40 cm, and it was about 40 cm deep. The burial was oriented approximately north-south with the head to the north. A semicircle of concentrated red ochre formed a "halo" around the head. The skeleton had completely disintegrated except for two molar teeth and some badly deteriorated soft bone from the skull.

During occupation C the area of the platform was extended by adding a yellow clay fill (layer 4) on the north and west sides of the earlier platform. This extension, especially on the west where the platform now slopes steeply towards the stream, gave the site the form it has today, although the stone pavement, which coincides with the western edge of the platform, was a much later addition.

The next event was the deposition of layer 3 over the southern half of the site. Layer 3 overlay both layer 4 and layer 6, and was deposited at some point after the extension of the area of the platform by the addition of layer 4. No break could be distinguished within layer 3, and no features were identified as cut from an intermediate point within it. Nonetheless, it is still possible that it accumulated as a series of floors, rather than as a single fill deposited all at once. Its surface, however, was recognisable as an actual living floor with hard surfaces, patches of reddish colour (probably from burning) and a light grey sticky material (possibly ash). A slightly disturbed alignment of stones bordered this living area on its northern side. It was difficult to tell whether this alignment represented a house as there was no obviously associated posthole pattern.

A considerable number of postholes and depressions were associated with layer 2 and the surface of layer 3, together with numerous large stones which were presumed to be the disturbed remains of house outlines or pavements. All those features which were definitely later than occupation C, and yet were not associated

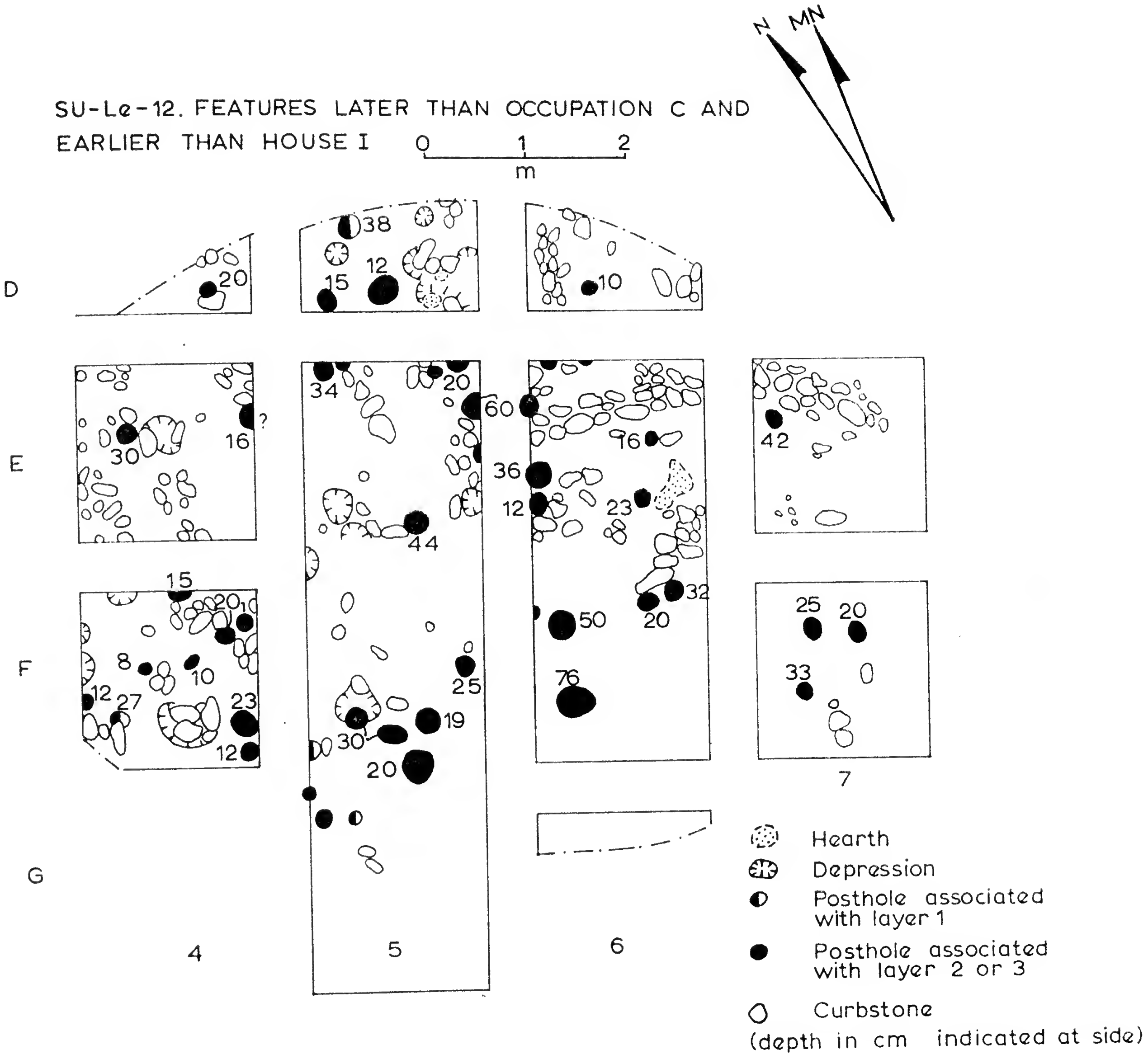

Fig. 45. Features associated with occupation D, SU-Le-12.

with house I, are illustrated in figure 45, and have been designated occupation D. Occupation D, however, was clearly a series of successive and similar occupations which may have continued for some time, but whose individual components cannot now be distinguished.

The difficulties of identifying postholes and other features in *'ili'ili* layers have been discussed elsewhere in these volumes. Although only layer 1 at this site was a true *'ili'ili* layer, the composition of layers 2 and 3 was sufficiently pebbly to present similar problems, and it was impossible to distinguish the precise level from which features were cut. Close scrutiny of the sections, however, revealed at least four different sets of postholes in this series of occupations: those filled with layer 1 but not part of house I, those in the surface of layer 2 sealed but not filled by layer 1, those in the surface of layer 3 filled with layer 2, and those in the surface of layer 3 sealed but not filled by layer 2.

The length of time occupied by these successive structural occupations is difficult to estimate. Moreover it is not easy to determine whether there was at any point a significant break in occupation. In some areas of the site the deposit distinguished as layer 2 was little more than a dark zone on the surface of layer 3, giving a strong impression that it might be a soil horizon marking a period of abandonment of the site, while in other areas it took on rather the appearance of an occupation floor. All that can be said is that there seems to have been a series of occupations, but that these need not have been continuous and there may have been at least one significant break, when this part of the platform, anyway, was not in use.

The foregoing discussion refers to the area of house I. House II, associated with layer 2 in the northwest part of the pavement, was also earlier than house I. But its chronological relationship to occupations C and D cannot be precisely defined, because layer 3, separating occupations C and D, was not present in this part of the site. However, since house II possessed an *'ili'ili* floor and well-preserved curbstones immediately beneath the pavement associated with house I, it can perhaps be assumed that house II was later rather than earlier in the sequence of occupations described as occupations C and D. Although only a small area of house II was excavated, sufficient evidence was recovered to indicate that it was probably very similar to, if smaller than house I. Two wall postholes, resembling those of house I and a similar distance apart, were discovered, as well as what was probably a centre posthole wedged with stones (fig. 46).

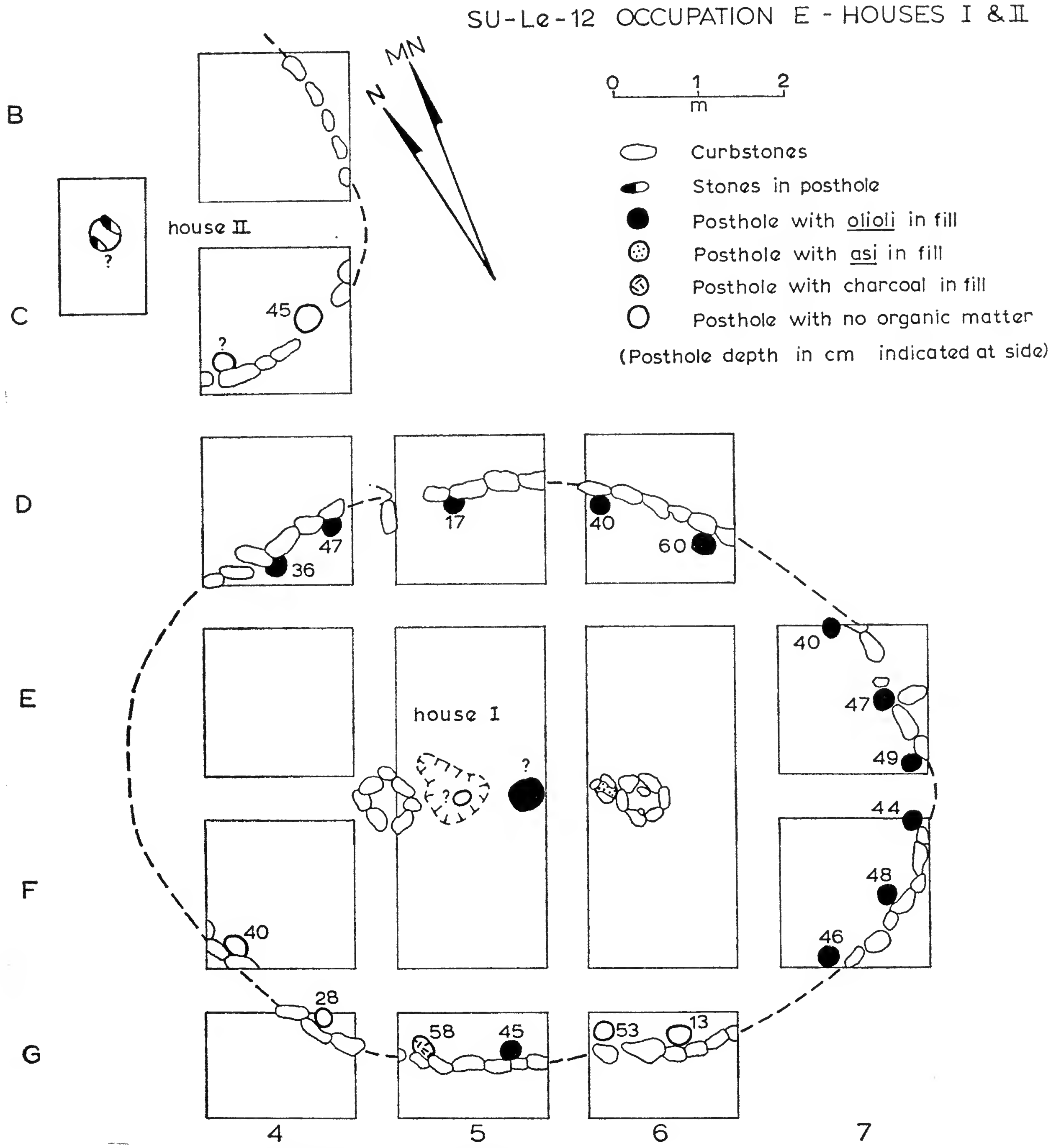

Fig. 46. Plan of house I (occupation E) and part of house II, SU-Le-12.

House I and its associated features, together designated as occupation E, can be discussed in some detail. Much more information was obtained about this occupation than about those that preceded it.

The pavement associated with house I was rounded on all corners except the northwest. The southeast and southwest corners closely followed the line of the house. The underlying earth platform, which provided the foundation for the house and pavement, extended beyond the pavement except along the western edge which dropped away sharply to the lower terrace by the stream. Excavations in the trench C-1 showed that the platform on this side had been built much earlier.

The stone wall which surrounded the site is probably also to be associated with this occupation, although there was no stratigraphic support for this view. Stone walls appear to have been an important feature of the settlement of Leuluasi in its most recent form, and it is accordingly not unreasonable to associate this stone wall with this latest occupation of Le-12.

Considerable structural information was obtained about house I (fig. 46). It appears to have had three centre posts supporting the ridge pole. Wall posts were found just inside the curbstones. Seventeen postholes belonging to the walls of house I were excavated and it is estimated that there were probably 25 altogether. On the average the postholes were about 22 cm in diameter (ranging from 16 to 28 cm) and about 47 cm deep (ranging from 17 to 60 cm). The distance between postholes varied from 50 cm to 1 m, averaging about 80 cm.

Twelve of the wall posts contained wood remains identified by the workmen as *olioli*[1]. Many such trees are still found in the area and are said to be used for house posts because of their durability. It was not clear whether or not the remains found in the postholes had been burned. One posthole contained wood charcoal of an unidentified wood. One of the centre postholes also contained charcoal fragments and *olioli* which could, however, have been associated with a surrounding depression. From another central posthole a large (55 cm long) piece of wood, said by the workmen to be *asi*[2], was recovered.

The two "fireplaces" outlined in stone were excavated and found to consist of scoop depressions filled with *'ili'ili* but no charcoal. This paralleled the experience at Sasoa'a. Fireplaces of this type are well described, however, for the early European period, and as they were intended only to provide light, and may have been carefully cleaned out, the absence of charcoal is probably not sufficient reason to doubt the interpretation of these features in house I as fireplaces, nor is the presence of two in larger houses unexpected.

Because of the restricted nature of the excavation, it was not possible to determine whether additional structures occurred elsewhere on the terrace in association with occupation E. There is ample space on the terrace for a cooking area or other subsidiary structures not sufficiently important for curbstone outlines. The results from Fo-1, where evidence of a cooking area at the rear of a smaller terrace platform was uncovered indicate that such additional features, identifiable only by more extensive excavations, would be not unlikely.

Radiocarbon Dates

Two series of radiocarbon dates have been obtained for this site. Initially three charcoal samples were submitted to Gakushuin. The results appear in table 4. The Gakushuin results raised a number of problems of interpretation which were discussed at length in an earlier draft of this report, written before the second series of dates became available. Some of that discussion is now redundant, although the major problem it raised remains. This concerns the extent to which materials of various kinds became incorporated in contexts more recent than those in which they originated. This question is discussed below in the section on artifacts, for quite a considerable proportion of the artifactual material in the site was recovered from fill layers, suggesting that its original deposition may have been elsewhere at an earlier date. The tendency of artifactual material to become scooped up in a fill and incorporated in new deposits raises the possibility that old charcoal could also have been redeposited in a more recent context. Determinations on such charcoal would perhaps reflect the true age of some material in the deposits but might not give a correct indication of the time when the deposits were laid down in their present position.

[1] Fragments of "*olioli*" from Leuluasi have been identified by R. C. Cooper, Auckland Institute and Museum, as certainly from a tree fern. Cooper (pers. comm.) notes: "*Olioli* is the Samoan name for a tree fern, but it is not clear which species is so designated. Pratt (1911: 53) identified *olioli* as 'the name of a tree fern, called . . . *Alsophila lunulata*'. Christensen (1943: 28-9) cited *A. lunulata* as a synonym of *Cyathea plagiostegia* Copel., and *C. lunulata* (Forst.) Copel., but noted *olioli* as a native name for *C. vaupelii* Copel. (ibid. 26). Altogether Christensen recognised ten species of tree ferns in Samoa; it is unlikely that the Samoans recognised all these entities."

[2] *Asi* probably refers to *Syzygium inophylloides,* a tree favoured by Samoans for building (Christophersen 1938: 24).

TABLE 4

CARBON DATES FROM SU-LE-12

Sample No.	*Material*	*Context*	*Half Life*	*Correction for Secular variation*	*Result*
GaK-1442	charcoal	square F-5, layer 1	5570	uncorrected	890 ± 80 B.P.
GaK-1443	charcoal	square F-6, layer 7	5570	uncorrected	1410 ± 80 B.P.
GaK-1444	charcoal	square F-7, layer 5b	5570	uncorrected	2210 ± 100 B.P.
NZ-1433	tree-fern wood	modern, growing near site			modern
NZ-1427	wood (*asi*)	square E/F-6, centre posthole of house I			modern
NZ-1430	tree-fern charcoal	square G-5, posthole of house I	5568	uncorrected	184 ± 75 B.P.
			5568	corrected	248 ± 75 B.P.
			5730	uncorrected	190 ± 77 B.P.
			5730	corrected	254 ± 47 B.P.
NZ-1431	tree-fern charcoal	square E-7, posthole of house I			modern
NZ-1432	tree-fern charcoal	square D-6, posthole of house I	5568	uncorrected	188 ± 54 B.P.
			5568	corrected	252 ± 54 B.P.
			5730	uncorrected	195 ± 54 B.P.
			5730	corrected	259 ± 54 B.P.
NZ-1434	wood charcoal	square F-6, layer 3, posthole at base of layer	5568	uncorrected	286 ± 91 B.P.
			5568	corrected	370 + 77 — 111 B.P.
			5730	uncorrected	295 ± 93 B.P.
			5730	corrected	379 + 79 — 66 B.P.
NZ-1428	wood charcoal	square F-6, layer 3, posthole at base of layer	5568	uncorrected	401 ± 114 B.P.
			5568	corrected	426 ± 114 B.P.
			5730	uncorrected	414 ± 117 B.P.
			5730	corrected	439 ± 117 B.P.
NZ-1429	wood charcoal	square C-3, base of layer 4	5568	uncorrected	881 ± 120 B.P.
			5568	corrected	831 ± 120 B.P.
			5730	uncorrected	907 ± 124 B.P.
			5730	corrected	862 ± 124 B.P.

The principal aim in submitting a further series of samples from this site for dating was to obtain more dates for the most recent occupation (E) and particularly for house I. Traditional evidence for settlement at Leuluasi in the immediately prehistoric period, and the excellent state of preservation of house I both suggested that the 900-year-old result obtained from sample GaK-1442 could not be a true indication of the age of house I.

In initially selecting samples for dating from Le-12, sample GaK-1442, diffuse charcoal fragments collected from within layer 1, was given preference over samples from features definitely associated with house I because the latter were mostly *olioli* (tree fern) charcoal, and doubts were harboured about the suitability of this material for carbon dating. In the second series, however, three samples of *olioli* charcoal from postholes, the large intact piece of wood (thought to be *asi*) from a central posthole, and a sample of modern *olioli* from a tree growing near the site were submitted. These results and those of three charcoal samples from earlier contexts in the site are also given in table 4. In this case the laboratory has given results according to old and new half lives, both corrected and uncorrected for known secular variations. All four results are quoted for each sample. The laboratory advises that the best result in each case is that using the new half life and corrected for secular variations.

The sample from the living tree fern gave a reading of modern as was to be expected. It contained no "bomb carbon", showing that the tree had begun growing before 1950. There appeared no foundation for the earlier doubts about the reliability of tree fern charcoal as a dating material.

The four determinations on material from features associated with house I provide a much more satisfactory estimate of the age of house I than sample GaK-1442, showing once more that samples from clearly defined features associated with a particular occupation are generally to be preferred to samples of diffuse charcoal collected from a layer, even those collected from a restricted area of a layer. Two of the *olioli* samples gave almost identical readings, while the third *olioli* sample and the wood sample gave modern determinations. The "modern" results, however, can be deemed to have a range from modern to latter eighteenth century, at which point they overlap with the uncorrected determinations on samples NZ-1430 and NZ-1432. Clearly, a late prehistoric age is indicated for house I, in line with the traditional evidence, the surface appearance of the site, and the absence of European trade items, although whether the precise date of construction of house I was early, middle or late eighteenth century cannot be determined with certainty. House I, however, definitely represents the closing stage of prehistoric occupation in the rear of the valley.

The reason for the older age of GaK-1442 requires some discussion. Layer 1 may have contained diffuse charcoal transferred from some other considerably older location. On the other hand, the sample may have been mixed during excavation, or collected in error from some much earlier context in the site itself, since the shallow deposit encompassed by layers 1, 2 and 3 represents a considerable period of time. The first of these possibilities seems most likely, but if it is accepted it provides a salutary warning against the collection of scattered charcoal from layers, and against reliance on a single sample to provide an accurate indication of the true age of an occupation. It is interesting to note that the determination on this sample is not significantly different from that on NZ-1429, which belongs to an earlier period of activity on the site, probably that of occupation C. The charcoal which formed sample GaK-1442 may also have originated in occupation C.

The two results from features associated with layer 3 are, as may be expected, slightly older than those for house I, and appear to place occupation D in the sixteenth or early seventeenth century. In the case of these two samples, correction for secular variation brings the results much closer together than if they were left uncorrected.

Sample NZ-1429, with an eleventh or twelfth century age, represents the probable time of the extension of the platform by the addition of layer 4, during occupation C, and before the addition of layer 3. Caution must be exercised in interpreting this sample, because it came from the base of the layer 4 fill, and like all samples collected from beneath mounds and terraces, merely provides a *terminus post quem* for construction of this part of the terrace. Moreover, charcoal of similar age apparently occurs in later contexts in this site; there is no guarantee that the charcoal forming sample NZ-1429 was in primary position either. Nonetheless, the result fits reasonably well with the sequence of events on the site and their time scale.

Similar problems arise with sample GaK-1443, which was collected from the interface between the original platform fill and the underlying natural in an area where layer 7 was so thin as to be almost non-existent. Although the sample was not actually associated with the structural remains of occupation A, it could be taken as a probable indication of the age of occupation A, or of the clearing of the ground immediately before platform construction. These two events are both likely to have taken place within the probable time span of fifth to seventh centuries A.D. indicated by the sample. However, mixing with older charcoal, held to have affected other samples from this site, cannot necessarily be discounted in this case.

More difficult to interpret is GaK-1444, which with a probable age of second to fourth century B.C., is the oldest date yet obtained from Western Samoa. The sample consisted of charcoal collected from the very bottom of layer 5b at the base of the depression in the surface of the platform. There are two principal alternatives which could explain the remarkable age of this sample. Either the sample was collected from an undisturbed position in the base of the fill of the depression and does provide a reasonable indication of the age of layer 5, or the excavators unwittingly penetrated to the underlying layer 7 and collected from it charcoal which they believed to be from layer 5. In this case, the date would be for layer 7, and would have to be considered in relation to the fifth to seventh century result for the previous sample, GaK-1443.

If the layer 5 deposits are interpreted as a deliberate fill intended to cover up a feature that was no longer required at the commencement of occupation C, the date would merely indicate that the fill was probably derived from a much older occupation layer somewhere in the vicinity. The artifacts found in layer 5 would not be part of the assemblage of the occupants of the platform, and the date would not date occupations B and C. This interpretation receives some support from the artifactual material associated with layer 5. This included 11 potsherds, 2 pieces of obsidian, a small chert flake and a small assemblage of very weathered flakes and adze fragments. All this material could be expected in association with a deposit of an age suggested by the date, but pottery, for instance, was conspicuously absent from actual occupation deposits on the surface of the platform. Moreover, it should be noted that while the degree of weathering on the surface of stone artifacts is not a reliable indication of age, there is a marked contrast between the unweathered surface of an adze found in close association with occupation A and the weathered items from layer 5.

If, on the other hand, sample GaK-1444 is viewed as consisting largely or entirely of intruded charcoal from layer 7, two quite different dates are available for the ephemeral activities on the site before the platform was built. The possibility that carbon samples representing two transient occupations of brief duration and quite different ages may be recovered from a similar stratigraphic context at the base of a mound has already been discussed in this volume (Report 23, p. 66). It seems quite probable that layer 7, which also contained a few potsherds, obsidian, and weathered stone flakes, was considerably older than occupation A which rested on its surface, or the burning off of the site just before the platform was built.

Whether this sample is accepted as associated with layer 5, or whether it is interpreted rather as being composed of intrusive material belonging to layer 7, it seems clear that the event or activity it dates is not the occupation of the platform, but the earliest occupation in the vicinity, whose extent and duration are not known, but whose disturbed remains are scattered through the later layers at the site, as well as trapped beneath the platform.

A general summary of the sequence at this site, as indicated by carbon dates, is given in table 5.

Table 5

Chronological Sequence at SU-Le-12

Activity/Occupation	Sample No.	Approximate age
Occupation E, House 1	NZ-1427 NZ-1430 NZ-1431 NZ-1432	18th century A.D.
Occupation D	NZ-1428 NZ-1434	16th-17th centuries A.D.
Occupation C	NZ-1429 (GaK-1442)	11th-12th centuries A.D.
Occupation A Initial activity in vicinity of site	GaK-1443 GaK-1444	5th- 7th centuries A.D. 2nd- 4th centuries B.C.

Artifacts

The artifact assemblage is small, consisting of stone flakes, potsherds, adze fragments and grinding and polishing stones. Surprisingly few artifacts were associated with occupation E, whose structural remains were extensive and well preserved. Perplexing features of the assemblage are the occurrence of a substantial proportion in fill layers rather than actual occupation deposits, and the extremely weathered appearance of much of the lithic material.

Pottery

Thirty-one sherds were recovered from the excavation. Thirty of these appear to belong to the thinner fine-tempered ware distinguished by Green at Vailele (I, Report 10, pp. 170-175) and Sasoa'a (Report 29, pp. 121-129) and discussed by him in some detail, while there is only one sherd of the thick coarse-tempered ware. Distribution of sherds was fairly restricted. The greatest concentration was in layer 5 in square F-7 and included six sherds from layer 5a and four from layer 5b. These were all of the finer ware. Seven sherds were recovered from layer 7 in square E-7, six of the finer ware, including one rim sherd, and the single coarse ware sherd. No sherds were found in association with occupation A. One sherd was recovered from the fill layer 6 in E-5.

Apart from two small sherds whose context is not known, the remainder all came from the trench C-1. Two of these were from beneath the platform in a context equivalent to layer 7, while the remaining 9 were from the platform fill, clearly earlier than occupation E.

This distribution is set out in table 6.

Table 6

Distribution of Pottery in SU-Le-12

Layer	E-5	E-7	F-7	Trench C1	No context
2 or 3	—	—	—	9 fine body	—
5	—	—	9 fine body 1 fine rim	—	—
6	1 fine body	—	—	—	—
7	—	5 fine body 1 fine rim 1 coarse body		2 fine body	—
uncertain	—	—	—	—	2

Table 7

Thickness of Body Sherds from SU-Le-12

Thickness in mm	No. of sherds fine variety	coarse variety
3-4	1	—
4	1	—
4-5	3	—
4-6	2	—
5-6	6	—
5-7	2	—
6-7	2	—
7	4	—
7-8	2	—
8	1	—
9-10	2	—
9-11	1	—
10	1	—
10-11	—	1

The assemblage consisted largely of small plain body sherds. The measurements in table 7 show that although their assignment to the finer ware was made on general appearance and temper, their thicknesses are generally well within the range of the finer ware as defined by Green.

Two rim sherds were recovered, one from layer 5a and the other from layer 7.

P 17/889, a small rim sherd from layer 5a, has a divergent profile. With the lip in a horizontal position the rim is straight sided. The lip is flat with rounded edges.

P 17/885, from layer 7, is a larger decorated rim sherd, and has a divergent profile with a slight bulge on the inner surface. With the lip in a horizontal position the rim is seen to be slightly incurved, with the curvature more pronounced on the inner surface. The lip is rounded. Decoration on the inner edge of the rim consists of faint traces of line incising of the kind associated with a sharp cutting edge such as a shell or finger nail. The sherd is fairly weathered, and the incised lines are only faintly visible.

This sherd is also interesting in that some evidence of fabrication techniques can be discerned. The inner surface below the lip has definite impression of anvil marks. There is also a slight suggestion of slab-bonding of additional material to build up the rim, although it is by no means definite, unlike obvious examples of this technique on sherds from Sa-3.

The sherd can be compared with rather similar rims from Sa-3. It most closely resembles bowl 42 from that site (fig. 60i).

Adzes

Very few complete adzes, or fragments large enough for classification, were recovered. Not all of these can be associated with actual occupations. Their number is supplemented by a small group of flakes clearly derived from adzes since they exhibit ground surfaces, which are noted in this section, but perhaps more properly belong to the flake assemblage.

An almost complete adze of Type I, A 17/242 (fig. 47c), was found resting on layer 7, in association with occupation A. It is 76 mm long, 41 mm wide and 12 mm thick at the centre. The front, one side, and the bevel have been ground, with slight grinding on the other side, but none on the back or poll. The bevel is extensively chipped so that only a small portion of the cutting edge remains, but otherwise the adze is in a fresh unweathered condition. This was the only adze associated with occupation A.

A central section of a Type V adze, Sasoa'a variety, and a flake from an adze with a ground surface, were recovered from layer 6, the earlier platform fill. Both are well weathered, suggesting

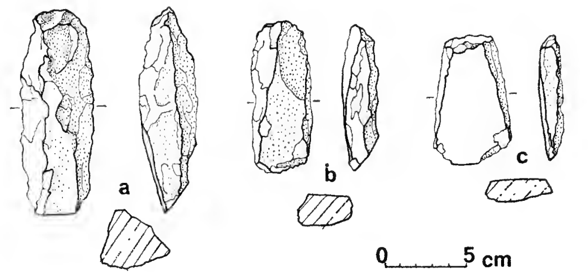

Fig. 47. Adzes from SU-Le-12. a. Type IX, A 17/157. b. Type I, A 17/174. c. Type I, A 17/242.

that their presence in this fill layer was due to their being scooped up from some older occupation layer and redeposited. The measurements of the existing piece, A 17/173, are length 93 mm, maximum width 44 mm, thickness at same point 29 mm. Although the surface is very weathered it appears that the back was unground and the remaining surfaces ground. The flake is too small to be diagnostic.

Three very weathered fragments were recovered from layer 5, the deposit of doubtful origin which filled the occupation B pit. None is diagnostic. A 17/177 is apparently an adze roughout, flaked, but with no evidence of a cutting edge. It is 81 mm long and has a diamond-shaped cross-section, 32 mm wide and 26 mm thick at the centre. If it was indeed intended as an adze it would have been a unique specimen similar to one in the surface collection from Savai'i (I, Report 5, p. 93). A 17/176 is the butt end of a small adze whose classification is uncertain. It is probably Type IX, although Types I and II cannot be ruled out as possibilities. Like the specimens from layer 6, these items are far more weathered than the single adze from occupation A, and could well derive from an occupation layer of greater antiquity somewhere in the vicinity.

The largest number of adze fragments is from layer 3, but the majority are undiagnostic, and cannot clearly be associated with an actual occupation. A 17/160 is the central section of a Type I adze, well ground on the front with partial grinding on the sides and a flaked back. The fragment is 73 mm long, 59 mm wide and 21 mm thick at its widest point. A more heavily weathered specimen of similar dimensions but much thicker, A 17/178, may be either a roughout, or a broken and discarded piece of a Type II or IX adze. A very weathered specimen, A 17/179, appears to be an unfinished roughout of uncertain type. Three flakes from ground adzes were also recovered from this layer, but are undiagnostic. Of these items A 17/160 and one of the flakes are relatively unweathered, and almost certainly derive from one of the occupations on the platform. The remaining items from layer 3 are so weathered, that like the specimens from layers 5 and 6 they must be considered as possibly older than the context in which they were found.

Two recognisable examples of Type I were found in layer 2, along with three flakes from ground adzes. A 17/174 (fig. 47b) is a small almost complete example of Type I, 88 mm long, 35 mm wide and 22 mm thick at the centre. The lower part of the front is ground but at the butt end the front consists of a ground median ridge and two flake scars. The bevel is ground, the sides partly ground. The cutting edge is badly chipped but the rest of the adze appears unweathered. It was probably used and discarded on the site during occupation D. Two of the flakes from layer 2 were also probably associated with this occupation. An adze fragment, A 17/172, was found in the fill of one of the postholes belonging to house II. It is the butt end of a fairly large adze which appears to be also of Type I. Only the front is ground. At the break the width is 55 mm and the thickness 34 mm. The length of the fragment is 73 mm, which is probably about half the original length. This fragment, like the remaining adze flakes from layer 2, appears somewhat weathered, and may derive from an earlier occupation than house II.

A complete adze and three fragments were recovered from the surface or from within the *'ili'ili* inside house I. The complete adze, A 17/157 (fig. 47a), belongs to Type IX. It is 120 mm long, 42 mm wide and 36 mm thick at the centre, which is the thickest part. Front and bevel are ground and sides partly ground. Both back and front are convex longitudinally, and the thickness diminishes markedly towards the poll. A small fragment, A 17/116, is part of the blade of an adze which may have been very similar to the previous specimen. The fragment certainly parallels it closely, but it is too small to be certain that it was not from a Type I or Type II adze. These two specimens, and a small undiagnostic flake from the same context, are all relatively unweathered, and unbattered, and could well be associated with the occupation of house I. A marked contrast is provided by the fourth item from this context, A 17/162, which is the very weathered butt end of a Type VII adze. It is 26 mm wide and 59 mm thick at the break and 100 mm long. It is difficult to believe that this item was made or used by the occupants of house I, and it should perhaps be regarded as part of the *'ili'ili* deposit.

As more sites were excavated in Samoa, it became increasingly evident that the presence of an adze in or on the *'ili'ili* floor of a particular house structure did not guarantee its association with the house and its occupants. Indeed, from a number of sites there are many examples of well-weathered and battered fragments, which have obviously formed part of *'ili'ili* deposits for some time. The use of *'ili'ili* for house floors is now well documented for much of the Samoan sequence, and the problem of adze fragment survival for long periods in *'ili'ili* deposits is a very real one. There is no means by which we can be certain that an adze was used during the period with which it is stratigraphically associated, although there are stronger grounds for making such an inference in some cases than in others. The excavator of a site can merely state fully the context in which an adze was found, and present his own interpretations of its association with that context. The same is also true of other categories of stone artifacts, and to some extent also of the scattered occurrences of pottery.

There are only four classifiable adzes from this site which can confidently be assigned to actual occupations. The remainder are of uncertain type, or not convincingly associated with occupations, or both. The four consist of three examples of Type I, one from occupation A and two from occupation D, and one of Type IX from occupation E. Types V and VII are also represented in the site, together with some uncertain examples of the I, II and IX group which may in fact be examples of Type II. Of most of these, however, it can only be said that they were in use in the vicinity at some time, and quite probably at an earlier time than occupation A.

Stone Flakes

Ninety-three items were identified during excavation as flakes. Like other stone material from the site the majority are very weathered, to the point where striking platforms often cannot be identified with certainty and there is little possibility of establishing use damage of edges. Many of these items would not have been considered flakes were it not for the presence of similar surfaces on adzes which have indisputably weathered since they were made.

The assemblage has been divided into items which are clearly struck flakes and items which are too weathered to be certain, which are further subdivided into those which probably are and those which probably are not struck flakes. In addition there are three cores, which may be rejected adze blanks, and one large used flake.

The division of the assemblage according to these categories and by layer is shown in table 8. It can be seen that there are only five flakes which lack the weathered surface that characterises the assemblage.

TABLE 8

DISTRIBUTION OF FLAKES, SU-LE-12

layer	struck flake	probable flake	very weathered probably non-flake	core
1	2	—	1	—
2	2 (1)	—	1	—
3	6 (2)	10	4	1
4	1 (1)	1	—	—
5	1 (1)	7	5	1
6	4	29	5	1
7	3	7	—	—
uncertain	—	1	—	—

(Numbers in parentheses refer to flakes with unweathered surface)

A perplexing feature, and one which casts doubt on the identification of the doubtful specimens as flakes, is the occurrence of a substantial proportion of the assemblage in fill layers, rather than in association with occupations. On the other hand, if the flakes, like the adzes of early type and potsherds, are derived from a very early occupation, both their weathered exterior and their occurrence in fill layers would be to some extent explained.

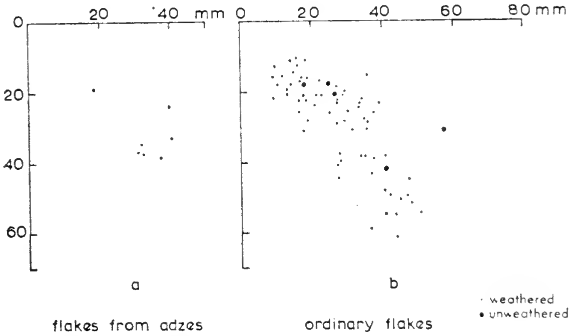

Fig. 48. Dimensions of flakes from SU-Le-12.

Because of the doubtful nature and doubtful context of a large proportion of the assemblage, no detailed analysis has been undertaken. The length-breadth dimensions of the definite flakes, and the doubtful examples which probably are flakes, are shown in figure 48 to give some indication of the size range for comparison with other sites. The small collection of flakes derived from ground adzes is included in the analysis. Comments about the doubtful value of differentiating flakes with ground surfaces from those without in the assemblage from Lotofaga (I, Report 24, p. 249) do not apply with equal force to the assemblage from Le-12, where the flakes struck from adzes are mostly unweathered, in contrast to the general flake collection.

Only one of the three cores seems likely to have been a deliberate artifact rather than a rejected waste item. G 17/830 from layer 5 is a very weathered elongated core with triangular cross-section which could have been some kind of knife-like item. It is 81 mm long, 36 mm wide and 18 mm thick at the centre. It is too weathered for signs of edge damage to be detected, but its superficial resemblance to the flake knife described below suggests that it may indeed have been a tool. The other two cores, G 18/255 from layer 6, measuring 29 mm x 40 mm x 16 mm, and G 17/835 from layer 3, measuring 82 mm x 48 mm x 15 mm, both appear to be waste items, perhaps from adze manufacture rather than flake production as such.

The most interesting item in the flake assemblage is a large flat leaf-shaped flake, A 17/158, from layer 3 in square F-6, which seems definitely to have been used as a knife or scraper. It measures 95 mm in length perpendicular to the striking platform, 66 mm in maximum width and 18 mm in thickness. Both long edges show signs of use or retouch, although it is more pronounced on one side than the other. This artifact was not included in the analysis of flake dimensions.

GRINDSTONES AND FILES

Several pieces of files and grindstones, mostly fragmentary, were recovered from various contexts. A small group of items which were catalogued as such have been excluded from the present discussion because close inspection showed them to be probably unworked.

From the platform fill, layer 6, in the vicinity of squares F-5 and F-6, two small file-like items were recovered. G 18/252 is a flat elongated piece of stone, 40 mm long, 14 mm wide and 6 mm thick, with a trapezoidal section. One flat surface shows signs of use as a file. G 18/140 is a flat square piece of stone roughly 27 mm across and 3 mm thick which appears to have been used for burnishing.

From the very base of layer 5 in square F-7, from a context which gave rise to some doubt whether it should rather be associated with layer 7, a substantial portion of a grindstone, G 18/245, was recovered. It measures 15 x 13 cm and has one hollow ground surface and a maximum thickness of 35 mm. Also in layer 5, in square E-7, a small flat file-like object, G 18/191, was found. It is similar to G 18/252 described above, but its use as a file is less certain.

Several fragments of grindstones were found in association with later occupations. G 17/726 was found in layer 2 in square D-4 and is small (48 x 43 x 13 mm) with one hollow ground surface. G 17/792 and G 17/788 are similar, one slightly smaller and one slightly larger than G 17/726. They were found in layer 1 in squares F-5 and D-6 respectively. One other piece of stone, G 17/786, also from layer 1, has traces of use for grinding or burnishing on one corner.

Obsidian and Chert

Five tiny pieces of obsidian and one small flake of chert-like material were found. One piece of obsidian was found in layer 1, square C-4, and there were two from layer 5, square F-7, and two from layer 7, square F-8 and baulk F/G-5. All five pieces are small and similar to obsidian recovered from other sites in Samoa. All have been worked, but only one piece could be described as a core, while the other four are not true flakes or cores but chips showing portions of flake scars. The core is the largest piece with a maximum length of 16 mm; two of the other pieces are 13 mm long and two are 11 mm long. No signs of use or retouch could be distinguished. The single flake of chert-like material was found in layer 5. Its length and breadth are 16 and 15 mm.

European Artifacts

Several nails and a flat piece of metal were found on the surface of the site. The nails were on the pavement surrounding house I and the other piece of metal was on the slope in trench C1. All are modern in type. It seems reasonable to suppose that they date to the construction of the modern fence at the back of the site or to some similar recent activity. No European artifacts were found beneath the surface and there is no indication that the site has been occupied at all during the European contact period.

Other Remains

Soil conditions at the site were not favourable to the preservation of bone or shell. As mentioned above, the human burial encountered in the site had almost entirely disintegrated, and it is unlikely that any other bone or shell remains would have survived. Some very fragmentary remains which may be pig teeth were found in the platform fill, layer 6, in squares F-8 and F-5, but otherwise no faunal remains were encountered.

Numerous flecks of soft red material were observed in some of the layers, notably 5 and 7, during excavation, and thought to be red ochre. A substantial piece was collected and can best be described as a pebble of soft fine-grained composition whose reddened part yielded an orange-red powder similar to red ochre but not of the same distinctive colour as pieces from Sa-3. Moreover this pebble also lacks the worn rubbed surfaces that appear on lumps of red ochre from Sa-3.

Conclusions

The principal aims of this excavation were to obtain detailed information about house I and to gauge the extent to which the site had been occupied before the construction of house I. Both of these aims were largely fulfilled.

A very complete plan of the posthole pattern of house I was uncovered, which can be compared with house plans from other prehistoric sites, and an early historic settlement in the same valley. The house was identical in structure with the typical Samoan house described by Williams at the time of first European contact (MS 1832: Observations . . .) rather than the forms described by Buck in the early twentieth century (1930: 11-27). The complete absence of European trade items of nineteenth century type places the latest occupation of the site securely in the prehistoric period and the carbon dates show it to have been very late in this period. Although it was not possible to explore a wider area of the site for associated features, data obtained from another prehistoric house site in the valley, Fo-1, indicate the sort of associated cooking area that could be expected.

The excavations also revealed a long sequence of occupation of the site. House I was preceded on the built-up platform by a series of earlier occupations which were represented by postholes and disturbed and scattered curbstones. Evidence of burial practice was also recovered, which provides an interesting comparison with similar data from other sites.

The platform which supported these occupations was itself constructed in more than one stage. There is some evidence that it was not a house platform in its earliest form, but a platform designed for some other purpose which featured a stone-outlined central depression. In this respect Le-12 has some resemblance to mound Va-1, which also appears to have had a central pit at one point in its complex occupation sequence (I, Report 7b, pp. 124-126). The tendency of mounds and platforms which have a long occupation sequence to fluctuate in function may also be noted in the case of Lu-53, where a sequence of residential occupations was succeeded by a star-shaped and apparently non-residential mound (I, Report 14). Whatever the original form of the platform at Le-12, it was converted to a small house platform which was later considerably extended in area.

Although evidence from beneath the platform was fairly restricted in its extent, structural remains indicative of some kind of residential occupations were found. Artifactual material associated with this occupation was very limited and did not include pottery. The soil on which the occupation rested, however, contained sufficient scattered artifacts to indicate the earlier presence in the immediate vicinity of people with a material culture closely resembling that of the early inhabitants of Sasoa'a.

The radiocarbon dates, when interpreted as in table 5, provide a good indication of the ages of the various occupations. The most intensive residential use of the site, that subsumed under occupations D and E, belongs to the last few centuries. This was the time when the traditionally remembered settlement of Leuluasi flourished. House I was built and occupied at the very close of the prehistoric period. The abundance of structural evidence assigned to occupation D, however, and the two dates associated with layer 3, suggest that occupation was either continuous, or at least frequently repeated during the last two or three centuries of the prehistoric period. Occupation C is less securely dated by the single sample from the base of layer 4, but appears to belong to a somewhat earlier period, suggesting that the terrace in its present form may have existed for only a little less than 1000 years. The age and nature of the earlier occupations are less well known, as activity during the earlier parts of the sequence, before construction of the terrace, took place largely outside the excavated area. There is evidence of several earlier occupations, however, the earliest belonging to the first millenium B.C. and associated with pottery.

The excavation at Le-12 had also some less satisfactory features which are typical of the difficulties inherent in the excavation of this type of site in Samoa. Once again the restricted nature of the data obtained concerning the earlier occupations of the site raised almost as many questions as it answered. This is largely because the area of the site sampled by excavation was small, but is also due to the complex nature of the stratigraphy in the relatively shallow deposits. A more adequate sample of the total site could only have been obtained by a very much greater excavation which would have been quite beyond the means available.

The problem of the transfer of artifactual material from its original context to more recent deposits was particularly evident and perhaps acute at this site. This is a serious problem in Samoan archaeology and tends to compound the lesser evil of the very limited range of artifactual material normally encountered in an excavation of this type.

However, despite its obvious limitations, the excavation of this site has provided a body of worthwhile information which could not have been obtained by other means. The most recent occupation of Le-12 can be compared with those of other sites. Le-12 itself and other sites at Leuluasi can now be confidently interpreted not as a single occupation never repeated but as a substantial settlement occupied many times throughout the known span of Samoan prehistory.

TEST EXCAVATIONS AT SU-LE-3, LEULUASI

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The setting and composition of an extensive cluster of sites at Leuluasi in the Falefa valley are described by Davidson (Report 20, p. 8). Site Le-3 is situated on the flat valley floor 120 m to the northeast of Le-12, and separated from the latter by a branch of the stream which drains the central part of the valley (fig. 5). Another branch of the same stream lies just to the north of Le-3.

The site forms a very slight mound on the flat between the two streams. Its principal feature is an irregular rectangular pavement with a border of curbstone boulders each about 35 cm long. Removal of the grass, debris and topsoil from all but one corner of the pavement revealed several structures outlined in curbstones approximately 30 cm long (fig. 49). The most intact set of curbstones, visible when Davidson mapped the site, outlined a large round house about 7 m in diameter. Within it was the partial outline of a smaller round house, 4-5 m in diameter, not evident until the pavement was cleared. A fireplace towards the centre of the two structures appears to have belonged to one of them. On the southwest side of the two round houses, fragmentary outlines of two other round or oval structures appeared. It seems likely that a second fireplace, immediately outside what would have been the perimeter of the larger round house, probably belonged to one of these structures. The surface within the two round houses was covered with river pebbles and gravel (*'ili'ili*) commonly used as flooring in such structures. A pavement of larger stones was attached to the eastern side of the main pavement, and may have had a special function. Time did not permit its investigation. Surface features on the site were generally in good condition, although trees which had formerly grown there had disturbed the pavement at various points.

Limited excavation of a second residential unit at Leuluasi was required to verify the surface indications of recurring occupation on many of the pavements mapped by Davidson and to supplement the results of extensive excavations at Le-12. One purpose of the test excavations at Le-3 was to demonstrate that the typical pattern of successive occupations applied to sites of this type in Leuluasi. Stratigraphic information on a second site, it was thought, might also be useful in determining the length and number of occupations that should be inferred for sites out in the valley flat, particularly if, on the basis of the evidence from Le-12, at the foot of the ridge, the sequence turned out to span an extended period of time.

THE INVESTIGATIONS

Although ten working days were spent on the site, two of them were unproductive because of heavy rain. The wet nature of the soil and continual showers slowed down operations on many other days. The work was carried out under the direction of De Nave by a crew of three, two of whom, particularly the foreman, Kasini, were experienced in excavation. From time to time they were supplemented by workers not needed at the nearby site of Le-12.

The limitations of time and the objectives of the investigations dictated the layout of the squares excavated. Squares A-6, B-4, B-6 and C-5 sampled deposits associated with the curbstones outlining the two round houses and were intended to reveal any features such as postholes and clarify the temporal relationship between the two houses. Investigation in squares C-3 and C-4, it was hoped, would yield sufficient evidence to confirm the existence of still other structures and relate them stratigraphically to the two round house outlines on the pavement surface.

STRATIGRAPHIC SEQUENCE

The investigations in squares A-6 and B-6 furnished information on the temporal relationship of the two round house outlines and provided a basic three layer stratigraphic sequence for the

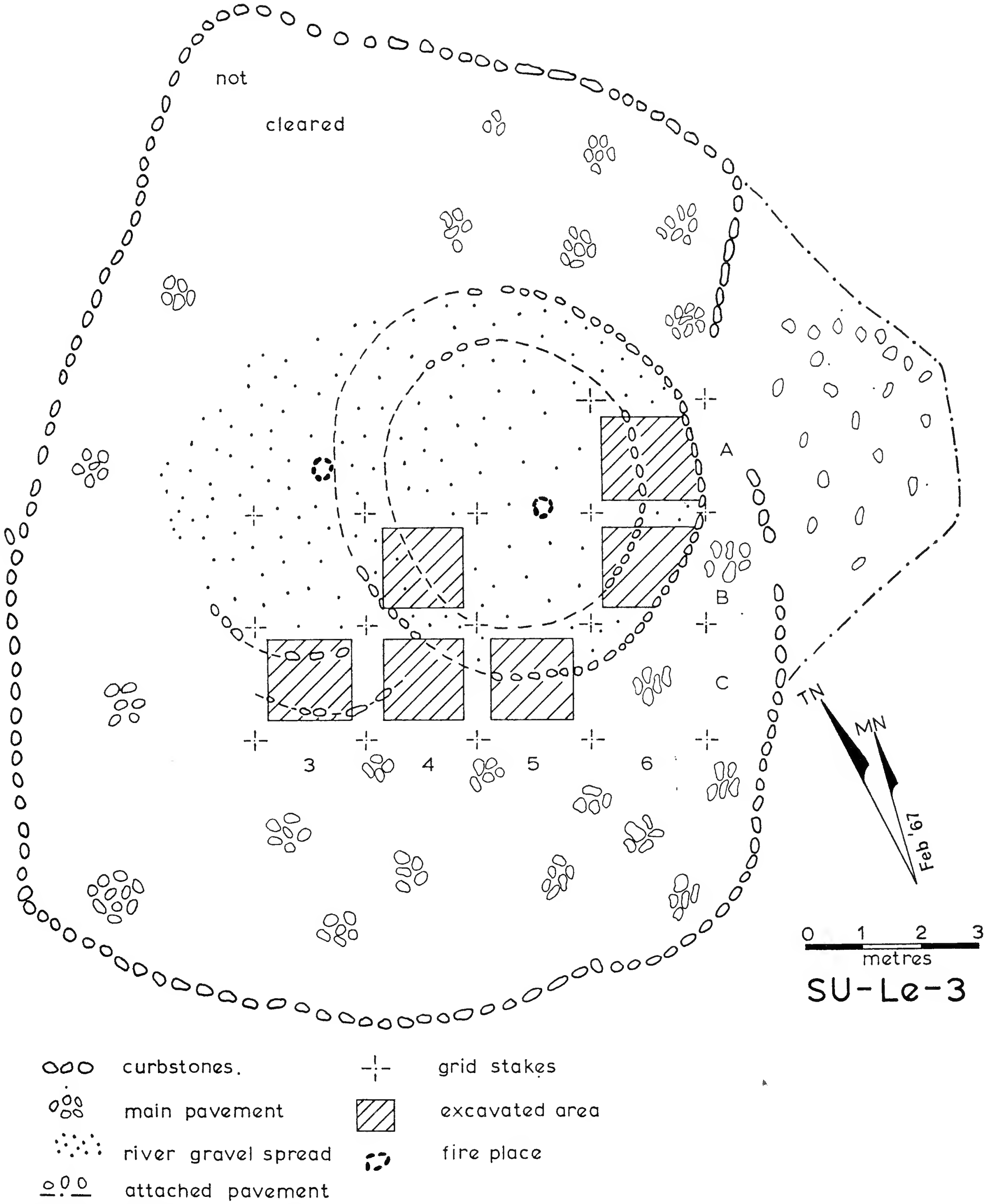

Fig. 49. Plan of SU-Le-3, showing excavated area.

entire site. The excavations in other squares confirmed this stratigraphic sequence, although local differences occurred.

Sequence of Beds

Layer 1: river gravel spreads which consisted of at least two main fills totalling between 20 and 40 cm in thickness. Sub-members were not easy to distinguish except by a higher degree of compaction and concentration of pebbles in the upper bed, a distinction reflecting the slightly looser nature of the lower matrix. The upper and more firm bed was labelled 1a, and lower and less compact member 1b. Only in the northwest corner of square B-6 were the two beds separated by a thin layer of light brown clay 5-10 cm thick. Elsewhere they were more difficult to distinguish.

In squares A-6 and B-6 the depth of layer 1a varied between 10 and 20 cm, the latter being more usual. In the northwest part of A-6, layer 1a filled a depression 50 cm in diameter to a depth of 30 cm below the surface. In squares C-3, C-4 and C-5 the thickness of this bed also varied between 10 and 20 cm, with greater depths being encountered only in some pit-like features. Layer 1b also ranged from 10 to 20 cm in thickness in squares A-6 and B-6, with a usual depth of about 15 cm. In squares C-3, C-4 and C-5 typical thickness was between 15 and 20 cm.

Layer 2: a thin discontinuous black band which marked the contact between the river gravel deposits above and the uneven clay surface of layer 3 below. The black band was always 5 cm or less in thickness and often did not appear except as lenses in the sections. Its colour derived from the heavy stain of finely divided charcoal in a clay matrix. Only in one place were any cultural deposits encountered under layer 2. This was in square A-6 where a thin fill containing a little river gravel was encountered under layer 2, separating it from layer 3. In distribution, layer 2 was present as a discontinuous band in squares A-6 and B-6, as a consistent bed in C-5, as a very thin lens in C-4, and as occasional patches in C-3 and B-4.

Layer 3: a homogeneous, well compacted deposit of brown clay of undetermined depth. It presented a rather uneven upper surface which had been modified by numerous features cut into it from some point in layer 1. In most cases, cultural features could only be delineated in this clay layer by their river gravel fills. However, it usually proved impossible to relate these features to a specific point within layer 1.

Excavation by levels in layer 3 was carried to 50 cm below ground surface in squares A-6 and B-6 and to 70 cm below ground surface in C-3, C-4, C-5 and B-4 without encountering another layer. In C-4 and C-5 a change in composition was noted in the form of particles of decomposing orange volcanic materials flecking the lowest levels in the clay.

Interpretation

The river gravel fills of layer 1 seldom exceed 40 cm in depth. They are sufficient, however, to account for the low mound-like appearance of Le-3 on the flat today. This slightly raised platform together with the paving of larger stones would have provided a durable and well-drained living floor in an area that would otherwise become a most unattractive and muddy surface under continual use. For this reason these deposits are interpreted as purposeful fills brought to the locality on at least two separate occasions, and probably many more. The difficulty is that only major rejuvenations can be distinguished, lesser increments simply being incorporated into the existing occupation layer.

The charcoal bands and lenses of layer 2, lying as they do on the uneven and undisturbed natural clay surface of layer 3, are best interpreted as traces of a former soil zone and an indication that surface debris was burned, presumably in clearing the area of vegetation before construction of the living platform. The uneven fill, the discontinuous nature of layer 2, and the unbroken massive nature of the exposed layer 3 deposits all support this interpretation.

There is no evidence to suggest that layer 3 is a deliberately deposited fill. Its composition indicated a deposit of natural origin probably water laid during flooding by one of the adjacent streams. Excavation penetrated this layer only to a depth of 30 cm without encountering other cultural deposits and it is not impossible that other cultural deposits are buried under it at some depth.

The one slight piece of evidence for an occupation earlier than layer 1 is the thin lens-like fill with a few pebbles found between layers 2 and 3 in square A-6. This lens has postholes and a few portable artifacts associated with it. It implies some use of the locality before deposition of layer 1, but not a long or extensive occupation. Since the position of the site between two branches of the stream is less favourable for successive settlements than that of Le-12 at the base of a ridge slope, a restricted number of earlier occupations is to be expected. If the above interpretation of the site's stratigraphy is accepted, major occupation occurred only once, when a succession of structures was erected on a raised living surface which underwent at least one rejuvenation in the course of its use.

Occupation Surfaces and Features

During excavation all but the northwest corner of the platform was cleared of grass and debris exposing the features of the most recent living surface. This process emphasised the difference between the river gravel surface of small stones toward the centre and the paving of larger stones toward the outside. It also exposed the curbstone outlines of fireplaces and houses on this surface but gave no indication of sub-surface features associated with them.

As the excavations at Sasoa'a (Report 21, p. 35) and Folasa (Report 22, p. 56) have demonstrated, such living surfaces will usually carry evidence of successive structures, often with little or no stratigraphic differentiation in the form of separate layers. This means the evidence for establishing a sequence of structures rests on demonstrating that construction of one unit has been superimposed on another, cutting off, destroying, or otherwise interfering with the earlier one.

On the 1a living surface, no stratigraphic evidence was encountered to indicate that remains of curbstone outlines in the vicinity of square C-3 were earlier than the two round house outlines in squares A-6, B-6 or B-4. The two round houses, situated more toward the eastern side of the platform, did appear to cut off the inferred outlines of these other houses, which were more centrally located. The large round house outline was the most intact and the only one visible when the site was initially mapped by Davidson. This suggests that the more intact round house outlines belong to the later set, which conforms with the distribution of the river gravel spread to the west beyond but not obliterating the large round house outline. In contrast the other curbstone outlines were not apparent until the whole living surface had been scraped.

The smaller round house outline, like those in the earlier set, was not initially visible, nor was it as intact as the larger one. Also it was shown to be stratigraphically earlier than the larger one though its relationship to the other possible set must be inferred on the grounds outlined above. The stratigraphic evidence was of two kinds. First, the curbstones of the larger house were only slightly embedded in layer 1a, while those of the inner house were well embedded in that layer and in some cases their bases penetrated into layer 1b. Second, when the river gravel of layer 1 was removed, it revealed an underlying tightly compacted pavement, 40-50 cm wide along the outer perimeter of the smaller house outline (fig. 50), which had been

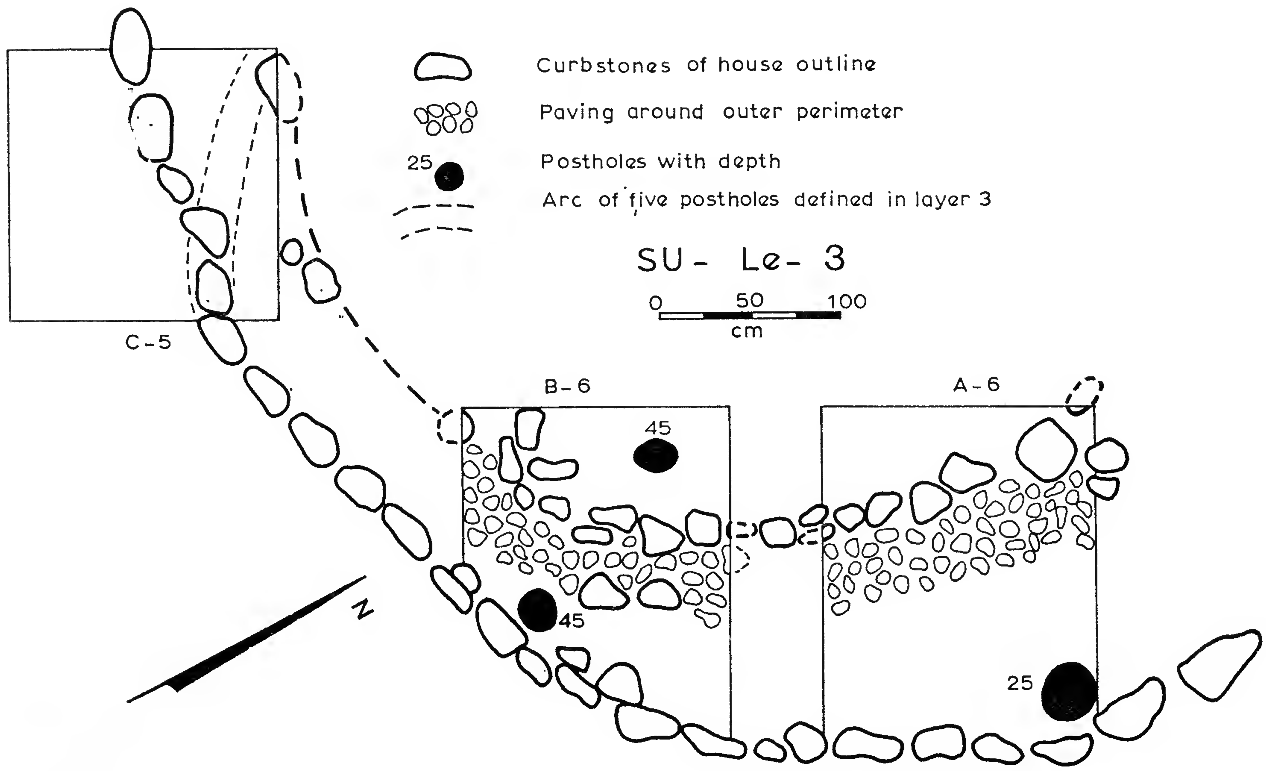

Fig. 50. Plan of part of SU-Le-3 showing features associated with layer 1a living surface.

covered over in construction of the larger house outline. Such narrow paved borders on the outer margins of houses were observed at Sasoa'a and Folasa (Report 21, p. 19; Report 22, p. 36). Another large stone, probably also belonging to this house outline, was encountered just under the upper gravel surface in the northwest corner of square C-5, but no sign of the house outline was found in B-4, where curbstones of the outer house were in evidence. Presumably the earlier curbstones had been removed from this area, probably for re-use, rather than buried under a later increment of river gravel. On the same reasoning the fireplace central to both houses probably belongs to the later and larger one, though it could have served both.

Only three postholes could be identified and assigned with certainty to the two most recent round houses (fig. 50). Other features filled with 1a deposits and definitely cut from the 1b surface or above were also noted, but cannot be assigned to particular structures, or to the 1a living surface. Two such deep postholes, one of fairly large size, were recorded in section on the northwest side of square C-5, and each may belong to either one of the two recent round houses. Another was recorded next to the west wall of square A-6 (plate 9) which may well be associated with the inner round house.

In summary there is good evidence for three, and probably four successive house structures on the uppermost living surface, the last two being of rounded shape, and the larger of these being the later. There is also evidence that layer 1a was of composite origin with the last increment of river gravel spread added when the larger round house was constructed.

The other living surface which can be identified is that of layer 1b. Again there were postholes which appeared to derive from it. To these must be added many other postholes with 1b fills which were not recorded until the surface of layer 3 was reached. These features were recorded in the greatest frequency in squares C-5, C-4 and C-3, indicating that earlier structures were more centrally placed on the platform than the later houses. These features include: one posthole in square B-6, two postholes in square A-6, two postholes and a large pit in square B-4, nine postholes (including stake holes) in C-5, nine postholes in C-4 and three postholes and perhaps more in C-3. As well there were three postholes in square C-5 cut from the surface of layer 1b or above, and another with the same origin in square C-3. Besides these there were three other probable postholes sealed by layer 2, all in the area of square A-6, where a thin fill with a few pebbles appeared between layer 2 and the layer 3 surface.

None of these postholes defined any obvious patterns except in square C-5. A number of those in C-5 were aligned in an arc from north to south roughly paralleling the inside of the wall of the most recent house (fig. 50). Obviously not all belong to this house, but some are perhaps to be associated with it.

No alignments of curbstones definitely associated with the 1b living surface were recorded, although the stratigraphic evidence suggested that it was on that surface that construction of the inner round house began, after which the pebble spread was added.

One scoop fireplace was discovered on the surface of layer 3 in the northeast corner of square B-4.

There are nine charcoal samples from the site although none of suitable size confined to a single feature was collected, and the one submitted for dating proved too small for analysis. Consequently age cannot be estimated on the basis of carbon dates. The length of occupation may, however, be calculated by giving house outlines a maximum duration of 20 years each, postulating at least three on each of the two living surfaces, and adding 20 years for the occupation at the base. On this basis a time span of the order of 140 years would appear to be involved. A total of 70 years is implied if present day figures for small *fale* are used (Report 39, p. 236).

Portable Artifacts

A small but typical assemblage of portable artifacts found on house floors in Samoa was recovered on this site. It consisted of adzes, flakes and grindstones, none of them particularly diagnostic in dating the occupation, except perhaps as one later than the earliest phase of Samoan settlement.

Adzes

Two broken fragments, recovered from the surface of the pavement to the south of the house outlines, proved to join, forming a complete adze of Type VI, 121 mm long. It has a subtriangular section at the centre, flaked sides and back, and a ground front surface forming a median ridge expanding toward the cutting edge. The well ground bevel exhibits two flake scars from use along the cutting edge.

Three other adzes were excavated, two from layer 1 in square B-4 and one on layer 2 in square A-6. The two from square B-4 were incorporated in the river gravel deposit 10-15 cm below the surface, though neither appeared to have been rolled. They are probably to be associated with one of the earlier house structures of the 1a living surface. One specimen, 105 mm long, is of Type I. The other, which is 115 cm long, may be assigned to Type II because it possesses the median ridge on the back, a five-sided irregular section, and the undulating lateral edges that result from bilateral flaking of the sides. However, traces of a ground surface along the whole extent of both back surfaces suggest that they were once ground flat. If this is true the specimen may be a Type VIIIb adze, whose back and sides have been reworked, so that morphologically it now most closely approximates Type II. The cutting edges of both specimens carry a number of flake scars from use.

The adze from layer 2 is a much more finished specimen, the sides, front and bevel being fully ground, and the back partly so. Morphological features place it in Type I and measurements place it among the smaller adzes of this type. The central section is 39 mm wide on the back and 12 mm thick, yielding a low shoulder index of 31 often found in adzes of this type. Again two small flake scars at either corner of the cutting edge indicate it was damaged by use.

While none of the three adzes can be assigned to a particular period of Samoa prehistory, all are types frequently encountered in late prehistoric contexts.

Flakes

One flake with a ground surface is a chip broken from an adze. It was found, along with the one adze, in layer 2 in square A-6. Other flakes were confined to two locations, the upper part of layer 1 in square C-3 and the lower part of the same layer in square A-6. The first group of five flakes from C-3 all have unweathered surfaces and four appear to be waste flakes measuring from 23 to 48 mm in greatest dimension. The fifth is a large thin flake of square outline, 42 by 45 mm in size and no more than 6 mm thick. Along two edges a series of concave facets have been worn, two large facets with chords of 14 and 18 mm on one end of the flake, and five smaller ones with chords of 5 to 11 mm on the other edge. The facets are not chipped but have been worn through abrasion perpendicular to the edge of the flake to a depth where the facets are 1 to 2 mm thick. Presumably the flake was used as an abrading tool to smooth rounded wooden shafts.

The flakes from A-6 have highly weathered surfaces. All but one is of a rock type used to make adzes and other stone tools, although 12 of the 24 flakes lack striking platforms and may well be natural spalls from the local gravel boulders. One appears to be a core, and this worn pebble may be one from which some of the flakes above have been removed, perhaps naturally. The other 12 flakes are very similar to those from Le-12 (Report 24, p. 87). None shows signs of secondary working or use, though in their weathered state it is difficult to be certain. They are best interpreted, as are those on many house sites, as waste from the manufacture or reworking of adzes.

Pottery

Two pieces of fine-tempered thin-walled pottery were discovered, one toward the base of layer 1 in square C-5 and the other toward the base of the same layer in square A-6. Neither is likely to be in primary association, and they were probably brought to the site in the river gravel. It is unsafe to use them to place the deposit in time.

Grindstones

Three grindstone fragments were found on this site. The largest is a sizable flat boulder 45 cm long, up to 32 cm wide and 13 cm thick, which also served as a curbstone in the northern border of the pavement. Two large hollow surfaces have been ground into the flat sides, one 2 cm deep and the other up to 4 cm deep. The rock is a very fine-grained homogeneous basalt and the resulting grinding surface very smooth. Such stones are today taken from old sites and used as basins in which to pound kava with a hammer stone. There is no evidence for the antiquity of this practice, chewing the root being the traditional method. The more likely use of this stone would be in the sharpening and shaping of stone tools.

The second grindstone is made on a thick coarse-grained natural boulder of olivine basalt with two sides broken off. It is 27 cm by 24 cm by 14 cm in size and only one of the flat sides carries a rough, slightly concave grinding surface.

The third grindstone is the broken end of a once larger object. It was made on a much thinner boulder slab, now 28 cm by 21 cm by 8 cm in size, though it was once much longer. The rock is again a coarse-grained olivine basalt. In contrast to the second grindstone, the one hollow ground surface is deeper and the ground surface more even. The last two grindstones were both found on the southern part of the pavement, one being mapped in position by Davidson's original survey (fig. 5).

Conclusions

Although these excavations were of limited extent, they furnished valuable information on two major points. First they demonstrated that as in other settlements, the surface of a residential site in Leuluasi was used for a succession of houses, in this case three or more, and that their position on the pavement, their size and perhaps their shape, varied from one structure to the next. This implies that houses were not simply rebuilt, but rather that old houses were dismantled and new ones erected.

Second, both the evidence of a succession of structures on the two major living surfaces and the evidence of accumulation of deposits without major interruption imply occupation of this locality for from 70 to more than 100 years. However, the location is not one that would have favoured continued reoccupation at various times during the whole 2000 year span of settlement in the valley. After a brief initial use of the locality, there was only one occupation of sufficient duration to require repeated rejuvenation of the platform by the addition of gravel spreads to the pavement. No intervening sterile fills, natural deposits or soil horizons occurred once occupation began.

We are inclined, despite an absence of materials capable of dating the main occupation at Le-3 more precisely, to view it as contemporary with the cluster of residential units mapped by Davidson in this part of Leuluasi, or at least with the most recent living surface on each. In favourable circumstances some sites, like Le-12, may yield much longer sequences, often with an interrupted series of earlier occupations. Since this does not apply to Le-3, it is reasonable to assign the main occupation there to the same period as the most recent occupation of the same type at Le-12. This would conform with the settlement pattern data and traditions presented by Davidson (Reports 20, 30) which suggest that these sites were all part of one major settlement occupied at some point not too far back in the prehistory of the upper valley.

On the evidence from Le-3, this part of Leuluasi in the valley flat would have to be interpreted as a permanent settlement of something around a century in duration during which occupation was fairly continuous. The data furnish no support for an interpretation of residential sites like Le-3 as bush refuges occupied either intermittently or for a single brief period during or following a war. The situation where a losing side retreated to some inland situation and settled there until once again permitted to return to their homes, does not seem to apply to Leuluasi. In this respect Le-3 can be profitably contrasted with Te-5 at Te'auailoti, which was interpreted as a bush refuge. There a similar living platform lacked the series of curbstone outlines, the maze of postholes that results from successive houses, or the multiple additions to the river gravel paving (Report 27, p. 104). Instead, the evidence at Le-3 may be compared with that from Sasoa'a (Report 21, p. 35) and Folasa (Report 22, p. 56) where excavations in residential units provided very similar evidence for successive occupations of some duration.

TEST EXCAVATIONS AT SU-TE-1, TE'AUAILOTI,

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Part of the investigation of Samoan settlement patterns in the Falefa valley involved the excavation of a series of sites selected by Davidson (Report 20, p. 12) on the basis of her surveys of the eastern arm of the upper valley. Te'auailoti was the furthest (five miles or 8 km) inland of the named areas of settlement which she studied and therefore several sites in it were deemed worthy of excavation. As the area known as Te'auailoti is large and includes several physiographic environments, excavation of sites in two localities, A and B, was undertaken. Locality A is a high narrow ridge rising from the valley floor, which is here about 250 ft (76 m) above sea level, to an elevation of about 450 ft (137 m). It is situated directly below the Mafa pass at the back of the Falefa valley and thus extends out from the mountain mass that runs down the centre of the island of Upolu. Sites on the ridge overlook the gently sloping alluvial floor of the upper Falefa valley in which is situated the large prehistoric settlement that covers an area now named Leuluasi. Locality B, farther inland to the west and at the base of the ridge, is described in Report 27.

The sites in locality A consist of a few fairly widely spaced terrace flats cut into the ridge as it climbs towards the mountain wall behind. Most of these sites are not well defined and only a few appear to carry any clearly visible features on their surface. Because the features on Te-1 were among the best defined, it was selected for test excavation during part of the period when major efforts were focused on the sites at Leuluasi below (plate 10).

SITE DESCRIPTION AND FIELD PROCEDURES

SU-Te-1 consists of a large, nearly square platform, 35 by 39 m, well up the ridge above two lesser terraces. The area of the platform was completely paved with small flat stones, and the border was carefully defined by an almost intact set of curbstones (fig. 51 and plate 10). On the upslope side at the rear of the platform, a long shallow ditch extended from one side of the ridge to the other. The surface at the centre of the ditch was only 40 cm below that of the platform, but the abrupt scarp behind was 2 m or more in height. The ditch was approximately 3 m wide and 39 m long. Around the front of the platform an earthen scarp was in evidence, suggesting that this part of the platform had been formed with the fill derived from the ditch area.

Investigations at the site began at the end of January 1967 and lasted for ten working days. During this period a crew of seven workmen and one experienced foreman, Kasini, cleared the entire platform and ditch of long grass and removed the topsoil and debris from most of the paving. Under forest cover this had accumulated to depths of 10 to 15 cm.

The main aims of the investigations were: (1) to learn if the site was residential and whether the occupation was of a temporary or more permanent nature, (2) to confirm the surface indications that the occupation was probably prehistoric, and if possible to obtain some charcoal samples which would help date it, and (3) to see if the location on the ridge and the presence of the ditch at the rear of the platform were defensive, in which case the site might be interpreted as one of the defended bush refuges mentioned in the ethnohistoric literature (Davidson 1969a: 76).

Much of the site had been badly disturbed by the roots of large trees in the heavy bush which until recently had covered the locality. In places there were shallow depressions where trees had been uprooted, with small mounds of soil appearing beside the holes. Much of the more recent damage on the platform has been caused by two still-standing *ma'ali* trees (*Canarium Samoense* Engl.), whose root systems have managed to cover much of the site.

EXCAVATIONS

Because of the aims of the excavation and the disturbed nature of the site, most of the initial

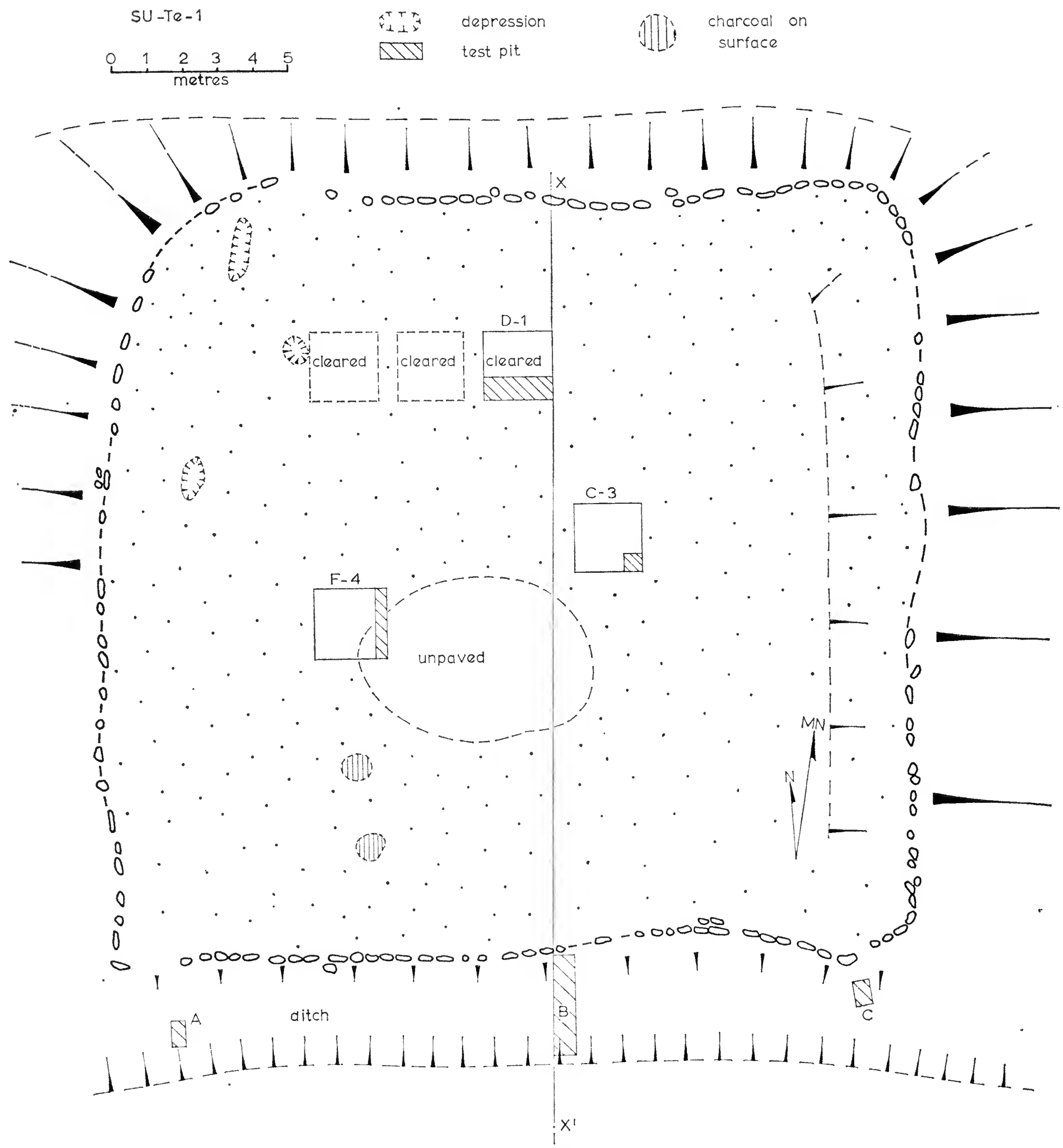

Fig. 51. Plan of SU-Te-1, showing areas cleared and excavated.

efforts went into surface investigation. This consisted of trowelling all areas on the pavement and examining them for signs of former structures. None was found. But it did reveal that an oval area toward the centre of the platform was completely free of paving, strongly suggesting the presence of a house in that position. When the area was scraped down hard, however, and examined for postholes, none was found. This suggests that it had been the intention of the terrace builders to erect a house in that area, but for some reason the task had been abandoned before its completion. This inference gains support from the lack of curbstones around the perimeter, and the absence of any *'ili'ili* deposits within the presumed house area.

At this point in the investigation a number of squares were laid out (fig. 51) and the paving stones in each removed. This exposed an underlying brown clay fill but revealed no signs of any earlier structures or other features.

It was now clear that no evidence existed for a structure on the surface of the platform, and we decided to use the few days remaining to put down six test trenches, three in the ditch and three in some of the squares which had been cleared of their paving and superficial deposits. The tests in the ditch consisted of a rectangular trench toward the centre labelled B, and two smaller trenches, A and C, at either end, while those on the pavement were made in squares D-1, C-3 and F-4 (fig. 51).

The test trenches in the ditch revealed little other than a shallow deposit of organic debris and topsoil. They made clear, however, that the ditch was not a deeply cut affair, but simply an elongated depression at the base of the back scarp which served to drain the rear of the platform.

In the test trenches on the platform, however, a layer of brown clay fill was encountered, at the base of which was a charcoal-stained clay surface. While the depth of the brown clay fill varied from 20 to 55 cm according to location on the platform, the charcoal-stained surface formed a thin layer which was only 5 cm thick. The brown clay fill is derived from the Uafato hill soils which Wright (1963: 163 and soil map of Upolu) has mapped for this locality. In one place in square C-3, a small fire area with charcoal was identified (fig. 52), but the charcoal proved to be too scattered to provide adequate material for a radiocarbon sample. The clay material under the charcoal-stained layer was of the same composition as the fill above, but was undisturbed by human activity.

By projecting the resulting sections from the various test trenches on to the main profile across the site, the stratigraphy and probable occupation sequence become fairly evident. It would appear that one of the flatter but uneven parts of the ridge was cleared and the debris burned off, this event being reflected by the variable charcoal-stained surface. Removal of the soil across the ridge at the back of the site increased the flat area, leaving a 2 m scarp. The resulting spoil was used to level the area, large stones being employed as curbstones around the perimeter to define the platform, which was then paved with flat stones in all but the part intended for the house.

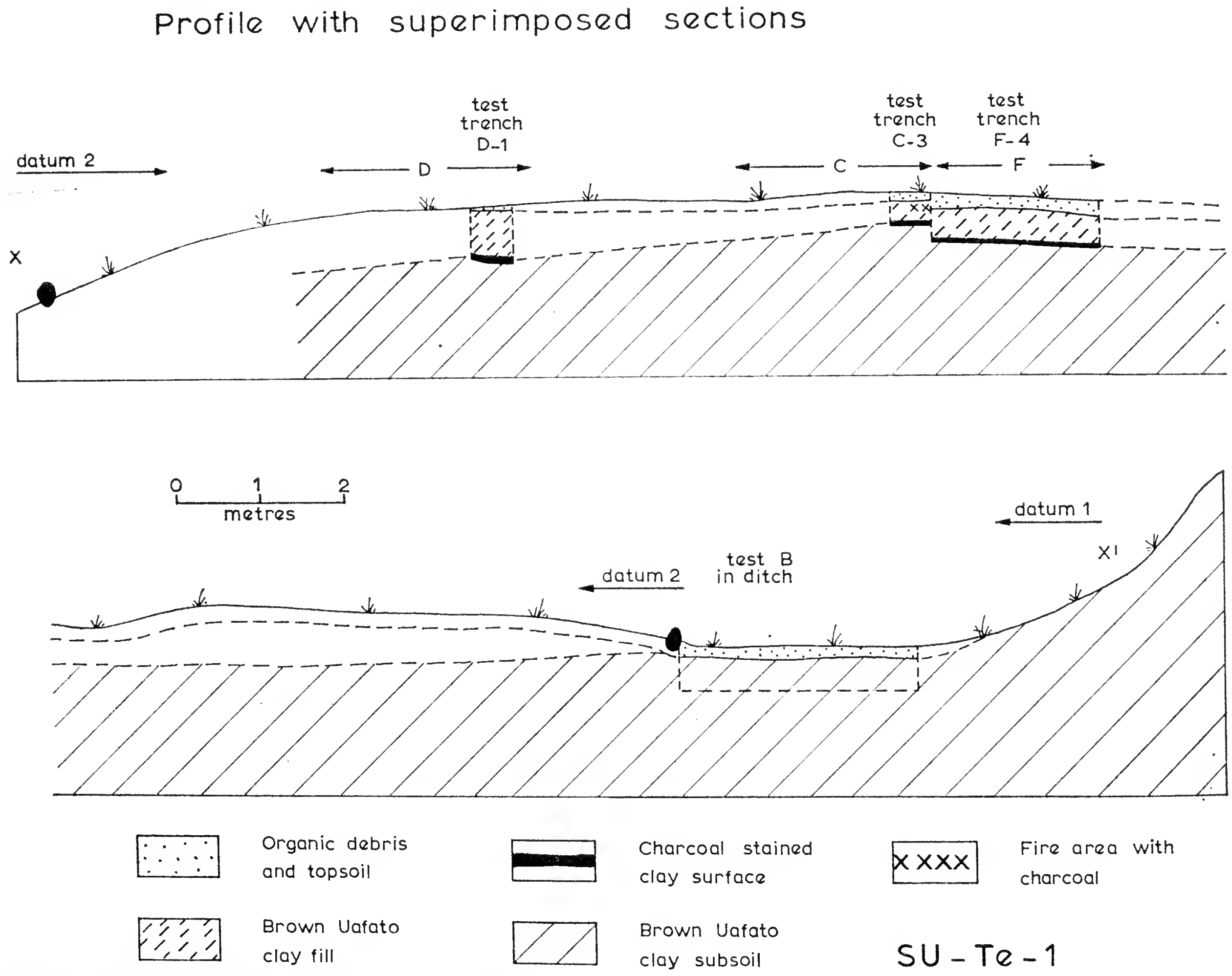

Fig. 52. Profile of SU-Te-1, with superimposed sections.

Portable Objects

A spent bullet of modern origin was found on the surface and a fragment of a flattened boulder, 9 cm by 9 cm by 3.5 cm in size with one small ground hollow, was embedded in the pavement 56 cm west of square D-1. In the fill of trench B three sherds of pottery were recovered, but it is doubtful that they were in primary position, and therefore they should probably not be used to date the site. A small adze chip with three ground surfaces from the front corner of an adze, probably of Type I, was found in the first level of square D-1.

Interpretation

By areal excavation of the surface of the large paved terrace platform on the ridge at locality A at Te'auailoti it had been hoped to verify its residential function. The results, however, proved ambiguous, and although it was possible to define an unpaved area in a suitable position and of suitable dimensions, no conclusive evidence that it had contained a house was forthcoming. If a house did stand on the unpaved area of the platform it lacked both *'ili'ili* and curbstones, thus differing from the normal type of dwelling house revealed by excavations on other sites in the interior of the valley. It is thus possible that the site fulfilled some specialised function for which a house different from the normal domestic dwelling was required.

The evidence does provide a partial answer to the question of duration and age, however, for if occupation occurred, it would seem to have been of a fairly brief duration and not repeated. Moreover, as the site was covered in heavy bush until recently, and neither the modern bullet nor the more ancient sherds of pottery are to be taken as an indication of age, the age of the bush and the lack of European trade items would imply a prehistoric date, as would the fragment of grinding stone. Unfortunately, no features with sufficient concentrations of charcoal suitable for dating were encountered (another indication of limited occupation), and in view of the recent burning off of the area, it was judged unwise to use the scattered charcoal on the platform surface for dating.

Investigation of the defensive nature of the site was also inconclusive. The location of the site on the steep ridge provides excellent defence on two sides. The ditch on the south side provides a steep scarp to the rear of the site which would restrict access from this direction as well. However, attackers would have had a height advantage. Thus the ditch does not seem a very satisfactory defensive device. On the other hand it does have the effect of isolating the site as a unit, so that its boundaries are clearly delimited. The ditch may also have provided drainage around the back of the terrace. On the whole it appears that the site was not designed principally for defence.

The position of the site must also be taken into account. Its location on the ridge places it away from those areas most suitable for agriculture on the fertile alluvium of the valley or the adjacent slopes. The position on the ridge, therefore, does not seem to be explained by convenience of access to any extensive nearby garden areas. Again this site differs from the obviously residential sites of Sasoa'a, Folasa and Leuluasi in this respect. The two most plausible explanations are (1) that the site, while not actually a fortified refuge, was a bush refuge for people temporarily banished from their normal residence, or (2) that it was a specialised site of a kind for which a remote situation on a steep ridge was preferred.

Against the first interpretation are the site's obvious differences from SU-Te-5, which more satisfactorily conforms with the requirements for such a site (Report 27), and the fact that considerable time and effort had been devoted to its construction. Both these considerations suggest that the second possibility is more likely. On the other hand, so little is known about the nature of Samoan religious sites, or of the actual physical characteristics of pigeon-snaring sites, the two types of specialised site most likely to require a location of this kind (Report 37), that a positive identification of this site as one or the other would be out of place. The possibilities are discussed further in the wider context of the Falefa Valley project in Report 30.

Conclusions

Investigation of SU-Te-1 showed that although considerable effort had been devoted to the construction of a large well-defined terrace and the paving of its surface, no normal dwelling house of the type encountered on other sites in the valley had been built on it. If there was a house structure or structures on the terrace their presence would be revealed only by extensive excavation, and they would be unlikely to have served as normal domestic residences. Although the site is isolated and well defined, it was not primarily a fortified site. Of the two most plausible interpretations, that it was a bush refuge or a specialised, non-residential site, the latter seems more likely.

ACKNOWLEDGEMENTS

Thanks are due to Janet M. Davidson who did the plane table mapping of the site and furnished guidance in the field and in writing the report, and to Kasini, who so ably assisted in carrying out the excavations.

EXCAVATION OF SU-TE-5, A BUSH HOUSE AT TE'AUAILOTI, LOCALITY B

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A persistent claim of those who oppose the concept of extensive settlement inland in Samoa is that all the remains found there were left by people defeated in war who retreated into bush refuges until it was again feasible to return to their own land (Davidson 1969a: 50, 76). Our excavations at settlements like Sasoa'a (Report 21), Folasa-a-lalo (Reports 22 and 28) and Leuluasi (Reports 24 and 25), however, have failed to support this contention, as all these settlements have been characterised by far longer occupations in more substantial dwellings than would be expected of temporary bush settlements. Still the references to refuge settlements in the bush in the ethnohistoric literature suggest that such sites ought also to be present, especially in remote situations well inland.

In the Falefa valley survey by Davidson (Report 20, p. 11) one set of structures which seemed to qualify for inclusion in this category was a series of small houses on paved platforms encountered along the very back slopes of the Falefa valley in a locality known as Te'auailoti. Whereas the terrace platforms of locality A were cut into a high ridge behind Leuluasi (Report 26, p. 98), those of locality B were low pavements scattered on flats along the steep slopes and ridges just above the level of the stream at the back of the valley. This places them at a distance of more than five miles (8 km) from the coast in an area that is only now emerging from heavy bush as the local plantation is developed. The ground here is very poorly drained and the soils are normally saturated, so that the locality is still not favoured for agriculture, although it is now used for grazing. It is the most inland settlement recorded by Davidson in this valley, and it was noticeable that the house outlines in it were smaller than those encountered elsewhere. Archaeological investigation of one of the sites in this locality promised, therefore, to throw some light on the question of "bush" settlements, and for this reason a brief excavation of the house at SU-Te-5 was conducted.

FIELD PROCEDURES

The excavation was carried out by a very experienced crew from the Sasoa'a site over the course of two really wet and miserable days. Only their experience and the presence of tarpaulins over the actual area of the excavation made it possible to continue. Because of the simple nature of the stratigraphy, however, it was possible to complete the task in the two days remaining before the close of the Samoan programme.

Since the time available was very limited, only the interior of the small house was excavated, although both the pavement and the house were cleared and mapped. For this reason no grid was imposed on the site; instead, a central baulk 30 cm wide was established across the shorter dimension of the house, and the two interior portions were both excavated (plate 11).

The pavement consisted of a number of large flat stones, a few boulders and finer river gravels known as *'ili'ili*. Its border was outlined in small boulders, with a low terrace wall along the two sides where the ground sloped away abruptly. The area occupied by the pavement was a small knoll 6 or 7 ft (*ca.* 2 m) above the stream which ran along the base of the slope to the north and west. The pavement, as can be seen from the plan (fig. 53), was of irregular shape, the house occupying only a small portion at one end and well back from the bank. No trace of features other than the house outlined by the stone curbs could be identified on the pavement.

The interior of the house proved to have an undifferentiated fill of river gravel or *'ili'ili* approximately 15 cm deep. This was removed by trowel without encountering any historic or prehistoric artifacts. In most places this fill rested on the underlying yellow clay natural into which the bases of a number of features not possible to define in the *'ili'ili* layer had been cut. In a few places along the northwest side of the house, on either side of the central baulk, were patches of a thin sub-floor fill of lighter brown soil underlying the *'ili'ili*. Scraping down hard on the

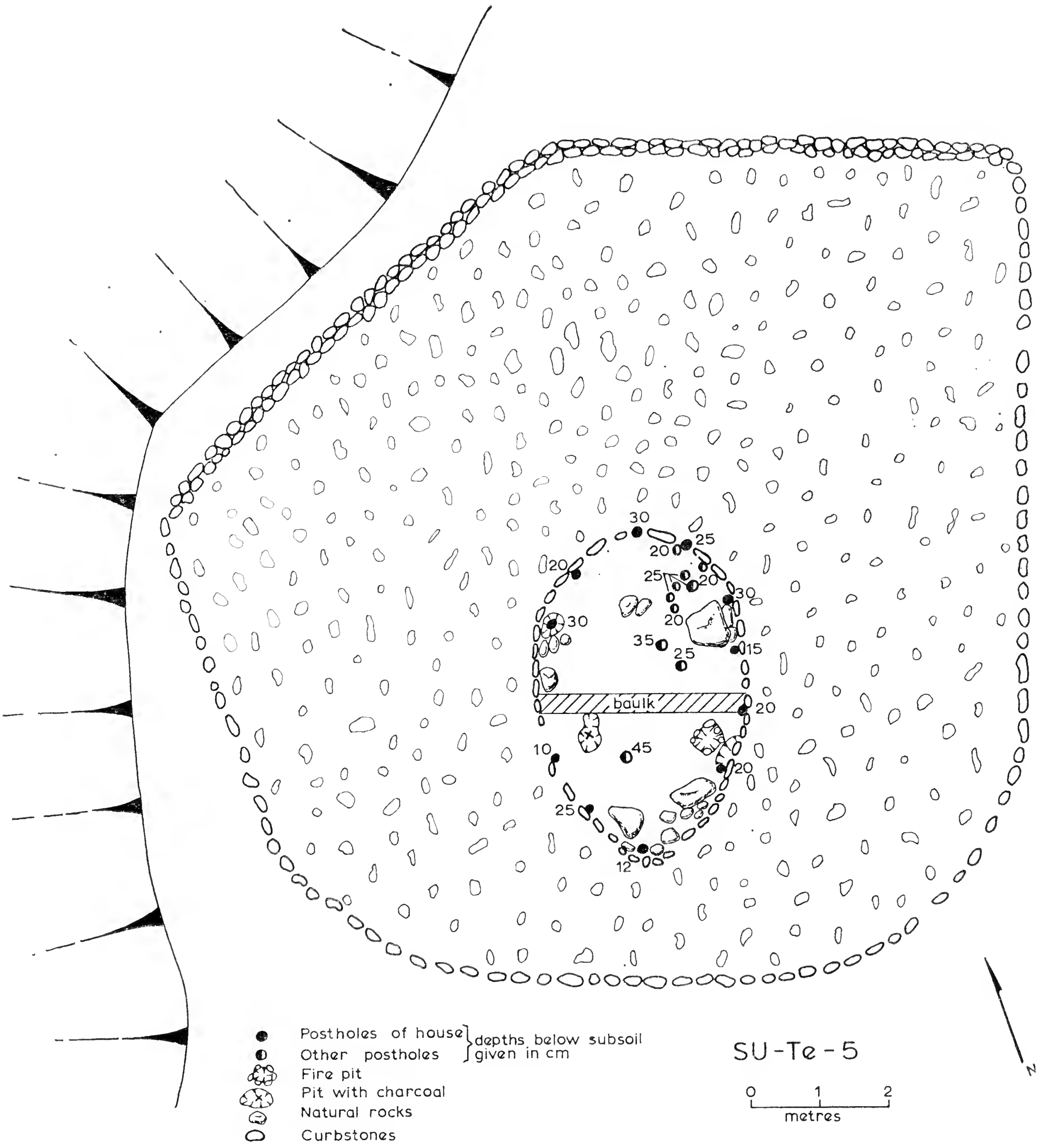

Fig. 53. Plan of SU-Te-5 showing excavated features.

yellow clay surface made it possible to define a number of features, most of them postholes filled with *'ili'ili*. A few, however, were pits with a fill like that of the sub-floor soil patches.

Structural Features

It appears that the pavement was probably formed by defining the perimeter in stone, and where necessary building this border up into a low standing wall along those sides where the ground surface was lower. At the same time the irregular area inside was levelled, the fill being dumped behind the low stone wall. After this the house was built, and when it was completed the interior was filled with *'ili'ili* and the exterior paved with stones and *'ili'ili*.

Only one house appears to have been erected in the area excavated, and there is no sign of another house elsewhere on the pavement.

Because we were dealing with only a single occupation and simple stratigraphy, the definition of postholes belonging to the structure proved relatively easy, and a fairly complete set was recovered. There are 11 certain postholes belonging to the house among a total set which numbers either 12 or 13. From the relationship between some of the stone curbs and the postholes, it appears that initially the house posts were set into the ground and the wooden superstructure erected. Then the stone curbs and *'ili'ili* pavement inside the house were added, which is in keeping with common Samoan practice. The house, however, measures only 4.7 m long and 2.8 m wide, or approximately half the size of the smaller range of houses at Sasoa'a and Folasa-a-lalo (Report 21, table 1, p. 30).

No well-defined curb-lined fireplace was evident in the *'ili'ili* pavement, but a pit outlined in stone on the eastern side of the southern half of the house is probably a firepit, although it contained little charcoal or ash. A number of large boulders outcrop at the southern end of the house, making the definition of the features there difficult (fig. 53). Other shallow pits and a number of additional postholes might be used to suggest that a previous structure once stood in approximately the same position. However, it is difficult to infer such a structure on the evidence available. The pits could as easily be explained as the result of storage of some kind within the house, while some of the postholes are clearly secondary ones belonging to the house, and the others could be interpreted as supports for internal features within it.

Natural Portable Remains

Several charcoal samples were collected from both pits and postholes, but none of them proved large enough for analysis of their radioactivity. The only portable object found was an unworked obsidian pebble from the surface of the yellow clay deposit in the north half of the house. Since historic trade items were lacking at the site it can be dated as prehistoric. A more precise assignment is impossible, however, because no artifacts were found.

Conclusion

Of the many sites we have excavated in Samoa this is one of the few that has proved to have evidence for only a single period of occupation. Moreover, it yielded no portable artifacts. Finally, although the house is of the same form as other prehistoric dwellings, it is only half the size of the smaller of those we have excavated at other settlements with longer records of occupation. The small size of the house, the single occupation, and the location in heavy bush at the very back of the valley, in an area where swidden agriculture is difficult because of the poor drainage, all seem to justify an interpretation of this site as one of the temporarily inhabited bush settlements mentioned in the ethnohistoric literature which, along with the ridge fortifications, were said to have been refuges for peoples defeated in local wars.

TEST EXCAVATIONS IN THE FALEFA VALLEY

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During the survey of the Falefa valley in 1965, test excavations were undertaken at Sasoa'a, Vaimaga and Folasa. In 1967 a brief test excavation was carried out at Leuluasi at the time excavations were in progress at Le-3 and Le-12. These excavations are described in this report.

SASOA'A

Two excavations were carried out at Sasoa'a. The first was the test excavation of the house at Sa-1, mentioned by McKinlay (Report 21, p. 14), which established the historic nature of the settlement at Sasoa'a. The second was in the large earth oven, Sa-15, in the western corner of Sasoa'a village (fig. 2).

A trench was set out from the outer edge of the rim to the centre, and the portion from the top of the rim to the centre was excavated. The radius of the oven from the outer edge of the raised rim to the centre was 11 ft (3.4 m) and that from the top of the raised rim to the centre 7 ft (2.1 m). The actual radius of the oven pit itself was 4 ft (1.2 m). The depth of deposit at the centre of the oven was about 18 in (46 cm). The profile consisted of a thin deposit of topsoil, a fairly uniform fill of large and small stones and large quantities of charcoal, and a single layer of large closely packed stones lining the edge of the oven depression and resting on natural. The total vertical depth from the top of the rim to the base of the oven depression at the centre was rather more than 2 ft (61 cm).

In its general construction this oven was similar to other large ovens excavated during the course of the Samoan project. This type of feature, which has previously been referred to as *umu ti*, following a wide-spread belief among informants about the function of such ovens, consists of a circular depression excavated into the ground and surrounded by an artificially raised rim. The fill of the depression is generally characterised by large stones and very large quantities of charcoal. The oven at Sasoa'a conformed to these characteristics, although it was shallower than some others investigated.

A charcoal sample was collected from the oven, but was not submitted for dating in view of the discoveries at Sa-1, which indicated a late date for occupation of the settlement.

VAIMAGA

In the early stage of the site survey in the Falefa valley a test excavation was carried out in an oven at site Vam-3, Vaimaga. A radiocarbon date was obtained from charcoal from this oven and has been reported elsewhere (Davidson *et al.* 1967). Vam-3 is one of two adjacent house sites on a relatively flat area of ridge surrounded on both sides by swampy streams. It is distinguished by a particularly well laid pavement, outlined by large stones, with a complete house outline in the centre. The oven, which lacks the raised rim considered by informants to be diagnostic of the *umu ti*, is situated immediately behind the pavement. The nearby structure of Vam-2 has a more irregular platform, one complete house outline and several discontinuous lines of curbs. Between Vam-2 and Vam-3 are several irregular lines of curbstones, another large oven, and two possible smaller ovens (fig. 4). There is thus considerable surface evidence for a complex history of occupation in this area.

Informants appeared to place particular emphasis on site Vam-3. Its traditional associations, however, were vague, and it may be that its fine state of preservation impressed my informants, as it impressed me.

The oven at Vam-3 proved to have been dug not into natural but into an earlier eroded stone platform. The stratigraphy in the centre of the oven was as follows:

Layer 1, recent soil, 0-25 cm,

Layer 2, stones and charcoal, fill of oven, 25-38 cm,

Layer 3, clay and gravel surface of earlier platform, 38-58 cm,

Layer 4, platform constructed of large stones, 58-122 cm,

Layer 5, thin river gravel spread,

Layer 6, thin scatter of charcoal on surface of:

Layer 7, natural.

The area of the excavation was too small for any firm conclusions to be drawn about the layers preceding the digging and use of the oven. It appeared, however, that several earlier occupations had occurred on the site.

A charcoal sample from layer 2 was dated and gave a determination of 760 ± 100 B.P. (GaK-1195). This appeared too old to be associated with the most recent structure at Vam-3, which is one of the best preserved at Vaimaga, an area traditionally occupied in the immediately pre-European period. In view of the complex history of the site, suggested by the test excavation, it is more probable that the oven belongs to a middle part of the sequence. A tentative reconstruction is as follows:

1. Initial burning off and clearance of the area, represented by layer 6.
2. Residential occupation associated with the artificially deposited gravel of layer 5.
3. Construction of a stone platform (layer 4) and occupation of its surface (layer 3).
4. Additions to the platform, through which the oven was excavated, and with which it may be associated.
5. The most recent stone platform and house mapped as Vam-3.

Results of excavations in other residential sites in the valley, particularly at Fo-1 and Le-12, suggest that this proposed sequence might be found to contain additional subdivisions, if further excavations were carried out at this site.

Several pig teeth and some very decomposed shell fragments were found in the excavation. No artifacts were found.

Folasa

Excavations were carried out at two ovens at Fo-2, on the ridge immediately above Fo-1, subsequently excavated by Ishizuki and described above (Report 22). Dates from these ovens have been reported elsewhere (Davidson *et al.* 1967).

Site Fo-2 is a long artificial terrace near the bottom of one of the steep ridges running down into the valley from Mt Fao. Below the site the land slopes much more gently towards the centre of the valley. A platform completely surrounded by stones, but with relatively sparse paving, occupies the outer part of the terrace. In its centre is a small rectangular structure, Fo-2a, outlined by curbstones with a small oven depression inside. At the back of the terrace, upslope from a well-defined path which crosses the ridge at this point, is a large earth oven with raised rim, Fo-2b (fig. 3).

Since the structure Fo-2a was the only square house outline encountered during the survey, the small oven depression inside was excavated and a charcoal sample obtained. The determination of 180 ± 70 B.P. (Gak-1197) suggests that the square structure is probably a relatively recent plantation shelter.

A quadrant was excavated in the large oven, Fo-2b. The oven was found to consist of a circular depression 8 ft (2.4 m) in diameter and 4 ft 3 in (1.3 m) deep at the centre, surrounded by an artificial raised rim 3 ft (91 cm) high at its highest point and varying from 8 to 10 ft (2.4-3 m) in thickness. The fill of the oven at the centre consisted of a considerable deposit of soil and earth eroded from the rim, over a thick layer of large stones and charcoal. Pieces of plant material, identified by the workmen as fragments of *ti* root (*Cordyline fruticosa* L.) were found at the top of the charcoal and stone layer.

A sample from this oven gave a date of 740 ± 100 B.P. Since the oven is situated at the rear of the terrace close to the scarp it must postdate the construction of the terrace, although it probably relates to the first use of the terrace, and thus may date its construction quite closely. It comes between the date from beneath the terrace at Fo-1 and that for house II at that site, confirming that this area has a long history of occupation.

Leuluasi

During the site survey in 1965, two apparently artificial features of unknown use, closely resembling each other in appearance, were mapped, one at Leuluasi and one at Olovalu. During the closing stages of the 1966-67 season an opportunity occurred to test the example at Leuluasi, Le-24.

The feature consists of a shallow circular ditch, with a slight bank on its inner side. The diameter from the outer side of the ditch is 16 m. The ditch itself is about 1.5 m wide and 20 cm deep in the centre, while the bank is of similar width and height.

A 1-m-wide trench was set out from the outer side of the ditch to the centre of the feature. Only two layers were encountered, a thin layer of topsoil, overlying a layer of earth and gravel, apparently river deposited. This rested on a second similar layer. The feature has apparently been formed by excavating the shallow ditch in layer 2 and piling up the material to form the bank. The ditch had not penetrated into the underlying layer, nor was it possible to distinguish an old surface beneath the bank, suggesting that there had been no soil formation or living surface buried beneath the bank.

Three small stake holes, evenly spaced, were found towards the outer rim of the ditch, apparently part of an insubstantial fence around the outer edge of the feature. There was one shallow posthole inside the bank. No other cultural features were found. It was concluded that the feature is artificial, but its purpose remains obscure. It should be noted that a low, insubstantial feature of this kind could only be recognised under exceptional conditions such as occur at Leuluasi and in the light bush at Olovalu. The structure, whatever it is, may have been exceedingly common in Samoa, but would seldom appear in the archaeological record.

Conclusions

Excavations in the ovens described above were undertaken principally to obtain charcoal for dating in an attempt to provide some initial chronological ordering of the various areas mapped. The excavations at Sa-1, originally undertaken to obtain information on the structure of a house at the settlement of Sasoa'a, also provided chronological information, by showing the house to be post-European. The excavations at Leuluasi, designed to investigate the mysterious feature at Le-24, revealed only that it was apparently man made, without explaining its purpose.

The question of the use of large earth ovens will be discussed further in Report 39. It may be noted here, however, that each of the ovens described is somewhat different in form. Sites Sa-15 and Fo-2b both have raised rims and are similar in diameter. Fo-2b, however, is much deeper, and consequently has a larger rim. Although the raised rim was regarded by several informants as diagnostic of an *umu ti,* some maintained that *umu ti* were always broad and shallow and asserted that they were always made in the bush, and never near houses. It was, however, the particularly deep oven at Fo-2b which yielded fragments of what appeared to be *ti* root. The oven at Vam-3, which lacked a raised rim, resembled an oven at Luatuanu'u, previously described (I, Report 12, p. 192; Green and Davidson 1965: 64), which was also associated with a large house platform. Finally, the small oven at Fo-2a, identified by informants as probably associated with a recent plantation house, appeared to be just that.

The dates obtained were valuable in providing preliminary information on the length of occupation at various areas in the valley. The small excavation at Vaimaga suggested considerable sub-surface complexity at this settlement and yielded a date of some antiquity which does not represent the beginning of the sequence at Vam-3. The date for Fo-2b may be compared with dates for the adjacent site of Fo-1, confirming that this area, also, has a long history of occupation. On the other hand, the date from Fo-2a suggests that the square house outline may probably be discounted as a prehistoric feature and shows that Folasa has been occupied fairly recently, even if that occupation was transient in nature.

EXCAVATION OF THE PREHISTORIC OCCUPATIONS OF SU-SA-3

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The excavations in Sasoa'a village had as their principal aim the archaeological recovery of structural and portable artifacts which could be assigned to the period of effective European contact just before A.D. 1840. The three house sites excavated in the village were selected with this aim in mind and the results were intended to document the early historic period of Samoan settlement in the upper valley (Report 21). That one of these sites, Sa-3, should also serve to document a very early period was not predictable on the surface evidence, although the finding and excavation of such a site had been a general aim since the completion of excavations at Vailele in 1964 (I, Introduction, p. 6). This objective had not been fulfilled in the interim because no obviously early occupation layers other than at Vailele had been found in any of the reconnaissance or intensive surveys conducted by participants in the Samoan programme. When we began the final three months of excavations in the upper Falefa valley, it appeared uncertain that this objective would be accomplished there.

Excavation of the European phase of occupation at Sa-3 was in the process of being closed down, when at two places some 10 m apart, pottery was encountered in a dark clay deposit underlying the occupation layer of the early European phase. The implications of this, indicating an early pottery horizon not yet explored, changed the whole orientation of the operations at this site (Report 21, p. 23). Fortunately, as the evidence of the historic phase was already largely in hand, the transition was easily made and between 16 January and 21 February, 1967, all efforts on the site were directed toward the new goal of excavating as fully as possible a substantial area of the earlier pottery-bearing layers.

The prehistoric occupations at Sa-3 which are the subject of this report are four in number, and only the uppermost was not associated with pottery. To what extent similar prehistoric occupations occur elsewhere within the area of the historic settlement of Sasoa'a is unknown. At the other sites tested, Sa-1 and Sa-2, evidence of earlier occupations associated with pottery was not encountered.

The locality of Sasoa'a now and as it must have appeared at the time of the early historic village is described by Davidson (Report 20) and McKinlay (Report 21). The location is low lying, alluvial, between branches of the Falefa River system, and subject to periodic flooding. It is not used today for habitation, but for coconut plantations and gardens, and any sustained activity during rainy periods on areas other than the house platforms turns those areas into a sea of mud. Some consideration of the physical nature of the locality at Sasoa'a at the time of the earlier occupations seems necessary because any occupation there at a depth of more than 50 cm below existing ground surface today is in danger of being almost continually waterlogged. This was demonstrated at various times during the excavations, particularly after fairly continuous or heavy rains, when the water table rose well above the level of the bottom layers. Only by continuous bailing in one of the test pits, which we converted to a sump, was it possible on these occasions to continue with the investigations. The situation implies that over the years deposition from the recurrent flooding by the two adjacent branches of the Falefa River, coupled with various human activities, has repeatedly raised the surface of the alluvial deposits in this part of the valley. Otherwise it is difficult to account for an occupation in so inhospitable an environment or to understand the conformation of the natural deposit which underlies those habitation layers deposited on it over time.

Although the valley was drowned at various points during the Pleistocene (Kear and Wood 1962: 40), there is little reason to believe that any recent change in sea level accounts for the current cycle of aggradation. The base level for the gradient of the valley's river system is controlled by a waterfall about ¼ mile (0.4 km) inland from Falefa Bay, which has probably restricted the river's ability to cut deeply into the sediments of the valley floor. Also, the river system drains a large area of the interior of Upolu. This part of Upolu has the second wettest climatic regime on the island, with no dry season and a mean annual rainfall of 130 to 175 inches (3302 to 4445 mm)

(Curry 1962: Fig. 14). All these factors have resulted not merely in flooding and local aggradation but also in a large area of uninhabited swamp between Sasoa'a and the settlement of Leuluasi much further inland (fig. 1). Doubtless the extent of aggradation from flooding — which Wright (1963: 80) says occurs once in five years — has also been contributed to by man in his removal of the natural forest cover from much of the valley floor and adjacent slopes.

Given the meander pattern on the valley floor, it seems probable that the local branches of the Falefa River have over time followed different courses. In the past they may not have been subject to flooding quite so often, but it is unlikely that during the period of human occupation in the valley the low-lying areas were ever very much better drained, while the open valley with its waterfall has always constituted a natural trap for alluvial soils. They are assigned by Wright (1963: 169-170) to the Sauniatu gravelly sandy clay and are naturally among some of the most fertile and productive in Samoa, so that nearly all the traditional subsistence crops grow well on them year after year. These deep flat and relatively easily worked dark reddish brown soils, distributed along the principal stream courses of the upper Falefa valley (Wright 1963: soil map of Upolu) offered an attractive situation for an agriculturally oriented people. The evidence from this site suggests that the early inhabitants of Samoa were quick to recognise this and exploit the locality.

THE STRUCTURAL FEATURES

Field Procedures

The basic stratigraphy of the site proved to be relatively uniform over the entire area opened. By the completion of the excavations, five basic stratigraphic units were recognised and designated as layers 1 to 5. Because the five layers were reasonably distinct in colour, composition and compactness, they were able to be excavated as stratigraphic units. However, as layers 4 and 5 sometimes reached considerable thicknesses without visible interruption, they were actually removed in a series of levels, which provided an additional internal control on the materials recovered.

A number of facts became evident as excavation proceeded. The first was that the lowest layer, 5, was absent over the entire southeastern portion of the site and thickened markedly toward the northwest in the area of square I-6 (fig. 54b). Layer 2 on the other hand thickened in the opposite direction to the south and west, disappearing altogether in the northeast portion of the excavation area (figs. 15 and 54). Also, what in most squares had been a rather flat basal deposit of the natural clay underlying the excavation, in squares E-5 and D-6 became a highly irregular surface, sloping up abruptly and forming a sort of miniature escarpment on this edge of the site (fig. 55 and plate 14). Finally, fills lacking the rich black charcoal-staining of layer 5 were encountered in a number of features on the northeastern part of the site. While firmly sealed in all cases by layer 5, they did not form a continuous deposit and so cannot be designated as a layer. However, they can be grouped together on the basis of an identical stratigraphic position and similar composition. They represent the earliest recorded events in human occupation of the site.

Stratigraphy

From a geological point of view two major formations were in evidence at the site, a naturally deposited sandy clay underlying the entire locality and a banded formation consisting largely of local beds of gravelly sandy clay (plate 12). The upper formation, with a river gravel spread on its surface, was a composite deposit of natural and cultural accumulation in which four occupations were identified.

Wright (1963: 170) describes a typical local soil profile of the Sauniatu gravelly sandy clay as 8 in. of dark reddish brown (5YR 3/2) gravelly sandy clay underlain by 14 in. of dark reddish brown (5YR 3/3) sandy clay on a base of gravelly clay in which the percentage of gravel increases with depth. The gross stratigraphy of Sa-3 then fits in generally with that expected for the soils in this locality, the main difference being the greater thickness of the upper gravelly sandy clay, a result of additions due to various cultural activities. My readings for the non-cultural dark reddish brown sandy clay from Sa-1 and Sa-2 were 7.5YR 4/3 and 7.5YR 3/3 respectively. This basal material was identical to that at Sa-3 and seemed to be typical of the locality. Five main though not continuous beds were encountered above it at Sa-3, numbered in the order in which they were removed. Their geological description based on the principal north-south and east-west sections (figs. 15 and 54b), is as follows.

Layer 1: (7.5YR 2/3) was predominantly a river gravel spread with only a small amount of sandy clay in the matrix. It often appeared darker brown in colour than the two underlying beds of layers 2 and 3, probably because it formed part of the present immature soil horizon. Its boundary with layer 2 was sharp, but where layer 2 was lacking the boundary with layer 3 was diffuse.

Layer 2: (7.5YR 3/4) was a slightly lighter brown and very compact sandy clay, which when initially encountered was thought to constitute the underlying natural because it was so similar to the basal clay deposit underlying Sa-1 and 2. Its

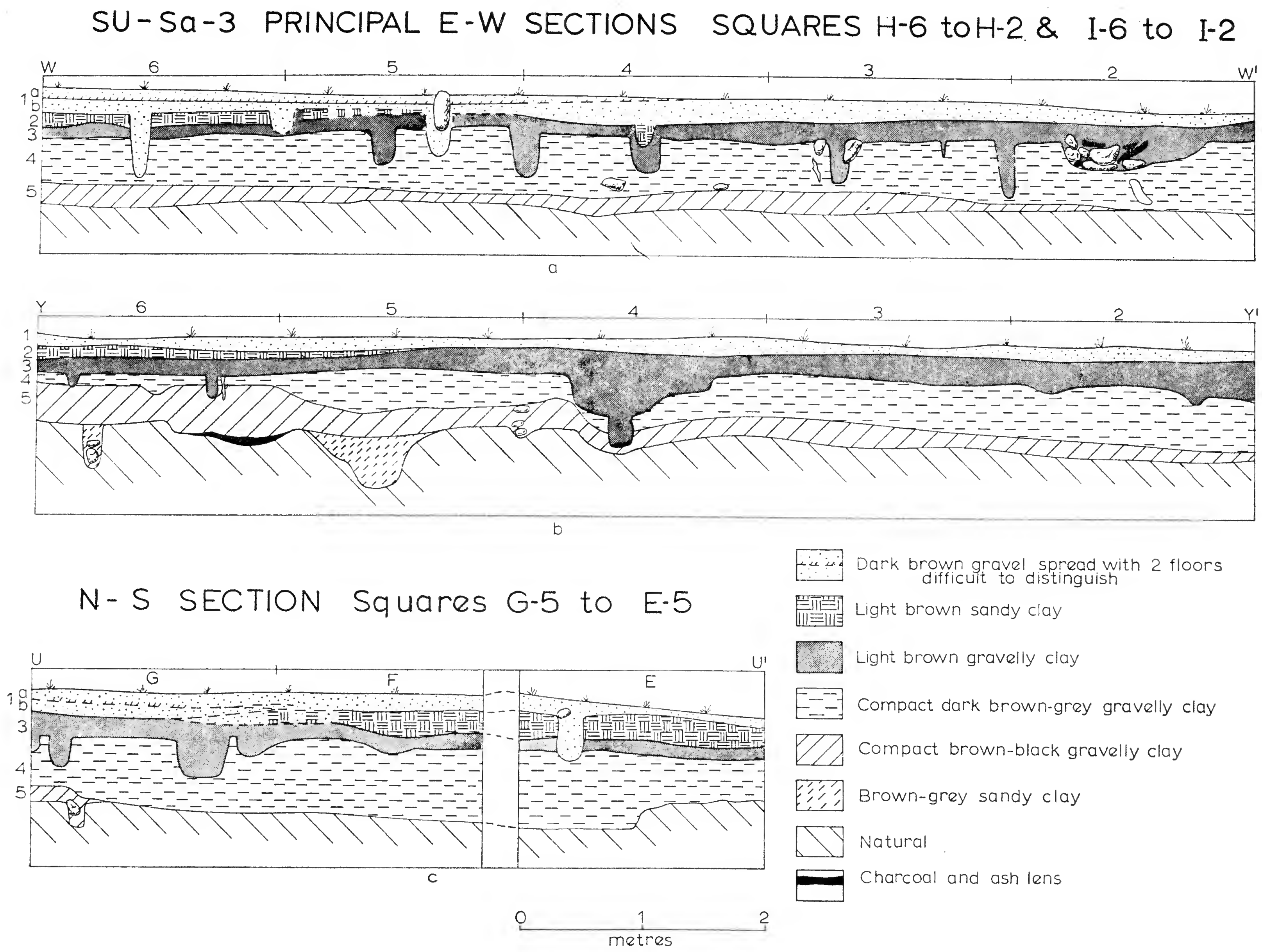

Fig. 54. Principal cross-sections, SU-Sa-3.

boundary with layer 3 was sharp except where it thinned and terminated.

Layer 3: (5YR 2/2) was the second obvious river gravel spread, but through burial it had come to possess a much higher clay content in its matrix than the gravel spread of layer 1. This had resulted in a more compact and slightly lighter brown bed, enabling it to be distinguished from layer 1 where the two were in contact, although the boundary between them was never sharply defined.

Layer 4: (7.5YR 3/2) was a compact dark brown-grey gravelly clay, usually of some thickness (40-60 cm), yet lacking any obvious internal bedding. Concentrations of gravel in it varied locally as did its grey cast, which was based largely on the presence of finely divided charcoal. While the boundary with layer 3 above was fairly sharp and easily followed during excavation, that with layer 5 was diffuse and depended very largely on colour. Where layer 4 lay directly on the natural subsoil, however, the boundary was sharply defined and easily traced.

Layer 5: (7.5YR 1/1) was a compact brown to black gravelly clay in which the presence of large amounts of finely divided charcoal provided the predominant black colouration that distinguished this layer from layer 4. Locally a stone pavement gave the lower part of it a bouldery composition. Its contact with the natural subsoil was everywhere very sharply defined.

It was noted above that a number of features were cut into the underlying natural and sealed in by layer 5. They consisted either of shallow scoop fireplaces with ash and charcoal, or of deep postholes and pits containing a fill of brown-grey sandy clay. Although they were the earliest features on the site, they appeared to differ from other layer 5 features only in that they were refilled before the main occupation associated with layer 5 began and so escaped the heavy staining from large quantities of finely divided charcoal and organic debris that characterised that occupation. Some potsherds and pieces of obsidian were found tramped into the upper surface of the natural sandy clay subsoil. Although their presence there does not serve to mark it off as a separate layer, they obviously belong to the initial stages of occupation along with the artifacts in the earliest features.

Occupation Sequence

Because some of the features on the site can be identified as definitely earlier than those filled by layer 5, I have assigned them to a separate occupation A. The features include five shallow scoop fireplaces filled with ash and some charcoal; another similar fireplace designated as an oven because it contained cooking stones; two large pit-like depressions, one with a large and deep stone-filled posthole to one side, the other with a possible one at its centre; and two smaller postholes. All these features were concentrated in squares G-6, H-6, I-6, I-5 and I-4 (fig. 55), while none was encountered in the southern part of the site, suggesting that the excavations were positioned on the edge of the earliest occupation area, the main portion of which lay off to the northwest.

Occupation B is represented by the lower portion of layer 5. Its features were cut into the underlying natural subsoil and filled with layer 5. They have been plotted on figure 55 in relation to the one boundary of layer 5 which the area excavated permitted us to establish. In addition, the positions of all adzes, both fragments and whole, which were recovered from a secure layer 5 context, are indicated.

In the lowest level of layer 5 in square G-6, a higher than usual concentration of small boulders and gravel which formed a rather irregular but continuous surface was identified as a probable pavement. It was confirmed when we were able to trace it into the adjacent, previously unexcavated squares of H-6, G-5 and H-5, although the surface became more diffuse and disappeared in parts of the latter two squares. In square I-6, which had already been excavated, the surface was not recognised, but from inspection of the section walls and questioning of the excavators, it became apparent that something like the surface in G-4 and H-4 had existed. On the other hand, the pavement was definitely not present in square I-5. Within the paved area a number of large boulders occurred and were plotted but no obvious alignments could be discerned (fig. 55). The presence of a structure was suspected when a number of boulders were encountered in association with a small area possessing gravel and not the larger paving stones. However, this area in the northwestern corner of square G-6 and the southeastern corner of H-6 did not prove very extensive. A more certain indication of a structure in this area appeared when the pavement was removed in square H-6 revealing three postholes associated with it. Two more postholes of the same size and depth in square G-6 were added to this set, suggesting that the pattern was that of a round-ended house, in which case there should have been another posthole in square I-6. None was indicated either on the floor plan or section for the southern face of square I-6. Unfortunately, the appropriate area at the base of the square, initially used for a test pit, had been transformed into a sump, the southern edge of which became badly eroded in subsequent floods, destroying any hope of defining a posthole along the edge of square H-6 or within I-6. This left the photographic record to be consulted, and

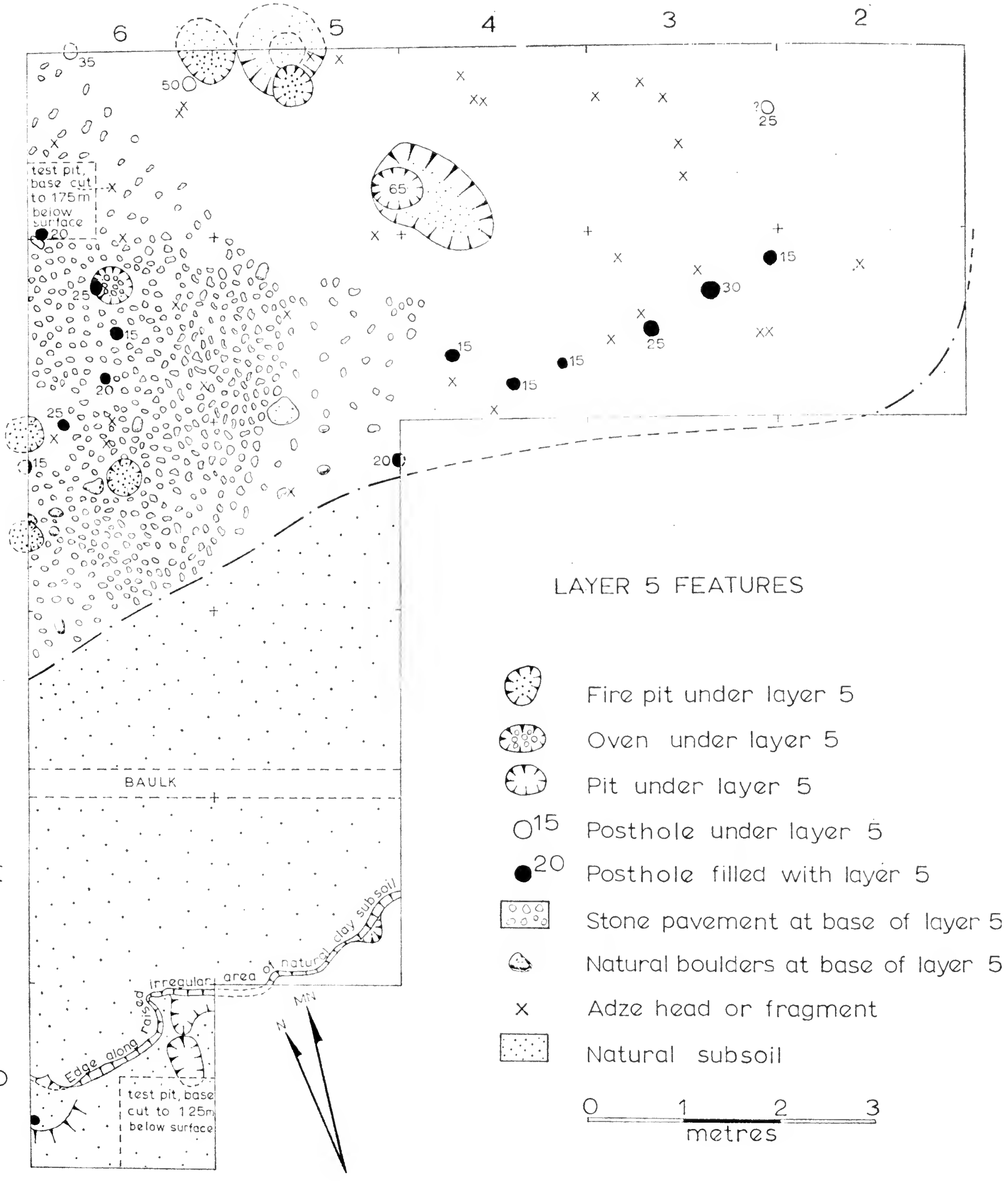

Fig. 55. Layer 5 features, SU-Sa-3.

its value demonstrated. An enlargement of a photograph taken before section drawing and flooding shows that the excavators had missed a posthole cut from layer 5 into the natural subsoil. An outline of an off-centre slice across it appears in section as a discolouration in the southern face of the test pit directly under one of the larger stone boulders so often used as curbstones. The depth, size and position all suggest that it was another posthole of this structure. With or without it, one would infer a structure with a rounded end (plate 13). Its inclusion limits the width of the structure to not much over 3 metres, making it a rather small house. This example and two other partially excavated structures with rounded rather than straight sides, one at the base of Va-4 (I, Report 10, p. 164) and the other toward the base of Lu-53 (I, Report 14, p. 213), suggest that houses of oval shape were present at the early end of the Samoan sequence. Among them, the Sa-3 example in association with a pavement and a dated deposit containing a large number of portable artifacts is the most certain.

The other postholes associated with layer 5 formed an alignment across squares H-3 and H-4. Either one more posthole in H-4 or another in G-5 also belong to this alignment. Although no pavement was present in this area, as many adzes were found in this vicinity as were present on the pavement (fig. 55). In this case some type of fence or screen roughly aligned with the southern edge of the pavement seems to be implied, rather than a building. A building is particularly unlikely because sufficient area was excavated to the northwest to encounter any features belonging to a structure lying in that direction, while to the southeast features from this period do not occur. It is important to note in this respect that in squares D-6, E-6, E-5, F-5 and parts of F-6 and G-5, where layer 5 was absent, no features at all were encountered either cut into the natural and filled by layer 4 or in association with the lower portion of layer 4 itself (see below). On this basis I feel the association between the features assigned to layer 5, even where they could not all be shown to have been cut from its surface or from some point within the layer (and in fact many probably were cut from one or the other as their fill implies), is relatively secure on distributional grounds. Moreover it is supported by the distribution of thin fine ware potsherds, the vast bulk of which came from the same portion of the excavated area, where they occurred primarily in layer 5, the greatest frequencies being encountered in the lowest levels within that layer.

Because no single feature yielded a pure carbon sample of sufficient size for dating, although several from fire pits and the oven under layer 5 were submitted, it was necessary to use a general sample taken from the very black, charcoal-rich layer 5 deposit in square I-6. This sample, GaK-1441, came from the northwest corner of the square at the base of the layer. It yielded a radiocarbon age of 1840 $\pm$ 100 B.P., implying a first to third century A.D. date for the deposit.

A major problem in the interpretation of layer 5 is the evidence for continuing accumulation of debris once the features assigned to occupation B were formed. Presumably the occupation surface called B formed but one part of a continuous process during which deposition proceeded for some time without interruption or formation of another occupation surface. The evidence of confinement of layer 5 to the northern part of the area excavated, the thickening of the layer toward the northwest in both the north-south and east-west principal sections, and the burial of the pavement and other features well below its upper surface, all suggest this. Perhaps because these excavations were situated toward one margin of the habitation zone, the continuing build-up to the northwest is to be explained by postulating that later occupation surfaces responsible for the large amount of finely divided charcoal and discarded potsherds lie in that direction. If this supposition is correct, it could well prove worthwhile at some time in the future to return to this locality.

The reasonably level surface of the natural clay base underlying layer 5, and the fairly sharp boundary between the two, suggest that the original surface was rapidly covered by accumulating midden deposit and suffered relatively little disturbance from human activity. This was particularly evident in the features assigned to occupation A. What was slightly more difficult to account for was the contrast between this relatively flat surface and its highly irregular nature only 4 m away, for in squares E5 and D-6 it rose abruptly toward the present surface along a miniature escarpment (fig. 55 and plate 14). Two explanations suggest themselves. One is that the occupants artificially levelled part of the area. Most of the argument presented below is against that view. The other is that the area selected for habitation was one of the many stream margin flats formed all over this valley, and on its southwestern side this flat had one of the irregular ridge remnants which frequently occur in these contexts. Here it should be noted that careful study of the surface of the sandy clay subsoil indicates that it sloped from the northwest corner to the southwest (fig. 15) and to the northeast (fig. 54b), so that most water on this surface would have drained into a natural hollow on the eastern margin of the site. Secondly, it is likely that some depth of gravelly, sandy clay originally overlay the natural clay base and through human activity became incorporated in layers 5 or 4. This is supported by a lack of root or other natural disturbance over much of the basal clay surface, and may be contrasted with the highly irregular and disturbed surface encountered in square D-5 or the southern part of square E-5, where cultural material from these early occupations was at a minimum. Presumably one of the flatter localities sufficiently sloping to drain into a nearby natural hollow was selected for habitation, while a small adjacent knob of irregular form was left relatively undisturbed. The build-up of layer 5 then merely accentuated the already existing slope and raised the occupation surface to the northwest as much as 40 to 50 cm above the immediately surrounding ground level.

I have dealt with the question of the conformation of the original ground surface and layer 5, along with possible explanations for each, in

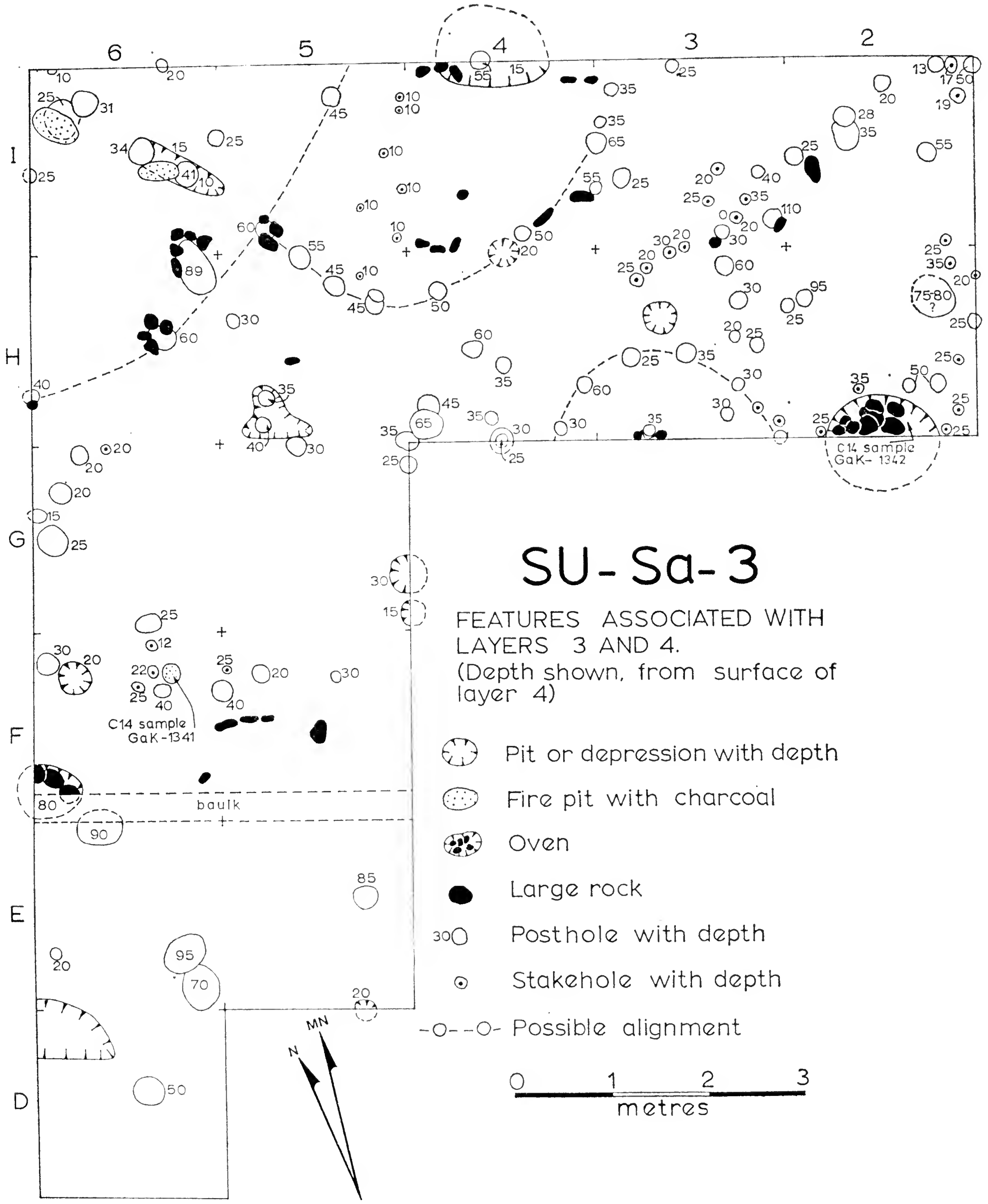

Fig. 56. Layer 4 features, SU-Sa-3.

some detail as they have bearing on any interpretation put forward for layer 4.

The next major group of features which could be defined was recorded on the surface of layer 4. None was defined along the more diffuse boundary between layers 4 and 5, nor were any recorded at the base of layer 4 where it was in contact with the underlying natural. In short, no features filled with layer 4 were found, suggesting that the next actual occupation was that on its surface. The difficulty is that most of the features on the surface were filled by the river gravel deposits of layer 3, and it is frequently impossible to assign them to the correct occupation. The data, however, are sufficient to be sure that no features recorded in the plan of the surface of layer 4 are from other than one of two separate occupations (fig. 56).

I have assigned to occupation C all those which were definitely associated with an occupation on the surface of layer 4. Those that almost certainly belong to the layer 3 pavement, I have placed in occupation D. Because the remainder were in large part filled with layer 3 gravels, they probably belong to occupation D rather than to occupation C. This interpretation is supported by a general lack of pottery in their fills.

The following features are assigned to occupation C.

1. In square H-2 a large oven filled with stone and burned material from which a charcoal sample was taken for dating (figs. 54a, 56). Unfortunately, at some point it was contaminated by the addition of more than 20 percent modern carbon (GaK-1342) and the amount remaining for a laboratory rerun proved too small for a satisfactory count to be established.
2. Some of a number of stakeholes in the same square, which perhaps were part of a shed or lean-to associated with the oven (fig. 56).
3. A posthole in the section of the southern face of square H-3 (fig. 54a). The rocks on top of either side of it were level with the layer 4 surface. The posthole was cut into by one from layer 3 (fig. 56).
4. A shallow depression filled with river gravel cut from a level 5 cm below the surface of layer 4 which was located towards the centre of the grid line between squares H-4 and I-4 (fig. 56).
5. A number of stakeholes, most of them in square I-5, but one in square H-5, all filled with lighter brown clay rather than river gravel.
6. Three large postholes in square I-6 which were stratigraphically under two scoop fireplaces lying on the surface of layer 3.
7. A number of natural boulders of the kind used for curbstones in squares F-5 and F-6 which were firmly set into the top of the layer 4 surface and did not protrude through layer 3.
8. A small depression some 25 cm across in square F-6. This was not evident until the removal of a second level within layer 4, so that it was probably cut from or just below the surface of the layer. The depression, though it did not appear to have been a firepit, contained a quantity of charcoal, and a sample from it, GaK-1341, yielded a radiocarbon date of 1800 ± 80 B.P., implying an age in the first to third centuries A.D.

Since the age of this sample is the same as that from layer 5, no great interval of time is indicated for the accumulation of both layers, despite some differences in the pottery they contain. As this estimate of age is the same as that for identical kinds of pottery from Vailele and the two dates from layers 4 and 5 are mutually supporting, it would appear that these two deposits can be assigned to the first to third centuries A.D. with a fairly high degree of probability.

Several lines of evidence tend to suggest that layer 4 was deposited over a very short period of time and without significant interruption between it and layer 5. The most important is the lack of any internal bedding, lenses, or signs of features cut from some surface within the layer. Thus it is on the upper surface alone that there is structural evidence of habitation. This is consistent with one of these features yielding a radiocarbon date which allows only a fairly short interval of time between deposition of layer 5 and occupation on the surface of layer 4. It is supported by local concentrations of potsherds from the same vessel, implying that the deposit consisted of refuse deposited at one time. An obvious explanation is that the layer was a deliberate fill. As the boundary between layers 4 and 5 was not well marked other than by a diminution in black colour, and as no features filled by layer 4 were encountered on the surface of layer 5, it is probable that the same type of accumulation which characterised the upper part of layer 5 was continued as layer 4, the principal changes being less charcoal and an increasing dominance of thick coarse ware sherds.

After layer 5 had accumulated, provision of a surface suitable for renewed habitation within the area excavated would have required dumping in precisely the area occupied by layer 4. Filling was everywhere carried out to a depth sufficient to yield a level surface. In this respect it is worth noting that in the northwestern part of the site (square I-6, fig. 54b) layer 4 becomes a relatively thin deposit. The same situation obtains in the southwestern part of the site (square D-5) where layer 4 is a thin deposit which fills in around and over a raised and irregular knob of natural clay. On the other hand, layer 4 elsewhere is typically 40 to 60 cm thick, which is what was needed to relevel the whole area. The resulting surface sloped evenly but gently to the south, and was as much as 30 to 40 cm lower on the southwestern margin than on the northwestern one (fig. 54b, c) so that drainage continued to be into the natural hollow to the southeast and south of the site.

In summary, following occupation B, marked by the pavement, house and other features, no further habitation levels can be identified within layers 4 and 5. The next occupation is that on the surface of layer 4. Its features are now difficult to distinguish from those associated with layer 3, as both could often be traced only in layer 4. In the interval between occupations B and C, which on the pottery and radiocarbon evidence was not long, refuse containing pottery accumulated toward one margin of the settlement. At first it consisted of deposits heavily stained by charcoal, found largely in the northwest portion of the area excavated, then of a major fill without the quantity of charcoal but still containing potsherds, adzes and a few other items. Because of the more dispersed and less concentrated nature of the potsherds in layer 4, the small number of vessels which can be reconstructed, and the lack of evidence for entire pots, dumping of broken vessels is implied. It appears that the deposition of this fill in variable amounts over an uneven surface was intended to produce a relatively flat and suitably drained area for habitation, the first being that of occupation C detailed above, the second being that of occupation D associated with an additional gravel spread, designated layer 3.

Occupation D, while prehistoric and probably fairly old, almost certainly derives from a time when pottery was no longer being produced and used. Thus except for the occasional potsherd that one might expect to be brought up as a result of digging into the underlying layers, sherds were not a primary feature of layer 3, nor were they often encountered in the fills of any of the features belonging to it. In contrast to the underlying deposits, but quite in keeping with many prehistoric house pavements of this type in Samoa, the portable artifacts recovered were in fact few in number (p. 152). Structural features, on the other hand, were fairly numerous (fig. 56). Among those almost certainly belonging to layer 3 are the following.

1. A 110-cm-deep posthole with a large rock on one side indicating it derived from the layer 3 surface. This posthole was in the southeast corner of square I-3 (fig. 56).

2. A 35-cm-deep posthole centrally located along the southern side of square H-3 which had been cut into one side of a posthole identified as belonging to layer 4 (fig. 56).

3. Another posthole in the southern wall of square H-4 which was filled with clay to a depth of 25 cm, and located within an earlier gravel-filled posthole 30 cm deep, thus forming a double posthole (fig. 54a).

4. Two postholes, one 45 and the other 60 cm deep, in square I-5, both with clay fills at the top connecting them with the layer 3 surface. One also had a number of rocks around it whose position firmly links it to this surface. On the basis of these rocks, and the size and fill of the postholes, they are probably related to two similar postholes in square H-6, which would make them part of a very large structure (fig. 56).

5. A very large posthole, 89 cm deep, on the grid line between I-6 and H-6 which was definitely cut from the layer 3 surface, and was the kind of posthole one might associate with a centre post of a fairly large structure.

6. Two shallow scoop fireplaces on the surface of the gravel pavement in square I-6, which overlay earlier features assigned to layer 4 (fig. 56).

7. Two more of the deep postholes mentioned above, with rocks at the level of the surface of layer 3, which from size and fill are to be associated with the two in square I-5.

8. A large deep rock-filled pit or posthole in the southwestern corner of F-6.

9. Three more of the large and very deep postholes in square E-6. These three and the one in F-6 appear to form two sets of what may have been large centre posts of some fairly substantial structure, rebuilt at least once.

10. A curiously shaped deep pit-like feature in square D-6 for which there is no satisfactory functional explanation.

11. The 85-cm-deep posthole in square E-5, which was defined from the layer 3 surface, and may constitute a post in the side of a structure associated with the double set of centre posts to the west. As mentioned above, it is likely that a great many of the other features recorded in figure 56 belong to occupation D and were cut from the surface of layer 3, but there is no way of demonstrating this stratigraphically. What does seem clear from the number of features definitely or possibly assigned to occupation D is that there were several periods of rebuilding on the surface of layer 3. This, of course, is in keeping with most such gravel pavements of this type encountered in Samoa. It suggests that occupation D was of some duration, and some fairly large, as well as smaller structures were associated with this period.

The next occupation, E, is that of the early European contact period described in detail by McKinlay (Report 21, pp. 22-27). It was separated from the prehistoric occupation D by a layer of sterile clay silt over a large part of the site where the historic phase dwellings were erected. However, this layer wedged out along the eastern sides of squares G-5 and I-5 and did not occur at all in rows 4, 3 and 2 of the H and I columns. McKinlay has plausibly suggested on the basis of its composition and the known occurrence of floods which leave such deposits in the area, that it represented such a horizon. It is notable that its upper surface was only 10 cm lower at the southern end of the principal section than at its highest point (fig. 15), and even in the southwest corner of E-5, its lowest point, only 20 cm lower. Thus it formed a fairly level surface, particularly because of the increased thickness at the southern margin of the site, before sloping away into the adjacent hollow. The suggestion that it was a clay fill derived from some nearby natural deposit of this composition, which was added to the site before it was again used as a dwelling platform has been considered. The unmixed composition and even structure of the deposit, however, militate against this interpretation, as does its penetration into the underlying gravel of layer 3 as a matrix.

Occupation D is definitely prehistoric and can be bracketed between occupation C dating at some point before the fourth century A.D., and E dating in the 1830s and '40s. This provides an interval of at least 1500 years, in which layer 3 representing occupation D, and the deposition of layer 2, are the only events recorded. Although occupation D was of some duration, it hardly qualifies to represent more than several hundred years of time. Also, layer 2, because it lacks a mature soil profile on its surface, represents a fairly brief event occurring not long before the beginning of E in the early nineteenth century, whether its origin was as a flood deposit or as a deliberate fill. Therefore, major intervals of time would seem to be represented by the boundaries between layers 4 and 3 and between layers 3 and 2. Such an interpretation is compatible with the compact dark brown surface of layer 4, which could be explained as reflecting a quite considerable interval of time between occupation C on its surface and occupation D represented by layer 3. The length of this interval is unfortunately not known because the relevant carbon sample was contaminated in processing. Moreover, the portable artifacts from occupation D are of little help in assessing its age except to show that it postdates the earlier cultural horizons which contain pottery. Still, allowing arbitrary maximum figures of 700 years for this boundary, 200 for occupation D, and 50 for the deposition of layer 2 before the use of its surface for occupation E, only two-thirds of the interval is accounted for, leaving some 450 years to be represented by the boundary between layer 3 and the deposition of layer 2. As is typical of open sites, the boundary between deposits often represents more time than is reflected by the layers themselves and the events they represent.

THE PORTABLE ARTIFACTS

The portable artifact collection from layers 3, 4 and 5 of Sa-3 consists of (1) a large number of items from layers 4 and 5 constituting an important early assemblage in association with pottery, and (2) a small number of items from layer 3 more typical of assemblages from later occupational levels in Samoa. The materials from layers 4 and 5 will be considered first, with the two major categories of items recovered, pottery and adzes, being discussed at length, and the remainder of the assemblage more briefly. This section will be followed by a much shorter résumé of the few items recovered from layer 3 contexts.

The assemblage of portable artifacts from layers 4 and 5 is at present the one which best documents the early end of the Samoan sequence. It is probably a fairly representative sample except for artifacts in shell or bone which have failed to survive in the acid soil, or other objects relating to exploitation of the sea, which would be limited in an inland location. It is significant that the assemblage, particularly that part of it from layer 5, occurs in a domestic context in association with the equally important structural data summarised above. This results in a fuller reconstruction of a cultural complex for the early end of the Samoan sequence than would have been possible using the rather restricted evidence of either layer V at Va-1 or layer F at Va-4.

Pottery

Cultural deposits rich in pottery have not been common in Samoa. In fact the two sites at Vailele which have produced pottery in direct association with their basal cultural deposits have yielded a total of less than 1000 sherds. Few of these sherds fitted together and none was of any great size. The thousands of sherds from Sa-3, some of fair size and many fitting together, therefore constitute the one rich pottery assemblage encountered from which the early ceramic complex in Samoa may be reconstrurcted. For this reason, I have provided a full description of what is a rather pedestrian collection of largely plain sherds. A second reason for extended treatment is that previously published descriptions of almost identical pottery from the other two Samoan sites have been challenged and alternative interpretations put forward (Golson 1971: 70-71) which need to be examined in the light of the fuller evidence from Sa-3.

It is evident that in relation to other recent ceramic analyses from Western Polynesia and Melanesia, most of the sherds of this assemblage are quite properly subsumed under two "types", or perhaps one type with two varieties. Typologically, the Sa-3 collection could be summarised, given the detailed descriptions of two such wares already in print for the Vailele sites, as consisting of two varieties of plain pottery; a coarse-tempered thick ware, and a fine-tempered thin ware, the latter possessing occasional rims decorated by a single design element. Vessel forms could be similarly summarised as comprising a few restricted-mouth bowls and many open ones of various sizes. What is probably a shouldered bowl would constitute an uncommon shape and there the matter would rest. Chronologically, it would remain to show from frequency counts that at Sa-3 a dominance of the thin variety stratigraphically preceded a dominance of the thick variety, an inference which could only be suggested for the two separate Vailele sites.

I have therefore not concentrated on typology, but turned to the question of reconstructing vessels and describing more closely the variation within what normally would be dismissed as a variety of plain pottery. The process has depended on the grouping of very like sherds which exhibit high concentrations in some square or squares, the fitting of these together where possible, and the description of the ceramic complex by category and by vessels reconstructed for each category. This has given some idea of the minimum number of pots and their distribution in the site. Although the two layers 4 and 5 were each subdivided into spits, sherds were usually collected from the whole area of a 2 m square unless they were so numerous that a division of a square into a half or quarters seemed called for. The three-dimensional method of recording each sherd used by Groube (1971: 297-298) in Tonga seemed unnecessarily cumbersome and not required in this situation.

Categories were established on the basis of (1) colour, texture and treatment of sherd surfaces, (2) finer variations within the three main categories of temper, and (3) sherds of pottery which fitted together, especially pieces of rims. The categories are therefore fairly uniform groups of sherds which approximate to what some ceramic typologists might call site variants but not varieties (Wheat, Gifford and Wasley 1958: 35-36). Within each category, one or more vessels may be identified and some reconstructed. Very similar treatment of interior in relation to exterior surfaces along with a visual identity of many sherds in minor characteristics of temper proved to be the best criteria for differentiation, the former being more useful in sorting the thin ware categories and the latter the thick ware ones.

Under my direction the basic categories were formed and the sherds first sorted in Hawaii by Virginia Bail; modifications were made in New Zealand based on further sorting by myself and two assistants. The initial 22 categories were reduced to 20 in the process, while the number of partly reconstructed vessels was increased markedly. In particular, there was an increase in some of the thin ware categories, where smaller vessels, often with extremely thin walls and rims, had previously tended to be neglected. Numerical order of the categories carries no significance, although some economy of presentation and discussion has been achieved by grouping the categories under either thick coarse or thin fine wares. This division also facilitates their chronological discussion.

Thick Coarse Ware

A little over 1600 sherds of pottery in the collection belong to the plain variety previously defined as thick coarse ware (I, Report 10, p. 170), best known from layer V of Va-1 (I, Report 7, pp. 112, 128). The thick ware sherds of Sa-3 have been distributed among nine categories in the final analysis. From these categories 11 vessels were reconstructed with a fair degree of confidence (fig. 57a-k), the solid areas in their wall sections being based on actual sherds employed in the reconstruction process. While sherds fitting together were numerous, joined sets of more than 3 or 4 sherds were uncommon except for bowl 7 of category IV, which consisted of 12 pieces. Most often joined pieces were from the same square, layer and spit, but enough pieces were fitted together from adjoining or sometimes more distant squares, to show that recognition of vessels depended on more than physical likeness or close proximity of sherds in the site. The nine thick ware categories, therefore, while containing sherds from other vessels as well, almost certainly contain a majority of sherds from the reconstructed vessels.

Thick ware categories

A description of the thick ware categories and reconstructed vessels follows.

Category I: Bowls 1 and 2. Colour: 7.5R 5/4 to 10R 4/1.
Temper: Feldspathic trachytic type with small grey rounded grains.
Surface: Rough but not uneven with many partially impacted temper grains protruding.
Shape: Deep, simple heavy-bodied open bowls. Two bowls, 1 (fig. 57a) and 2 (fig. 57b), reconstructed; one 46 cm and the other 42-43 cm in diameter.
Rims: Direct, slightly incurved walls with broad flat lips: one lip 6 mm thick, others 10-20 mm thick (fig. 58a). Undecorated.

Category II: Bowls 3 and 4. Colour: 5YR 6/4 to 5YR 4/2.
Temper: Feldspathic basaltic type with large angular grains, many of which present a pseudo-glassy appearance.
Surface: Fairly even and at times smooth from floating of clay on surface; only a few temper grains protruding, principally in thicker pieces.
Shape: Shallow and deep, simple heavy-bodied open bowls. Two bowls, 3 (fig. 57c) and 4 (fig. 57d), reconstructed; both about 43 cm in diameter; others probably similar or slightly smaller in size.
Rims: Direct, walls usually converging toward lip or parallel sided. Flat lips with widths from 5-10 mm,

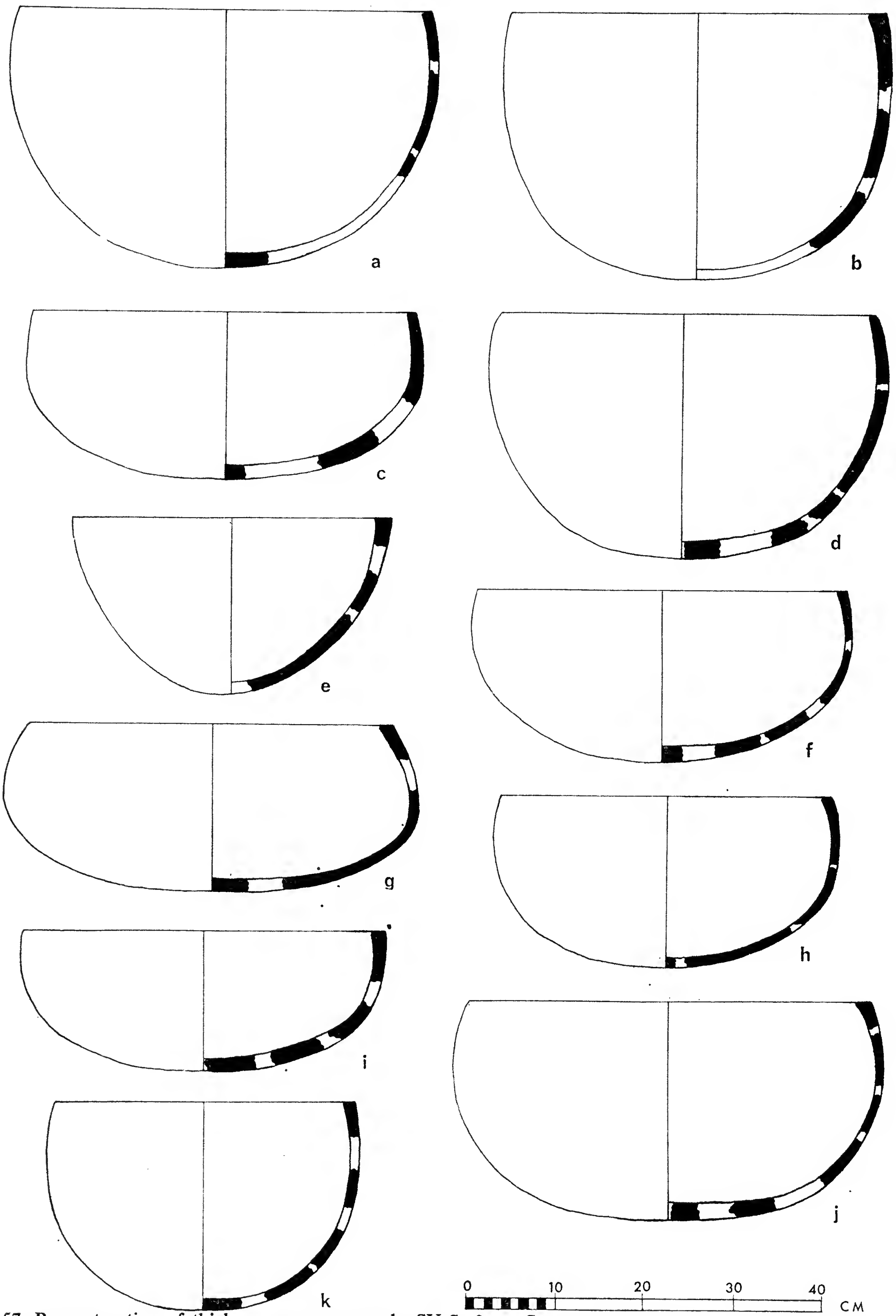

Fig. 57. Reconstruction of thick coarse ware vessels, SU-Sa-3. a. Category I, bowl 1; b. Category I, bowl 2; c. Category II, bowl 3; d. Category II, bowl 4; e. Category VII/XIII, bowl 5; f. Category X, bowl 6; g. Category IV, bowl 7; h. Category XVI, bowl 8; i. Category III, bowl 9; j. Category III, bowl 10; k. Category V/XI, bowl 11.

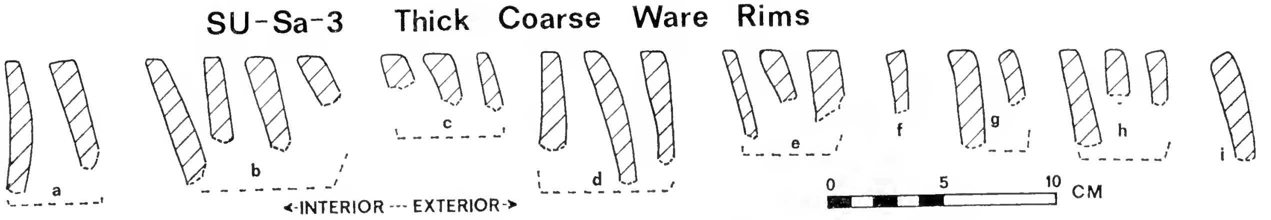

Fig. 58. Other thick coarse ware rims in profile. a. Category I rims; b. Category II rims; c. Category VII/XIII rims; d. Category X rims; e. Category IV rims; f. Category XVI rims; g. Category III rims; h. Category V/XI rims; i. Category XX rims.

except for an expanded one of 12 mm (fig. 58b). Undecorated.

Category VII/XIII: Bowl 5. Colour: 2.5YR 4/6 to 2.5YR 4/2 for Category XIII and 2.5YR 6/4 to 2.5YR 4/2 for Category VII.
Temper: Feldspathic basaltic type with large subangular to well rounded greyish white grains.
Surface: Fairly smooth with some floating of clay on surface; only a few temper grains protruding.
Shape: Deep, simple open bowl (fig. 57e). Diameter 35-36 cm.
Rims: Direct, parallel to slightly diverging walls forming a flat lip which in bowl 5 is 15 mm thick; lips of other sherds 10-11 mm thick, except for one 5 mm thick (fig. 58c). Undecorated.

Category X: Bowl 6. Colour: 2.5YR 6/4 to 2.5YR 5/2.
Temper: Feldspathic trachytic type with large angular grey grains.
Surface: Smooth, even, well impacted with few temper grains protruding.
Shape: Simple open bowl of medium depth with slightly incurving sides (fig. 57f). Diameter 41-42 cm.
Rims: Direct, slightly incurved and expanded to flat lips 7-9 mm thick (fig. 58d). Undecorated.

Category IV: Bowl 7. Colour: 2.5YR 6/6 to 2.5YR 5/2.
Temper: Feldspathic trachytic type with numerous large angular grey grains.
Surface: A rough, even finish because of protruding temper grains.
Shape: Calabash form of large shallow restricted bowl with some asymmetry (fig. 57g). Diameter 40 cm.
Rims: Direct, walls incurved and expanded on lip interior to flat surface 10-15 mm thick, except for one 5 mm thick (fig. 58e). Undecorated.

Category XVI: Bowl 8. Colour: 7.5YR 7/3 to 7.5YR 4/2.
Temper: Feldspathic trachytic type with numerous large angular grey grains.
Surface: Fairly even finish but with some temper grains slightly protruding from hard impacted surface.
Shape: Simple open bowls of fair depth with slightly incurving sides. Reconstructed bowl 8 (fig. 57h) with diameter of 37 cm; others probably similar.
Rims: Direct, walls slightly incurved and interior expanded to flat lip. Lip width of 9 mm in bowl 8; other rims less incurved with lip width of 8 mm (fig. 58f). Undecorated.

Category III: Bowls 9 and 10. Colour: 5YR 5/4 to 5YR 4/2.
Temper: Feldspathic trachytic type but more sand and more grains of dark minerals than usual.
Surface: Smooth, partly floated and wiped, with few temper grains exposed.
Shape: Simple open bowls. Bowl 9 is thick bodied and shallow with a diameter of about 40 cm (fig. 57i), while bowl 10 is deep with thin incurved side walls and a diameter of about 45 cm (fig. 57j).
Rims: Direct, walls incurved and interior expanded to thick, flat lips 12-14 mm wide, except for one 8 mm wide (fig. 58g). Undecorated.

Category V/XI: Bowl 11. Colour: 2.5YR 6/6 to 5YR 3/2.
Temper: Feldspathic trachytic type with numerous small, angular grey grains.
Surface: Even and fairly smooth from partial floating of clay on surface so that few temper grains protrude.
Shape: Deep, thin-walled simple open bowl (fig. 57k). Diameter 33 cm.
Rims: Direct, straight, with parallel-sided or slightly converging walls to form flat lip 7-10 mm wide (fig. 58h). Undecorated.

Category XX: Rims only. Colour: 10R 6/6 to 2.5YR 6/6.
Temper: Feldspathic trachytic type but with more heavy, dark mineral grains than usual.
Surface: Fairly even, but with dark mineral grains often protruding.
Shape: Bowl, though shape and size uncertain.
Rim: Direct, simple, slightly expanded to flat lip 10 mm thick (fig. 58i). Undecorated.

Analysis of thick ware vessels

The 11 reconstructed vessels represent only a portion of the 25-odd vessels for which there is fairly certain evidence (table 9). If one works on the basis of the other rims illustrated from each of the categories (fig. 58), the 22 rim forms there and the 11 reconstructed bowls in fact provide some evidence for at least 33 vessels. Moreover, closer study of these other rims suggests that the shapes among the two-thirds of the vessels which have not been reconstructed do not differ markedly from those which have been. There are no rims reflecting other vessel shapes and no body sherds with shoulders or angles to support the notion of vessel forms different from those which have been reconstructed. Finally, the 10.8 percent frequency of rims among all thick ware sherds (table 9) is of the same order as the 10-12 percent range encountered in the Vailele collections. The above leads to the conclusion that the third of the thick ware vessels reconstructed is a reliable sample reflecting the range of bowl shapes present in this variety of sherds.

On the basis of the layer V assemblage at Va-1, I had suggested that "two kinds of low open bowls of shallow depth and fair size, much like the pottery kava bowl of Fiji known as *dari*" were involved (I, Report 7, p. 128). One kind would correspond to large shallow vessels like those of figure 57c, f and i found at Sa-3, and the other to the deep medium-sized vessels like figure 57e, h and k. To them may now be added the large shallow bowl with a restricted opening (fig. 57g) and the large, deep, open-mouthed bowls of 40-45 cm in diameter (fig. 57a, b, d and j). No small vessels are represented in the thick ware variety of sherds, and only three bowls of medium size were present.

Among the two main temper types common to the thick ware sherds (I, Report 19, pp. 271-273), the feldspathic trachytic type occurs in 60.5 percent and is distributed among seven of the nine categories. The feldspathic basaltic temper occurs principally in vessels of Category III and in Category VII/XIII.

No decoration is present on any of the 173 rims in the thick coarse ware variety of sherds and no unusual features were encountered among the numerous body sherds of this variety. In particular, there is no sign of any attempt at decorative manipulation of vessel bodies beyond fine striations from the final wiping of finished surfaces as noted in previous descriptions of the variety. I believe it will have to be accepted that this pottery is a plain ware in every sense and the lack of decoration is a function neither of sample size nor of the context in which it occurs.

A few possible anvil depressions were observed on some sherds, though traces of the use of a paddle are lacking. Unfortunately, there is little else in sherds of this variety bearing on methods of pot construction. However, given the restricted range of bowl shapes produced, the method need not have been elaborate.

For the chronological discussions below it is important to observe that the thick coarse variety of sherds from Sa-3 and those from layer V at Va-1 are virtually identical.

Thin Fine Ware

At Sa-3 a little over 5800 sherds of pottery belong to a variety of Samoan thin fine ware previously defined on the basis of a small collection of 204 pieces from Layer F of Va-4 (I, Report 10, pp. 170-174). Nearly all rims and a majority of the larger body sherds from Sa-3 to a total of 3099 pieces, or 53.3 percent of the sherds of this variety, have been distributed among ten categories distinguished by minor differences in their physical properties (table 10). From these categories 37 vessels were reconstructed, of which 26 are illustrated (figs. 59 and 60). Reconstructed vessels, where not illustrated, were considered sufficiently similar to illustrated examples to be listed as such. As with the thick ware reconstructions, the solid areas in the wall sections represent actual sherds used in the reconstruction process. While sherds from the same squares and levels fitting together were encountered in all categories, the more broken nature of the thin ware sherds made joining them difficult. Nevertheless, examples of five and six joined sherds were achieved in a number of instances, and there was one example of nine sherds. In general, however, the reconstructed vessels depend on fewer joined pieces and therefore are presented with slightly less confidence than those in the thick ware categories. It is also obvious from table 10 that the ten thin ware categories contain numbers of sherds from other vessels too, as the range of additional rim forms (figs. 59n-p and 60n-t) and additional lots of body sherds within each category attest. An impression of the degree of confidence one may place in a particular reconstruction can be obtained from inspection of the figures in table 11 and the size of the sherds employed in the reconstructions (figs. 59 and 60).

The 2719 sherds assigned to an "other" category are all small pieces 10-20 mm or less in their largest dimension. None falls outside the range covered by numbered categories and had the effort been judged worthwhile, nearly all could have been accommodated in one of them. They have here been placed in a residual category of "other". The complete range of sherd and vessel variation in the class of fine ware sherds appears to have been adequately covered by the sorted sherds, and further analysis would appear to offer no additional information.

Thin Ware Categories

A description of each of the thin ware categories and reconstructed vessels in them follows.

Category VI: Bowls 12 to 15. Colour: 2.5YR 6/4 to 2.5YR 5/2.
Temper: Ferromagnesian basaltic type with grains occurring in low frequency.
Surface: Both interiors and exteriors present very hard, smooth, even finishes, sometimes with a crackled appearance.
Shape: Medium to deep simple open, thin-walled bowls in two sizes: one comprising bowl 12 (fig. 59a) with a diameter of 31 cm, and the other bowls 13, 14 and 15 (fig. 59b, c, d) with diameters of 38 and 45-46 cm; other vessels probably similar.
Rims: Direct, straight to slightly incurved, and usually thickened on interior at lip to widths of 8-11 mm (fig. 59a-d, n). Flat lips 59.4 percent decorated with light notching at right and oblique angle to rim (fig. 59a, d, n).

Category VIII: Bowls 16 and 17. Colour: 2.5YR 5/4 to 2.5YR 5/2.
Temper: Ferromagnesian basaltic type with occasional decomposed grains of a 10R 4/6 ferric material.

TABLE 9

DISTRIBUTION OF THICK COARSE WARE POTSHERDS IN SU-Sa-3

Category	Total no. potsherds	Layer 4	Percentage in Layer 5	Occup. A	No. rims	% of rims	Minimum no. of vessels	Locus in which sherds show high concentration
I	142	75.4	24.6	—	18	12.7	4	Squares: in G-5-6 and in H-I-5, layer 4
II	516	78.5	20.9	0.6	50	9.7	6	Squares: in F-G-H-5 and in H-I-3-4, layer 4
VII & XIII (Combined)	118	67.0	28.8	4.2	8	6.8	3	Squares: in G-5-6, layer 4
X	149	73.2	22.8	4.0	25	16.8	2	Squares: H-4-5, layer 4
IV	132	84.8	14.4	0.8	10	7.6	2	Squares: G-H-5-6, layer 4
XVI	83	72.3	25.3	2.4	13	15.7	2	Squares: G-H-5 and H-6, layer 4
III	244	75.9	18.0	6.1	20	8.2	3	Squares: E-5-6 and F-5, layer 4
V & XI (Combined)	211	53.1	42.6	4.3	27	12.8	2	Squares: in square I-5, layer 5, and in H-4 and I-3, layer 4
XX	9	33.0	66.0	—	2	22.2	1	Not certain
Totals	1604	73%	24%	3%	173	10.8	25	

TABLE 10

DISTRIBUTION OF THIN FINE WARE POTSHERDS IN SU-Sa-3

Category	Total no. potsherds	Layer 4	Percentage in Layer 5	Occup. A	No. of rim sherds	% of rims among total sherds	% of total rims Plain	Decorated	Minimum no. of vessels	Possible no. of vessels
VI	392	1.0	83.4	15.6	64	16.3	41.6	59.1	7	7
VIII	294	3.4	81.0	15.6	53	18.0	91.0	9.0	5	10
IX	406	3.7	75.1	21.2	81	20.0	76.5	23.5	11	24
XII	884	3.2	69.4	27.4	137	15.5	70.1	29.9	10	30
XIV	122	9.8	76.2	14.0	11	9.0	54.5	45.5	5	5
XV	138	6.5	59.4	34.1	34	24.6	73.5	26.5	5	16
XVII	150	8.0	58.0	34.0	62	41.3	90.3	9.7	7	12
XVIII	133	7.5	72.9	19.6	32	24.1	93.7	6.3	3	7
XIX	83	26.5	72.3	1.2	19	22.9	100.0	0.0	6	8
XXI	497	3.6	67.6	28.8	69	21.7	78.3	21.7	13	19
Other	2719	6.2	67.1	26.7	7	.3	100.0	—	—	—
Totals	5818	5.3	69.8	24.9	569	9.8	75.4	24.6	72	138

Surface: Both interiors and exteriors had smooth, even finishes, but these have flaked away by polygonal cracking of the outer skin, leaving a rough but regularly textured underlying surface.
Shape: Deep, simple open, thin-walled bowls in two sizes: bowl 17 (fig. 59f) with a diameter of 30 cm and bowl 16 (fig. 59e) with a diameter of 45 cm; other vessels probably similar.
Rims: Direct, straight to slightly incurved, and only occasionally thickened at lips (fig. 59o); only one lip (fig. 59f) decorated with shallow, narrow notching.

Category IX: Bowls 18 to 24. Colour: 5YR 5/3 to 5YR 5/2.
Temper: Ferromagnesian basaltic type, the grains providing a generally sandy appearance to the texture; occasional distinctive flecks of a grain of 7.5R 6/6 colour.
Surface: Hard, even grainy interiors and exteriors, the interiors usually being of a lighter colour than the fire-blackened exteriors.
Shape: Simple open bowls of shallow to medium depth with extremely thin walls, being typically 3-4 mm thick; bowls fall into three sizes from the smallest of 11 cm represented by bowl 21 (fig. 59j), to small of 18 cm illustrated by bowls 19 and 20 (fig. 59h, i), to medium of 33-35 cm comprising bowls 18, 22, 23 and 24 (fig. 59g, k, l, m).
Rims: Direct, straight to slightly incurved, with walls parallel or slightly thickened on the interior at the lip to form a flat surface usually between 3 and 6 mm wide, a few thickened lips being in the 8-11 mm size range (fig. 59p). While 23.5 percent of the rims in the category are decorated, there is only one decorated rim among the seven reconstructed vessels (fig. 59m).

Category XII: Bowls 25 to 29. Colour: 5YR 4/4 to 7.5YR 4/2.
Temper: Ferromagnesian basaltic type; the grains give a very sandy appearance to the texture with many black ferromagnesian silicate crystals and grey multicrystalline basaltic fragments.
Surface: Soft, friable, even interiors and exteriors, the interiors usually being of lighter colour than the fire-blackened exteriors.
Shape: Simple open bowls of medium to deep depth with walls from 5 or 6 to 8 mm thick; bowls 25, 28 and 29 fall into a medium size range between 34 and 35 cm in diameter (fig. 60c), and bowls 26 and 27 into a large size (fig. 60a, b) 41 and 46 cm in diameter respectively.
Among the bowls not illustrated, 25 is similar to 12 (fig. 59a) though with a plain rim, and 29 similar to 28 (fig. 60c).
Rims: Direct, straight to incurved, parallel-sided walls often thickened on the interior at the lip whether or not carrying decoration, two examples of reduced rims also being recorded (fig. 60n); lip widths range from 4 to 10 mm in thickness. Flat lip surfaces, 29.9 percent decorated by notches at right and oblique angles to the rim (fig. 60a, c, n).

Category XIV: Bowls 30 and 31. Colour: 2.5YR 4/6 to 2.5YR 4/2.
Temper: Ferromagnesian basaltic type, with a moderate number of black ferromagnesian silicate crystals and a few grey to yellow multicrystalline basaltic fragments protruding from the surface.
Surface: Hard, even interior and exterior surfaces which have a partially floated and wiped self-slip, the interiors usually being lighter in colour than the fire-blackened exteriors.
Shape: Vessel 31 is a large deep, fairly thin-based open bowl with slightly incurved upper walls similar to bowl 15 (fig. 59d); vessel 30 (fig. 60d) is a large shallow, shouldered bowl of unique shape in this assemblage. The shoulder is based on the only four angled body sherds, two of them joining, in the entire collection. Other vessels are simple open bowls of medium to large size.
Rims: Direct and indirect, straight and parallel sided to slightly incurved and diverging with flat lips (fig. 60o). Only one bowl lip is decorated, but its sherds constitute 45.5 percent of rims assigned to this category.

Category XV: Bowls 32 and 33. Colour: 2.5YR 6/6 or 2.5YR 5/4 to 2.5YR 4/2.
Temper: Ferromagnesian basaltic type, with grains occurring in low frequency and not often protruding through surface.
Surface: Hard, smooth finishes which often present a crackled appearance, interior surfaces at times being darker than exteriors. Some use of self-slipping on surfaces, followed by wiping which leaves very fine striations.
Shape: Deep, medium to large, simple open, thin-walled bowls, bowl 32 of 37 cm in diameter being similar to, but a little larger and shallower than bowl 24 (fig. 59m), and bowl 33 (fig. 60e) being 43 cm in diameter; other vessels were probably similar.
Rims: Straight to slightly incurved and usually parallel sided or with only moderate interior thickening toward lips; lip widths of 4-7 mm common, with a few thicker lips of 9-11 mm (fig. 60p). Lips decorated by light oblique and right-angle notching constitute 26.5 percent of rims in this category.

Category XVII: Bowls 34 to 38. Colour: Two groups, one 10R 4/3 to 10R 3/1; other 10R 6/1 to 2.5YR 6/2.
Temper: Ferromagnesian basaltic type, with a high frequency of black ferromagnesian silicate crystals forming part of an abundant well sorted sand temper.
Surface: Hard, compact, even surfaces with a fine sandy texture; interiors sometimes darker than exteriors.
Shape: Simple, open thin-walled bowls in three sizes; a small bowl, 38, 22 cm in diameter similar to bowl 46 (fig. 60l); two medium-sized bowls, 34 similar to bowl 12 (fig. 59a), and 36 (fig. 60f), 30-33 cm in diameter; and two large bowls, 35 similar to bowl 26 (fig. 60a) and 37 similar to bowl 14 (fig. 59c), 39-41 cm in diameter. Bowl 36 possesses an atypical thick base formed by a number of joined sherds which clearly reveal an additional flattened slab welded to the base; it also has a hole near the rim for suspension.
Rims: Direct, straight to markedly incurved, some parallel sided though often with a slight thickening at lip on interior or exterior, or both; a few diverging to thick flat lip. Lips generally flat and in 4-6 mm wide range, a few divergent examples being in the 8-11 mm range (fig. 60q). One rim is distinctive (fig. 60q, fourth from right) in having the thickened portion of the lip on the exterior, which has been achieved by bending the top of the vessel wall out and adding a strip along the interior at the lip. Only 9.7 percent of the rims in this category are decorated.
Category XVIII: Bowl 39. Colour: 10R 4/6 to 7.5R 4/5; some 2.5YR 5/4.
Temper: Ferromagnesian basaltic type, with moderate amounts of fairly fine well-sorted grains.
Surface: Hard, even, with a gritty to smooth surface texture; exteriors often darker or fire blackened.
Shape: Small-sized, simple open bowl with thick

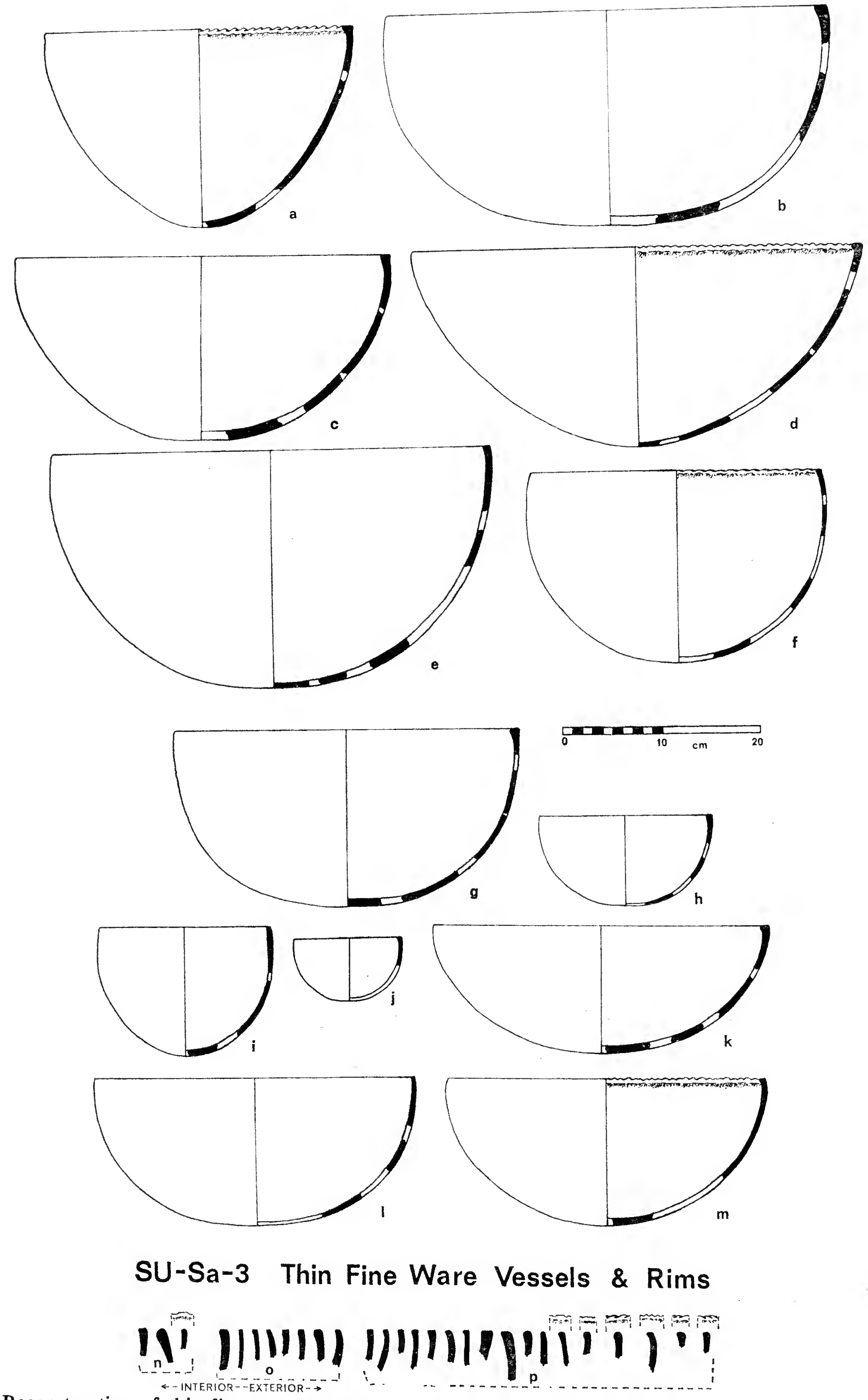

Fig. 59. Reconstruction of thin fine ware vessels and other rim profiles for three categories; VI, VIII and IX. a. Category VI, bowl 12; b. Category VI, bowl 13; c. Category VI, bowl 14; d. Category VI, bowl 15; e. Category VIII, bowl 16; f. Category VIII, bowl 17; g. Category IX, bowl 18; h. Category IX, bowl 19; i. Category IX, bowl 20; j. Category IX, bowl 21; k. Category IX, bowl 22; 1. Category IX, bowl 23; m. Category IX, bowl 24; n. Category VI rims; o. Category VIII rims; p. Category IX rims.

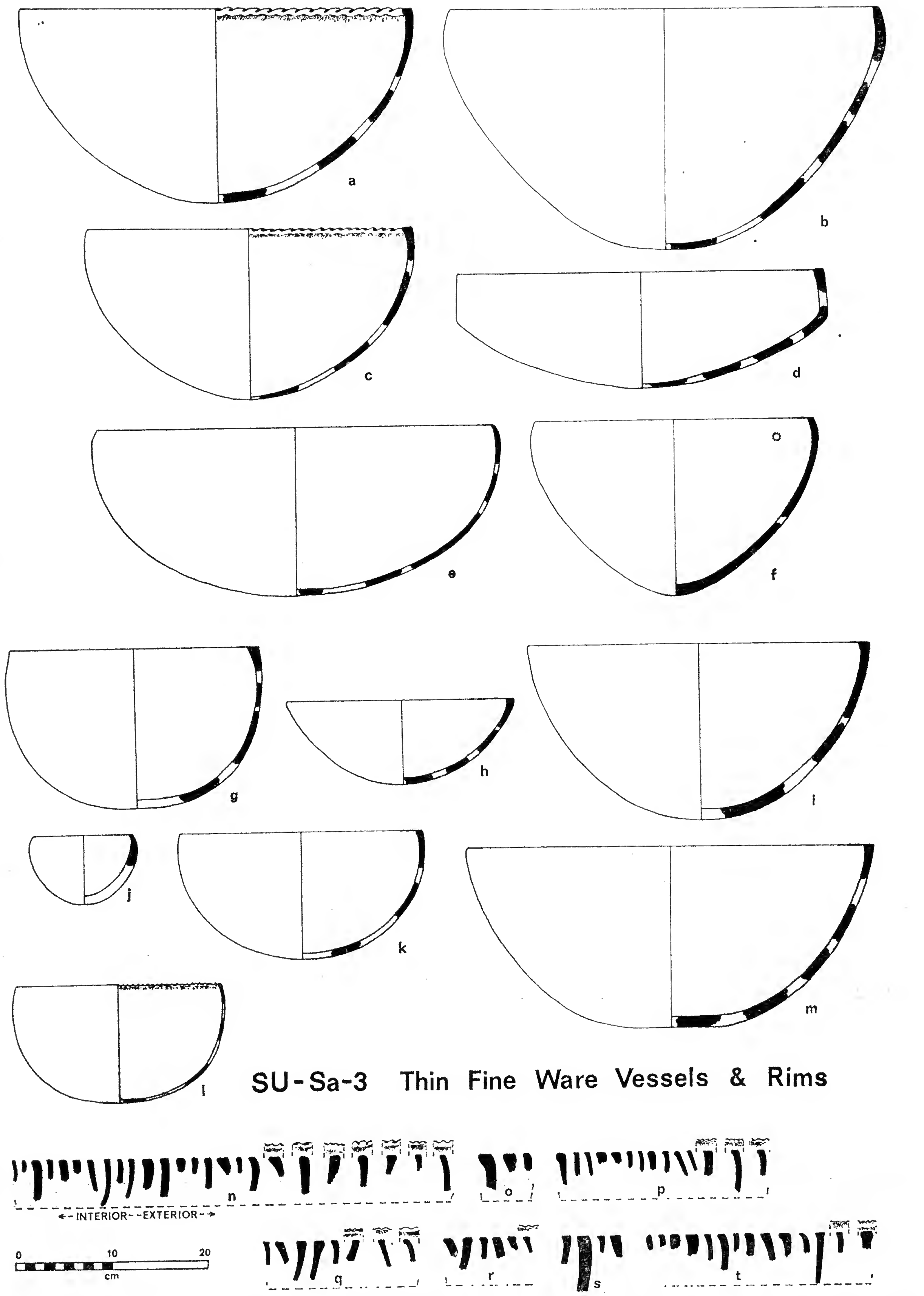

Fig. 60. Reconstruction of thin fine ware vessels and other rim profiles for seven categories: XII, XIV, XV, XVII, XVIII, XIX and XXI. a. Category XII, bowl 26; b. Category XII, bowl 27; c. Category XII, bowl 28; d. Category XIV, bowl 30; e. Category XV, bowl 33; f. Category XVII, bowl 36; g. Category XVIII, bowl 39; h. Category XIX, bowl 40; i. Category XIX, bowl 42; j. Category XIX, bowl 43; k. Category XXI, bowl 45; l. Category XXI, bowl 46; m. Category XXI, bowl 48; n. Category XII rims; o. Category XIV rims; p. Category XV rims; q. Category XVII rims; r. Category XVIII rims; s. Category XIX rims; t. Category XXI rims.

base (fig. 60g); other vessels are probably similar, but of smaller size.
Rims: Direct, straight to somewhat incurved, diverging to flat lips 7-10 mm wide (fig. 60r); one rim (fig. 60r, first from right) possessing remains of suspension hole. Decoration of very faint notching confined to 9.7 percent of rims in category.

Category XIX: Bowls 40 to 43. Colour: 10R 5/6 to 10R 3/1; some also 2.5YR 5/6.
Temper: Ferromagnesian basaltic type, with few to moderate numbers of black ferromagnesian silicate crystals.
Surface: A crackled hard, even texture, with a floated or self-slipped clay film on surface; exteriors usually fire darkened.
Shape: Simple, open to slightly incurved bowls with fairly thick (9-11 mm) bases and moderately thick (5-8 mm) vessel walls in three sizes; the smallest being bowl 43 (fig. 60j), 11 cm in diameter; the small size being bowl 40 (fig. 60h), 24 cm in diameter; and the medium size being bowls 41, similar to bowl 28 (fig. 60c), and 42 (fig. 60i), 33-36 cm in diameter.
Rims: Direct, slightly incurved rims, most diverging to flat lips 9-12 mm wide (fig. 60s), except in smallest bowl where sides converge to rim only 3 mm wide (fig. 60j). No decorated rims in this category.

Category XXI: Bowls 44 to 48. Colours: 2.5YR 5/4 to 2.5YR 4/2 and 2.5YR 4/4 to 2.5YR 3/2.
Temper: Ferromagnesian basaltic type from a well sorted sand with few to moderate numbers of black ferromagnesian crystals, except for bowl 44 in which these are frequent.
Surface: Compact, even though often crackled surface, many with gritty and others with smooth clay textures from a self-slip; both interiors and exteriors occasionally fire darkened.
Shape: Simple, open, straight to slightly incurved bowls with thin (2-5 mm) to moderately thick (6-9 mm) vessel walls. Vessels in three sizes: small with bowl 46 (fig. 60l), 22 cm, and bowl 45 (fig. 60k), 26 cm in diameter, medium with bowl 44, similar to bowl 18 (fig. 59g), 37 cm in diameter, and large consisting of two bowls 43 cm in diameter, which include bowl 47 similar to bowl 13 (fig. 59b) and bowl 48 (fig. 60m).
Rims: Direct, straight to markedly incurved, with either parallel or diverging walls and flat lips, extending over large range from 6-13 mm wide (fig. 60t); the one exception is a markedly incurved and rounded lip (fig. 60t, eleventh from right). Rims decorated with right and oblique angle notching comprise 21.7 percent of rims in this category.

Analysis of thin ware vessels

It may be argued that the greater number of sherds in the thin fine ware variety is both a reflection of a large number of thin fine ware vessels broken at the site and a result of a higher frequency of breakage which has occurred in sherds of this variety. The 1604 thick ware sherds recovered were distributed over an area of approximately 64 m², yielding an average of 32 sherds per m². While this is a significantly higher concentration per unit area than the 2.2 pieces per m² at Va-4 (I, Report 10, p. 172), it is directly comparable with the approximately 38 sherds per m² at Va-1 (I, Report 7, p. 112). However, both figures are far lower than that for the 5818 thin ware sherds at Sa-3. These were in large measure recovered from an area of some 48 m², giving a concentration of 121 sherds per m², or by unit area a ratio of four thin ware sherds at Sa-3 to every thick one.

It is true that the greater number of thin ware sherds may be attributed in part to the tendency of sherds in this class to break into more small pieces with the result, for example, that it proved not worthwhile sorting some 47 percent of the smaller body sherds into their respective categories. However, this alone does not explain the greater frequency of thin ware. Unfortunately, because a given number of thick ware sherds of the same size range weigh more than the same number of thin ware sherds of a similar size, the technique often used of dividing total sherd weight by sherd frequency to assess relative sherd size will not in this case yield an accurate comparison. Other manipulations of the data indicate that differential breakage accounts for perhaps a little more than one of the three additional thin ware sherds of the basic 4 to 1 ratio, while the remaining sherds are a reflection of the greater number of broken vessels that occur. For instance, there are 569 thin ware rims in contrast to 173 thick ones, giving a ratio of 3.3 to 1. Differential breakage might be used to reduce the ratio to 2.3 to 1, but not more. Also, the minimum number of vessels estimated for the thin and thick classes (tables 9 and 10) indicates the presence of at least 2.9 thin ware vessels to every thick ware one, while the totals for possible vessels yield estimates of 4 of thin ware to every 1 of thick ware. In sum, between two and three times as many thin ware vessels have been recovered from an excavated area 25 percent smaller than that from which the thick ware vessels came. Thus the more than three times as many thin ware bowls reconstructed are probably a fairly accurate reflection of the extent of their greater frequency in the Sa-3 pottery collection. The 37 reconstructed thin ware bowls are also probably a reliable sample of the range of vessels present because they constitute at least half of the minimum of vessels for which there is good evidence and more than a quarter of the possible total number of vessels estimated to be present.

While the percentage of rims in most categories is higher than expected, this is explained by the fact that nearly all rims, but not all body sherds, were picked out and sorted into numbered categories (table 10). If all rims are calculated as a percentage of the total number of sherds, as with other collections, a result of 9.8 percent is obtained (table 10). This is of the same order as the 10.8 percent for the thick ware sherds at Sa-3 and the 10-12 percent obtained for the Va-1 and Va-4 sites at Vailele. All are indicative that one rim for every nine or ten body sherds

TABLE 11

SHERD FREQUENCY AND DISTRIBUTION OF RECONSTRUCTED THIN WARE VESSELS FROM SU-Sa-3

Fine ware bowl number	Number Plain rims	Number Decorated rims	Number of body sherds	Layer or occupation concentration	Area of concentration by square(s)
12		12	100	5	I-5-4
13	15		21	5	I-4 & I-6
14	8		44	5	I-4-5-6
15		23	93	5	I-4-5
16	10		48	5	H-4-5 & I-6
17		5	60	5	I-4 & H-4
18	5		88	5	H-4-5 & I-4
19	1		5	4	F-6
20	9		8	5	I-6
21	2		0	5	I-4
22	15		78	5	H-I-5 & I-4
23	4		88	5	I-4 & H-5-6
24		7	36	A	I-5-4
25	15		69	base 5 & A	I-4-5
26		13	38	5	I-3-4-5-6
27	29		53	5	I-3-4-5-6
28		4	116	5	I-3-4-5-6
29	8		101	5	I-4-5
30	1		19	5	I-5 & H-4
31		5	48	5	H-3
32		2	15	5	I-6
33	9		58	base 5 & A	I-3-4-5-6
34	7		17	base 5 & A	I-5
35	8		10	5	not evident
36	8		10	A	I-3
37	11		25	base 5 & A	I-5
38	4		26	base 5 & A	I-5
39	25		84	5	I-4-5-6
40	6		22	5	H-5-6
41	4		12	5	H-2-3
42	3		20	base 4 & top 5	H-4-5-6
43	1		0	5	I-5
44	14		19	5	I-4-5
45	18		45	5	not evident
46		7	10	5	H-4-5
47		6	46	base 5 & A	I-5-6
48	1		15	5	I-4-5-6
Totals	241	84	1547		

is a typical ratio for the entire Samoan ceramic complex. Given the use of 325 of the 569 rims and 1566 of the body sherds in reconstructing thin ware vessels (table 11), it seems reasonable on this basis as well to infer that they are an adequate sample, reflecting such variation as occurs in the thin ware assemblage.

The reconstructed thin ware bowls cover a wider range of shapes and sizes than those of the thick ware variety. As a consequence, the size classes are more clearly defined and may be summarised for both varieties according to their diameters as follows: smallest 11 cm, small 18-26 cm, medium 30-37 cm, and large 38-46 cm. In the bowls, depth exhibits a strong correlation with size, deep bowls having a depth of half or slightly more than half the diameter. This leaves a smaller class of shallow bowls in which depth is less than half the diameter. In comparison with thick ware bowls, 8 of which are large and 3 of medium size, 13 of the thin ware bowls are large and 15 of medium size. In addition, there are seven small bowls and two of smallest size which are not represented at all in the thick ware variety. While the large thick ware bowls are evenly divided between four shallow and four deep vessels, only four thin ware vessels qualify as shallow bowls, two in the large size group (figs. 60d, e), one in the medium size group (bowl 32), and one in the small size group (fig. 60h). The size differences between the thick and thin ware vessels can be summarised, then, as consisting of a higher frequency of medium-sized thin ware bowls, the addition of smaller thin ware vessels and a lower frequency of shallow vessels. The other shape difference to be noted is the replacement of the single large shallow thick ware bowl with a noticeably restricted mouth (fig. 57g) by a large shallow thin ware shouldered bowl with a nearly vertical rim (fig. 60d) identified from four angled body sherds unique in the Samoan pottery collection.

Among the thin ware vessels a sand-sized temper of the ferromagnesian basaltic type (I, Report 19, pp. 271-272) is universal. Within this category there is wide variation, however, more than was indicated by the sherds subjected to petrographic analysis. Such variations are noted above under each of the categories on the basis of megascopic examination of the sherds under a binocular microscope, but nothing has been observed which would seem to require modification of the three basic temper types. More important, all three implications of the petrographic analysis (I, Report 19, p. 273) have been strongly supported, namely: (1) that the pottery was made using temper which could have been collected from appropriate sites in northeast Upolu; (2) that temper types in sherds vary in regular patterns with respect to typology and stratigraphy; and (3) that the co-ordination of microscopic and megascopic analysis has established empirical rules for the sorting of total sherd collections.

Observed decoration on Samoan pottery had been confined to incision on the lip of one rounded rim sherd with coarse temper (I, Report 10, pp. 173-174). The fine to broad notching at right and oblique angles to the rim at Sa-3 forms the only design element encountered and is directly comparable to the Vailele example. Decoration, therefore, while confined to the thin fine ware at Sa-3, may occur on the occasional coarse ware sherd, although not in the later ceramic contexts where coarse ware pottery predominates. No surface decoration of body sherds occurs in the thin ware variety, even though 25 percent of all rim sherds and 27 percent of the reconstructed vessels possess decorated rim lips. Obviously, decoration was not only a minor component of the Samoan ceramic complex, but one which was restricted to a single area of the vessel. The 140 decorated rims constitute 2.4 percent of the 5818 thin ware sherds and 1.9 percent of the total sherds at Sa-3; figures which reflect the extremely limited level of general occurrence.

A feature recorded on two rim sherds, one belonging to bowl 36 (fig. 60f) in Category XVII and the other a rim from Category XVIII, was a suspension hole just below the lip of the bowl. Another feature noted on several sherds related to bowl 37 in Category XVII was an arc-shaped area where the sherd had been reduced to half its normal thickness by scraping away of the material. No other unusual features, or features suggesting other types of vessels than those reconstructed, were observed.

Evidence of manufacturing techniques, while not as restricted as in the thick ware class of sherds, was hardly abundant. One rounded lip to which a separately bonded strip had been added along the interior was noted among the rims of Category XVII. In several instances, sherds with what looked to be vestiges of slab construction were observed, and a certain case of such construction was recorded for bowl 36 in Category XVII. The usual fine striations which result from wiping over floated or self-slipped surfaces were sometimes in evidence, and there were occasional interior depressions, especially on the two joined shoulder angle sherds, that could be interpreted as anvil marks. Finally, many of the flattened rims possessed a squashed appearance at the lip indicating that a small flat slab of wood used as a paddle was responsible for rim formation, as in some modern Fijian bowls whose manufacture I have observed. Thus of the basic Oceanic techniques of fabrication: hand-building, ring-building, coiling and slab construction (Palmer 1971: 80, 84), only the last is definitely attested, while among the possible techniques of compaction and finishing after fabrication, a weak though likely case can be made for the use of the paddle and anvil. For instance, this technique certainly seems to me to be required in explaining the production of some of the very thin-walled hard-surfaced bowls, even where all evidence for such a technique has been obliterated. Still, simple hand formation of the smaller bowls using a stone as a punch, and a combination of this process for the base with ring-building for the upper portion of some of the medium to large bowls cannot be excluded.

Whatever the methods of initial fabrication, however, the use of excess water as a means of floating clay to the surface to provide a self-slip, and scraping or wiping the surface so as to remove any traces of the previous technique, is typical of the last stage in the manufacturing process. The lack of pottery misfires, waste products of pottery production, or tools indicative of its manufacture all suggest that although the inhabitants of Sa-3 used pottery it was not necessarily made on the site.

One outcome of the study of this much larger collection of thin fine ware sherds, particularly of the rims, is of some importance in the interpretation placed on the Samoan ceramic assemblage and presented in the concluding sections of this volume (p. 249). This is the realisation that some of the very small rim sherds from Va-4, which I had interpreted as outcurved (I, Report 10, fig. 70, sherd no. 4 under flat lip and no. 2 under rounded lip) are easily accommodated among the incurved bowl rims of Sa-3 (fig. 60p, q, t). Thus Golson's (1971: 71) interpretation that one of the two Va-4 sherds belonged to an open basin with strongly everted rim and the other to a vertically oriented rim on a pot of ovoid shape are in my view rendered doubtful on this basis as well as the one we both recognise, namely that the Va-4 rims were too few and too small to permit confident reconstruction of their original position on the vessel to which they belonged.

Functional Interpretation

Several things, some negative and some positive, can be said about the functions of vessels in this assemblage. First, there is no reason to treat the thick ware variety of bowls as other than a functional equivalent of and chronological replacement for many of the medium to large bowls in the thin ware variety. Second, there is no evidence of the common Oceanic categories of narrow-necked water jars, and large ovoid cooking and storage pots, much less of any of the uncommon jar, dish, plate or tray forms. While decoration may in some pottery industries serve as a guide in distinguishing various utilitarian from non-utilitarian vessels, it is not possible to sustain such a distinction here. Rather the remarkable restriction of vessel form to open bowls of several sizes, suggests some limitation of the functional role of pottery within the domestic context of Sa-3. The repeated signs noted in the category description of darkened or fire-blackened areas, both on interior and exterior surfaces, but especially the latter, are indicative that some bowls were used as vessels for cooking or heating food. Still, a sufficient number of bowls and sherds entirely lack such evidence to be certain this was not the only use of these bowls. The two cases of suspension holes also suggest that their use involved more than cooking food.

In the absence of ethnographic records of the use of pottery in Polynesia, one turns to wooden bowls, the only items of comparable shape, for possible interpretations of the pottery forms. Here there are some obvious and suggestive parallels. The smallest pottery bowls equate easily with the half coconut shell containers used as drinking cups for water and for serving foods of fluid nature (Buck 1930: 104, 139) as well as for kava drinking (Buck 1930: 150-151) and for holding various dyes used in bark cloth manufacture (Buck 1930: 306). Pottery bowls in the small size range are comparable to small, round to elliptical wooden bowls (Buck 1930: 107, see also Plate XXXIIIb), though some of the wooden bowls have a flat base. Similarly, medium-sized pottery bowls are very like some medium-sized round wooden bowls pictured by Buck (1930: Plate VIc, man on left with round bowl of about 30 cm diameter between his legs; see also bowl on left side of Plate XXXIIIb). Such bowls are used to hold arrowroot paste and dye when decorating bark cloth (Buck 1930: 691, caption for Plate XXXIIIb), to pound cooked breadfruit in (Buck 1930: 684, caption for Plate VIc), or to prepare various foods in and sometimes even to cook the food by dropping heated stones into the interior (Buck 1930: 100, 105-108). For all of these functions the small, medium and even some of the large pottery bowls would have served quite adequately. Moreover, where heating was required in paste, dye or food preparation, the pottery vessels could have been placed directly on the fire, without resorting to heated stones.

The other obvious function of some of the medium and large pottery bowls, particularly the shallow ones, is as kava containers. Not all wooden kava bowls in Samoa had legs or handles (Buck 1930: 150), and most are of shallow depth. Some kava bowls with broad, flat lips and legs also possessed a narrow raised band on the outer part of the lip. This was incised with repeated oblique lines in parallel which give an effect very similar to the notched lip decoration found on Samoan pottery (Buck 1930: 148 and Plate IXB). Kava bowls also had bored suspension lugs (Buck 1930: 149), a technique which calls to mind the suspension holes on two of the Samoan bowls. Certainly the pottery kava bowls of Fiji, though apparently a recent innovation (Palmer 1971: 81), are remarkably similar in size and shape to many of the pottery bowls from Samoa, indicating that this is a feasible functional interpretation for them even though the Samoan and Fijian forms are not necessarily historically related. Indeed, given the likelihood from its restricted distribution that the ceremonial wooden kava bowl of Tonga, Fiji and Samoa is a later innovation, occurring after the initial settlement of East and West Polynesia, an earlier use of pottery vessels in this role seems quite reasonable. It is supported by an association of the larger pottery bowls with a pottery drinking cup of a size and style like the coconut cups traditionally employed in the serving of this beverage.

In short, if the pottery bowls of Sa-3 were substituted for those of the smaller round to elliptical wooden bowls expected ethnographically in a domestic context, they would cater quite adequately for the known demands of a Samoan household. Only some of the more elaborate food and kava bowls with their longer dimensions greater than 50 cm would be lacking.

Chronological Analysis

Most Oceanic pottery analyses have had chronological change as one of their major concerns. In Samoa the restricted range of time during which pottery is known to be present reduces the importance of this aspect of the pottery analysis. All the stratigraphic evidence presented above, and that on the adzes and other portable artifacts given below, indicates that layers 4 and 5 occupied a short interval of time and are in cultural content nearly identical. The analysis of the pottery supports this interpretation, the changes observed being of a minor nature within a unified ceramic complex.

An obvious implication of the stratigraphic data in tables 9, 10 and 11 is that the coarse ware variety of Samoan plain pottery is predominant in layer 4, whereas the thin fine ware variety occupies this position in layer 5 and occupation A. In fact 95 percent of the thin ware sherds are from the earlier stratigraphic contexts and only among those sherds assigned to Category XIX is the general pattern broken.

Two points need to be made at the outset with respect to these figures: one is that the stratigraphic division of the two varieties may have been even more marked than is indicated by the figures, and the other is that thin and thick ware sherds occur in association in both layers, the change being one of increasing replacement of certain thin ware bowls by thick ware ones and not simply a replacement of one variety by the other.

On the first point, it is my impression that the 5.3 percent figure for thin ware sherds in layer 4 and the 24 percent figure for coarse ware sherds in layer 5 are inflated by 1 or 2 percent owing to the problem of defining precisely the contact between the two layers in different squares. The result was that in a few squares thin ware sherds at the top of layer 5 were included in layer 4, and in other squares thick ware sherds at the base of layer 4 were included in layer 5. The overall discrepancies, however, were not great.

On the second point, the 3 percent of thick ware sherds from occupation A are convincing evidence, for example, that this class is present from the beginning of the sequence. It is supported by bowl 11 (fig. 57k), a thick ware vessel definitely associated with the base of layer 5 and occupation A. Other figures (unpublished) on the distribution of thick ware sherds by square also convincingly demonstrate the presence of unreconstructed vessels of this class in layer 5 as a minor component of the thin ware ceramic complex. This was also demonstrated at Va-4 (I, Report 10, p. 172). Conversely, the evidence for assigning bowl 19, a small thin-walled vessel (fig. 59h), to layer 4 is unambiguous, while that for another thin ware bowl of medium size, 42 (fig. 60i), suggests it too came from the base of layer 4, although some of the sherds are in the top of layer 5. Many thin ware sherds in Category XIX are also from layer 4 (table 10). As well, there is an unreconstructed thin ware vessel of seven sherds in Category XVIII which is almost certainly from layer 4. What all this demonstrates is that large thick ware vessels, which were a minor form in the pottery industry of layer 5 and occupation A, replaced over a short span of time most of the large and many of the medium-sized, but none of the smaller thin ware vessels. There is also some evidence to suggest that more large shallow bowls were produced toward the thick ware end of the sequence.

In the course of this replacement process decoration of rim lips was discontinued. Had it not been, there should have been at least 32 rims with lip decoration among the 1600 thick ware sherds, on the expectation that 2 percent of all Samoan sherds would be decorated. Viewed another way, the figure of 24.6 percent decoration of fine ware rims would predict that 42 of the 173 thick ware rims at Sa-3 were decorated. In fact, at Sa-3 and Va-1 all 258 thick ware rims were plain, and only four decorated thin ware rims were recovered from a layer 4 context at Sa-3. Coarse ware rims, from early enough contexts, as was noted above for the one from Va-4, although a minor component, might also be decorated on occasion.

The other change that is evident at Sa-3 is a reduction in the amount of pottery recovered. I have argued above that this is not solely due to breakage but is a reflection of the greater number of vessels in the layer 5 and occupation A contexts. There appear to be no grounds for arguing that the reduction in vessel numbers is related to a restriction of the functional roles served by the ceramic complex. The reduction could, however, be attributed to the two different contexts in which the Sa-3 pottery is found. The earlier, with its high frequency of sherd recovery and vessel reconstruction, would, after allowing for breakage among the thin ware bowls, be correlated with the initial structural evidence of habitation at the base of layer 5 and supported by the greater frequency of adzes and other portable artifacts in that context. The later and much lower concentration of sherds in layer 4, of the same order as at Va-1, would be attributed to the occurrence of the pottery and other items in refuse from elsewhere in the settlement which was brought to the site in the soil and dumped there as a fill. The alternative is to argue that despite the differences of context in which the pottery occurs, the reduction reflects the production of less pottery over time. This is the interpretation I find more attractive, but for which a preference is difficult to sustain given the ambiguous nature of the evidence. Still, if pottery production was to cease entirely shortly after this period, a decline in the amount used by a settlement and available to be discarded as rubbish seems a not unreasonable line of argument.

Adzes

Stone adzes constitute another important class of portable artifacts from Sa-3, first because they are one of the few items encountered on most sites in Samoa, and second because they can be readily compared with other early assemblages from Polynesia. It is fortunate, therefore, that the adzes in the collection capable of classification are reasonably numerous — 21 from layer 5 and 13 from layer 4 — and that the range of types is fairly wide. This makes it possible to document the existence at the early end of the Samoan sequence of most of the principal adze types and provides crucial evidence of their relative frequencies, which had been lacking. The latter point needs to be stressed. Because a fair degree of continuity obtains in the sequence of adze types of Samoa, it is the differences in relative frequencies more often than major innovations involving new adze types which characterise the kind of changes that occurred historically.

Another point to be stressed is that the 21 adzes from layer 5 were associated with a house, pavement and related structural evidence defining a domestic occupation surface.

For these reasons it is likely that the adzes from Sa-3 will constitute an often cited collection in comparative studies of Polynesian adzes and their history (Green 1971). It seems wise, therefore, not only to describe and illustrate them fully but in their classification to refer to comparable distinctions which have been employed in typologies of early adze collections from Tonga (Poulsen 1967), the Society Islands (Emory and Sinoto 1964) and the Marquesas (Suggs 1961a; Sinoto MS). By this means it is also hoped to facilitate later discussion of Samoan adzes in the comparative assessments and summaries which appear at the end of this volume, and at the same time assist others who would wish to refer to this material when pursuing their own comparative studies.

In classifying the adzes from layer V of Va-1, it was noted that "the more typical adzes of Type I generally found in later contexts, are not present" and only some small adzes which were related to those defined as Type I were in evidence (I, Report 7, p. 131). This situation also appears to obtain at Sa-3, where none of the larger adzes typical of Type I are present. Instead, there are five smaller adzes which conform in most formal criteria to the normative definition of the type, and six others, which may be classed as related to Type I because they have a flat front and back and a thin cross-section. These six adzes present variations from the norm which require some sort of special recognition. This I have provided by referring to them as varieties Ib, Ic and Id, leaving the small adzes most closely conforming to the original definition under Type I.

Type I (fig. 61a-c)

In the surface collection there are 47 complete Samoan adzes of Type I between 244 and 53 mm in length. Twelve specimens are less than 100 mm long, 28 are between 100 and 150 mm, and 7 are between 150 and 244 mm. In contrast, the five Type I adzes from Sa-3 (table 12) fall in the smallest group, and a sixth incomplete one, judging from a fairly high correlation of thickness with length (Green and Dessaint MS), is probably not much greater than 110 to 120 mm in length. Thus adzes typical of Type I in the early part of the Samoan sequence all fall toward the small end of the Type I size range, while most of the larger adzes of the period belong to Type V. Adzes of Type I in Tonga would be assigned by Poulsen (1967: 199) to his group 1b, by Emory and Sinoto (1964: 153) in the Society Islands to their Form 2, by Sinoto (MS) in the Marquesas to his Type 2A, and by Duff (1959: 133) throughout Polynesia to his Type 2C.

Type Ib (fig. 61d)

This variety was previously regarded as a variant of Type I when encountered in layer V at Va-1 (I, Report 7, fig. 56f). It has a very thin cross-section resulting in a low shoulder index (less than 30) but is not well enough made nor sufficiently finished to be placed among adzes of Type III, which it most nearly resembles. Though it possesses an almost rectangular section, the

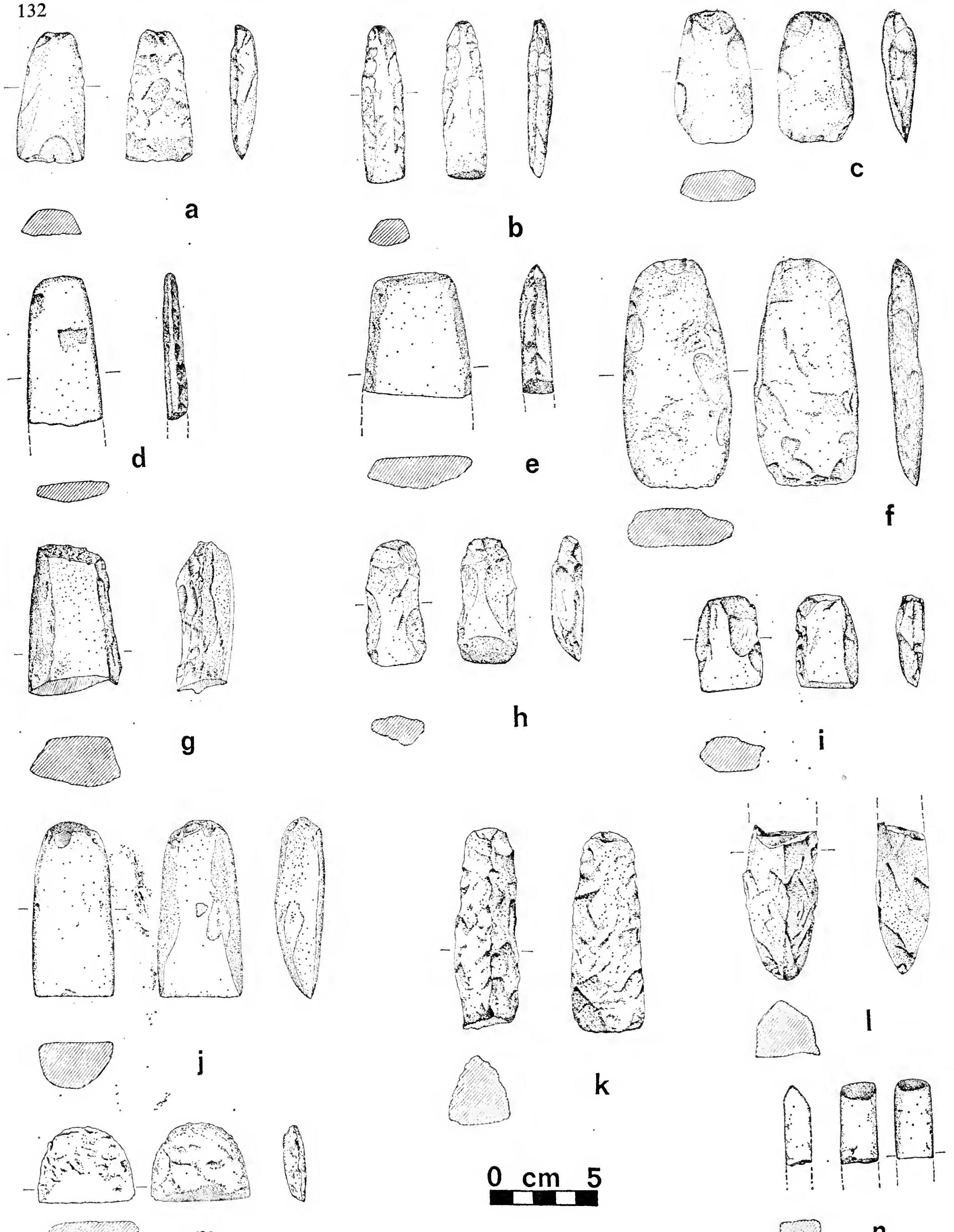

Fig. 61. Lighter weight adzes of various types from layers 4 and 5, SU-Sa-3. a. Type I, A 17/215; b. Type I, A 17/208; c. Type I, A 17/221; d. Type Ib, A 17/207; e. Type Ic, A 17/220; f. Type Id, A 17/134; g. Type II, A 17/211; h. Type II, A 17/199; i. Type IVa, A 17/208a; j. Type IVb, A 17/139; k. Type VI, A 17/210; l. Type VI, A 17/205; m. unique, A 17/196; n. unique, A 17/219.

well-ground poll and flat back of Type III are lacking, and the sides, while ground, do not everywhere make a neat juncture with the front and back surfaces. The layer 5 specimen from Sa-3, though broken, is illustrated as the best available example of this variety (fig. 61d). A smaller example from a later context is specimen A 17/288 of Type I from Lu-53 (I, Report 14, p. 217). Because Type III adzes are already present in layer V of Va-1, a suggestion that Type Ib is an ancestral form of Type III cannot be demonstrated. Sinoto's (MS) Type 3E in the Marquesas would appear to be a comparable form; elsewhere adzes of this variety are not distinguished from those assigned to a category comparable to Type I.

TYPE Ic (fig. 61e)

This variety was also originally regarded as a variant of Type I when first encountered in layer IVb and V of Va-1 (I, Report 7, figs. 56c and h). In common with all Type I adzes, the front and back surfaces are fairly flat and the width is much greater than the thickness of the adze in cross-section, thus yielding a low shoulder index of less than 36 in the case of these three examples. The main difference from other adzes of Type I lies in the treatment of the sides, which are not ground to a single inward-sloping flat surface. Instead, the lateral edges along the sides bear traces of flaking and grinding at an angle to both the front and back surfaces, resulting in an irregular median line along each side. Two such adzes were present at Va-1, and the butt portion of a medium-sized adze of this variety was found in layer V of Sa-3. Only Sinoto (MS) seems to assign adzes of this form to a separate category, IB. Emory and Sinoto (1964, Plate 3b) place an excellent example from Maupiti burial ground in the Society Islands in their Form 1, along with adzes which I consider are of a different type.

TYPE Id (fig. 61f)

The distinction between adzes of Type I and Type Va tends to become blurred if the front lateral edges of Type I adzes are ground and rounded, so that the flat inward-sloping sides are no longer well defined. The result is an adze with a flat front surface, but otherwise not easily distinguished from one of Type Va, particularly in broken specimens. For example, Golson (I, Report 7a, p. 111) initially classed the broken fragments of Type Va from layer V of Va-1 as specimens belonging to Duff Type 2C (our Type I), then withdrew this identification upon seeing their resemblance to complete specimens of Type Va. Similarly, before classifying the adzes here placed under Id, I first considered defining them as an extremely thin variant of Type Va. What has convinced me not to proceed with this alternative is the occurrence of a flat central area on the front surface and traces of similarly flat surfaces on the sides, indicating that two distinct grinding surfaces had been present even though the line of demarcation between them had subsequently been partially or wholly erased. Also, most adzes of this variety, like those in Type I generally, have relatively straight cutting edges in contrast to the convex edges characteristic of Type V. A similar type of adze is apparently that placed by Poulsen (1967: 199) in his group 1a/1b, while Type 1C of Sinoto (MS) would also appear to include adzes of this variety.

At Sa-3 four specimens are assigned to this variety, two from layer 5 and two from layer 4. All are in the small to medium size range as defined for adzes of Type 1. A complete example from layer 4 illustrates this adze form well (fig. 61f).

Assignment of varieties b, c and d to Type I without further distinction would have been possible since they possess most of the features deemed essential to the definition of the type, while the variations under discussion are largely in those features not assigned any classificatory or historical significance. But these variations may prove of importance in classifications with other aims and as they recur several times in the three assemblages I feel they are worth noting. Their recognition in fact leads to the observation that the greater uniformity which adzes of this type exhibit at a later date when they have become the common form, is not in evidence in these early levels. Thus, although Duff (1959: 133) has singled out adzes of this form as one of the two major varieties of quadrangular adzes brought into Polynesia from Indonesia or South-east Asia in an already fully developed state, the early Samoan evidence implies that the type was not the predominant early form nor were its formal properties well established. Rather, it seems to have been a category of adze shape in which a certain amount of experimentation was taking place, encouraged perhaps by the necessity of fashioning a suitable adze kit in a new suite of rock types (see discussion under raw materials below).

TYPE II (fig. 61g-h)

Two adzes from layer 4 of Sa-3 have been classified as Type II. The length of the larger specimen, of which only the butt portion was recovered, is estimated at between 120 and 160 mm on the basis of general shape and thickness of cross-section. It has a less highly weathered surface than some other adzes in the two lower layers. The front surface and to a lesser extent the sides are ground, but the back is not and presents a flaked irregular rounded surface (fig. 61g). This adze conforms more closely than the second specimen to the definition of the type. The other specimen, while complete, is much smaller and in many ways represents yet another variation of Type I. The front blade surface, the bevel, and a small ridge on the back are evenly ground. But the flaking along the sides, particularly from the back edge, has left the back surface irregular with a narrow ground ridge, and the butt portion of the front with an uneven quality (fig. 61h).

Despite the fact that Buck (1930: 339-342) recognised this as a distinct form of adze in Samoa, its absence as a type or subtype among the other adze classifications of Polynesia suggests it does not occur outside Samoa, at least as a common form.

Type IVa (fig. 61i)

This adze form is generally equivalent to Duff's (1959: 131; 1970: 13) Type 2A, although not always as thin in section as his descriptions imply. It is thought by him to be the basic adze form of Southeast Asia and Polynesia. In Samoa, in contrast, it seems always to have been among the uncommon forms (I, Report 17, pp. 262-263) and its representation in early contexts is minimal. The one small specimen from layer 5 of Sa-3, therefore, is not very convincing evidence of the importance usually assigned to the type. The front of this specimen, although ground, has been damaged by the subsequent loss of flakes on one side toward the poll. Both sides are irregularly flaked surfaces, while the entire back to the poll is fully ground, as is the complete but very narrow and steep bevel surface.

Poulsen (1967: 199), following Buck's classification, has distinguished adzes of this type and assigned them to his group 1c. Emory and Sinoto (1964: 155) place similar adzes from the Maupiti burial site in their Form 3A, while Sinoto (MS) appears to assign them to his Type 3B in the Marquesas.

Type IVb (fig. 61j)

This adze form is represented by one complete and beautifully finished specimen and another fragment which is probably of the same type, although it may just possibly derive from an adze of Type Va. Both specimens are from layer 5 of Sa-3. The documentation of this form as early in the sequence is of some importance because it is an uncommon type in Samoa whose general historical position was not well known. In the complete specimen all surfaces but the poll are well ground and finished, with a very narrow steep facet along the cutting edge of the bevel surface indicating an attempt at resharpening. While an edge is formed where the sides join the bevel surface, elsewhere the juncture between sides and back surface has been ground away, resulting in a rounded cross-section.

Adzes of this form are uncommon not only in Samoa but in most Polynesian collections. As a result, in some classifications the form has not been singled out for separate recognition, although some adzes of a similar shape occur in the Maupiti burial site under Emory and Sinoto's (1964: 153; cf. Plate 3c) Form 1 and in the Wairau Bar site under Duff's (1956: Fig. 40) Type 3D. Separate recognition has been accorded the form by Poulsen (1967: 200) under his group 2c and by Sinoto (MS) under his Type 4C.

Type V (fig. 62)

In the first volume of this work the history of the recognition of this form as a distinct type of early Polynesian adze with apparent Melanesian connections was traced (I, Report 7a, pp. 110-112). Further confirmation of its importance in this respect has since been presented (Green 1971: 27), based in part on the major role that adzes of this type play in layers 4 and 5 of Sa-3.

What may not be immediately obvious from the measurements of the adzes from Sa-3 in table 12, but is striking when one separates the entire collection into two groups, one of Type V and one of all others, is the generally larger size of the former. Closer inspection of the measurements in the table confirm this impression. Only two of the twelve Type V adzes, G 18/131 and G 17/943, are small. Although they are broken, their length is estimated at under 100 mm on the basis of their shape, width and thickness (Green and Dessaint MS). All the rest, including the broken fragments, are from adzes 130 mm or more in length, the lengths of complete specimens falling in a range between 135 and 175 mm. A comparison of these figures with those of surface adzes of Type I indicates that in length they equate with those Type I specimens which fall at the upper end of the medium size range and the lower end of the large category.

While determination of weights for all reasonably complete adzes from Sa-3 supports the size data, as is to be expected, the differences between the two groups are more apparent on this basis than from any of the three size criteria usually given for an adze. Although weights of adzes are sometimes recorded (Best 1912; Duff 1956: Appendix 3; Davidson 1971a: 63) they have not been much used in interpretation. The results in this case (table 13) suggest, however, that where function is under consideration, weights should be included as part of the description. This suggestion arises from a belief that weight may prove an important criterion in the functional assessment of an adze, a belief based in part on an unpublished study of New Zealand adzes by

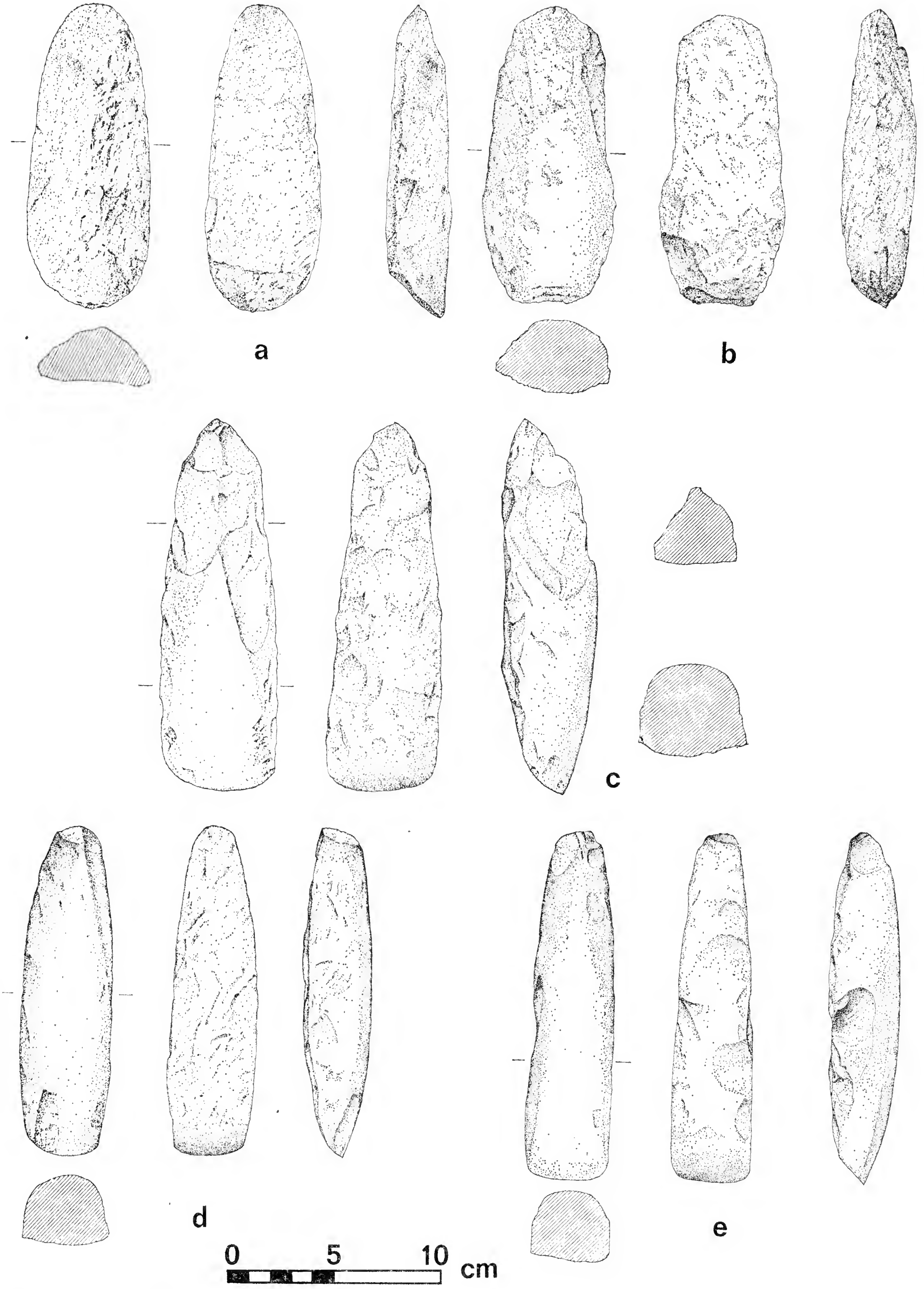

Fig. 62. Heavier weight adzes of Type V from layers 4and 5, SU-Sa-3. a. Type Va, A 17/201; b. Type Va adze blank, A 17/120; c. Type Vb with incipient tang, A 17/197; d. Type Vb, A 17/202; e. Type Vb, A 17/128.

TABLE 12

DISTRIBUTION, CLASSIFICATION AND MEASUREMENTS OF ADZES FROM SU-Sa-3

Artifact Number	*Description*	*Location in site* Square	Layer	*Type*	*Measurements in mm* L	W	Th	*Shoulder Index* Actual	Prob.
TYPE I									
SU/A 17/215	Complete	H-6	5	Ia	64	31	13	42	—
SU/A 17/208	Complete	I-3	5	Ia	76	20	11	55	—
SU/A 17/221	Complete	H-4	5	Ia	63	36	16	44	—
SU/G 17/928	Poll	I-4	5	Ia	44+	48	20	—	42
SU/A 17/103	Butt	I-2	4	Ia	57+	29	13	—	44
TYPE I, EARLY VARIETIES									
SU/A 17/207	Cutting edge and bevel missing	I-5	5	I, var. b	73+	34	10	29	—
SU/A 17/220	Butt	H-3	5	I, var. c	59+	47	15	—	32
SU/A 17/131	Blade	G-6	5	I, var. d	54+	49	20	—	41
SU/A 17/133a	Middle portion	I-6	5	I, var. d	48+	56	19	—	34
SU/A 17/134	Complete	I-4	4	I, var. d	109	50	20	40	—
SU/A 17/218	Butt	G-5	4	I, var. d	65+	39	17	—	44
TYPE II									
SU/A 17/199	Complete	I-2	4	II	60	25	14	56	—
SU/A 17/211	Butt	E-6	4	II	72+	46	26	—	57
TYPE IV									
SU/A 17/208a	Complete	H-5	5	IVa	43	31	15	48	—
SU/A 17/139	Complete	I-6	5	IVb	85	38	21	55	—
SU/A 17/226	Middle portion	H-4	5	IVb or Va	37+	27	12	—	52
TYPE V									
SU/A 17/201	Complete	G-6	5	Va	140	54	25	46	—
SU/A 17/120	Whole adze blank	I-6	5	Va	136	54	35	40	—
SU/A 17/216	Middle portion	H-3	5	Va	70+	55	29	—	53
SU/A 17/225	Poll	H-3	5	Va	54+	39	21	—	54
SU/A 17/227	Poll	H-6	5	Va	57+	38	27	—	58
SU/A 17/113	Blade	G-5	4	Va	56+	57	25	—	44
SU/A 17/118	Middle portion	I-2	4	Va	115+	56	33	—	59
SU/A 17/197	Complete	I-5	5	Vb	172	52	43	83	—
SU/A 17/202	Complete	I-3	5	Vb	163	36	35	97	—
SU/G 18/131	Middle portion	H-3	5	Vb	47+	27	17	—	63
SU/G 18/906	Blade tip	G-5	5	Vb	54+	—	—	—	—
SU/A 17/128	Complete	I-4	4	Vb	154	42	32	76	—
SU/G 17/943	Blade	H-6	4	Vb	51+	31	23	—	74
TYPE VI									
SU/A 17/205	Blade	G-5	4	VIb	70+	35	28	—	80
SU/A 17/210	Butt	H-3	4	VIb	95+	29	32	—	110
SU/A 17/214	Butt	I-3	4	VIb	76+	33	38	—	112
UNIQUE TPYES									
SU/A 17/196	Complete	I-4	4	Thumbnail shape	38	46	11	24	—
SU/A 17/219	Blade	I-3	5	Chisel	38+	20	12	—	60

TABLE 13

WEIGHTS OF COMPLETE ADZES FROM SU-Sa-3

Type	Artifact number	Weight
A. Light weight adzes		
Ia	SU/A 17/215	45 gm
Ia	SU/A 17/208	26 gm
Ia	SU/A 17/221	56 gm
Ib	SU/A 17/207	52 gm
Id	SU/A 17/134	180 gm
II	SU/A 17/199	33 gm
IVa	SU/A 17/208a	35 gm
IVb	SU/A 17/139	122 gm
Thumbnail	SU/A 17/196	31 gm
	Average weight:	64 gm
B. Heavy weight adzes		
Va	SU/A 17/201	319 gm
Va	SU/A 17/120	435 gm
Vb	SU/A 17/197	541 gm
Vb	SU/A 17/202	396 gm
Vb	SU/A 17/128	346 gm
	Average weight:	407 gm

F. and M. Knox (pers. comm.). The weights, for instance, in table 13 show that most adzes of Type V in this assemblage are six times or more heavier than the majority of the remaining adzes, with only a few among these other adzes being even as much as a third to half the weight of those of Type V. The same appears to apply to the incomplete adzes, with few fragments, except for A 17/211 and A 17/133a, suggesting adzes of any size. Even these two examples would not, when complete, have approached Type V adzes in weight.

The entire Sa-3 adze assemblage, especially the portion from layer 5, may be assigned to a domestic context on the available evidence from the site. Against this background the adze kit may be interpreted functionally. The majority of the adzes are generally lightweight specimens which fall in the small to lower medium size range. Morphologically, they encompass a wide range of types possessing a variety of straight cutting edges. This combination of factors implies that the users were engaged in a variety of small-scale tasks requiring a range of fine tools able to be employed in a fairly precise fashion. The interpretation is in keeping with the diversity of manufacturing activities which might be expected to occur around a dwelling, but not in the bush or garden. The remaining third of the kit is composed of consistently heavier adzes less varied in morphology and size, factors which suggest they would be most effectively employed on larger-scale tasks such as the initial shaping and dressing of wooden household objects from bowls and drums to house posts and rafters. This interpretation is also suggested by the wider and often markedly curved arc of the cutting edge on the Type V adzes, an edge compatible with general shaping and hollowing operations but ill-adapted to any intricate work on a smaller scale. For the finer carving and finishing of wooden objects, the variety of cutting edge widths, most of them straight, supplied by the smaller adzes would appear more suitable.

One might further deduce the probable existence of yet other large adzes employed in the bush and garden which are not in evidence in the present assemblage. Suitable adzes are present in the surface collections.

Unlike other adze forms, the central cross-sections of specimens assigned to Type V do not exhibit the same proportionate increase in width with an increase in thickness as in other adzes (Green and Dessaint MS). Thus, while there is a tendency for measurements of thickness to form a bimodal distribution, with the thick and thin clusters labelled as varieties a and b, or Vailele and Sasoa'a, there is an area of overlap (I, Report 2, pp. 25-26), and the distinction is somewhat arbitrary. In this assemblage adzes of broader width in proportion to thickness, yielding shoulder indices under 60, can be assigned to the Va group, and the others with a rather comparable range of width and thickness, but whose proportions yield shoulder indices between 74 and 97, to a Vb group. In the general study, shoulder indices for the Va group run as high as 70 (I, Report 2, p. 25). This leaves undecided the position of the central portion of an adze fragment G18/131 belonging to a smaller than usual adze. On measurements alone it could be assigned to the Va group, but its actual morphological shape suggests a better fit is with adzes of Type Vb, as its cross-section borders on triangular.

Another difference between the two varieties in this particular assemblage is that the entire arc of the cutting edge in Type Va tends to be curved, resulting in the use of Emory's (1968: 155) term "hoofed" for the type, while in Type Vb the marked curvature is towards the sides, with the central portion of the cutting edge being only slightly convex (fig. 62). All specimens indicate that grinding was applied in finishing the upper surface or front and sides of adzes of this type, but little or none to the back, except on the bevel. The upper surfaces of the Vb adzes are particularly well finished, which makes a flaked area on the poll of one of the complete specimens, A 17/197, all the more noticeable (fig. 62c, and plate 15).

The claims, particularly by Duff (1959, 1970) that various forms of butt modification in East Polynesia were part of an ancestral Polynesian adze tradition inherited from Southeast Asia, have for some time held the field. With increasing evidence of the actual composition of early adze assemblages from both East and West Polynesia, these views have now come under challenge (Emory 1968; Green 1971, 1972a) because an equally strong case can be made for the independent development of various forms of butt modification in East Polynesia after A.D. 700 to 800. Palmer (1969a), moreover, convincingly argues that if tentative but repeated attempts to assist lashing by means of butt modification of the adze head are found in the earliest East Polynesian contexts, where they later become a formalised and well established feature, then it is reasonable to anticipate sporadic though unsustained efforts in the same direction in older contexts in West Polynesia and Fiji from which the East Polynesian assemblages are believed to derive. He cites examples from surface contexts in Fiji, Samoa and Tonga and a few early examples from Fiji in support of his point.

The occurrence, then, of an incipient tang on A 17/197 (fig. 62c) from layer 5 of Sa-3 is the kind of additional evidence in support of Palmer's argument which he predicted (1969a: 101-102) but could not cite at the time. The butt modification consists of the deliberate flaking away of an originally smoothly ground surface on the hafting end of a typical Type Vb adze, to produce a rough surface and an irregular central ridge. It must be stressed, however, that this specimen is an isolated occurrence and therefore may not be used as evidence of some type of remote or inherited memory of stepped or shouldered adze forms belonging to a period 1000 to 2000 years earlier in Southeast Asia. Not only is it of different age but its technological production and resulting morphological form are quite different. The fact that the incipient tang has been fashioned on one of the most common types of adze after it had been completed, seems instead to be a reasonable basis for suggesting that modification of the butt of an adze head to assist lashing was attempted in early contexts in Samoa, as well as in East Polynesia, and is an important link between them. Also, it provides a basis on which to argue for the independent development of the more formal types of butt modification that have arisen in East Polynesia in association with the change to the predominantly medium and heel type wooden hafts found only in that area (Buck 1944: 443-446). In contrast to East Polynesia, any type of butt modification on adzes from Samoa is extremely rare, and the few known examples (Sinoto 1963: 63; Emory and Sinoto 1965: 45-46; Palmer 1969a: 99; I, Report 17, p. 260) are easily accounted for by trade or some seldom repeated attempts at imitating later East Polynesian forms.

The frequency of adzes of Type V in these early assemblages is worthy of comment from a historical as well as a functional point of view. At Sa-3 they constitute 30 percent of the adzes in layer 4 and 43 percent of those in layer 5. At Va-1, in the similarly early context of layer V, they comprise 42 percent of the assemblage, yielding an overall average of 40 percent for the three early adze assemblages from excavated contexts in Samoa. This may be contrasted with the uncommon occurrence of the type in the Samoan surface collection (I, Report 17, table 27), where it comprises only 4 percent of adzes among a total of 733. This is consistent with its almost complete absence in most later excavation contexts in Samoa. Obviously, it was a historically important early form, replaced by other medium to large-sized adzes in later contexts.

In adze classifications of Polynesia, three sound reasons developed above can now be cited for the removal of adzes of our Type V from the Duff Type 4 grouping of triangular-sectioned adzes, where they have traditionally been assigned the role of a historically unimportant flat-backed gouge (Duff 1956: 182; 1959: 137). The first is that in historical typologies, where the interest is in the morphological development of various adze forms, adzes of this type play a major role in demonstrating the early development of the Polynesian adze kit from earlier assemblages in adjacent Melanesia. Moreover, while it is uncertain whether the type has anything to do with the development of triangular-sectioned adzes of Duff Type 4, which are probably a Polynesian innovation (Green 1971: 32; and below), Type V is almost certainly not derived from adzes of Duff Type 4 as Duff (1956: 182) originally maintained. The second is that functionally these adzes form a distinct group of large-scale woodworking tools in early Samoan domestic contexts. The same interpretation may also apply to Type V adzes in the early assemblages of Fiji and Tonga (Birks and Birks 1968: 105-115; Poulsen 1967: 218). The third is the evidence from Samoa and the Marquesas (Suggs 1961a: 110-111; Sinoto 1966: Fig. 3) that it was present as a major type in early contexts which are culturally Polynesian, but was quickly replaced by adzes of other forms, so that its importance cannot be judged on the basis of early collections from New Zealand or Hawaii.

In sum, as recent studies by Suggs (1961a: 110-111), Emory (1968: 155) and ourselves (I, Report 2, pp. 24-26) have all demonstrated, it appears necessary to accord Type V the separate status Buck (1930: 346-348) originally gave it in one of the first and most perceptive of adze typologies to be published for Polynesia. It should occasion no surprise, therefore, that it now occupies such a position in most recent adze classifications from Polynesia. Poulsen (1967:

200) in Tonga placed it in his 2b group; Emory and Sinoto (1964: 156) designated it as Form 5 in the Maupiti assemblage, while in the Marquesas Sinoto (MS) has followed Suggs (1961a: 110-111) and the Samoan practice and distinguished two varieties, 5A and 5B. Only Duff (1970: 14) continues to place it as a 4C variety of triangular adze.

Type VI (fig. 61k, l)

Distribution studies of Polynesian adzes have always indicated that triangular-sectioned adzes with apex to the front are a "Polynesian elaboration on [an] ancestral theme" (Duff 1959: 137). Similar studies of adzes from the rest of Oceania and Southeast Asia have also supported Duff's conclusion that "the development and proliferation of Type 4 [the triangular-sectioned adze] was distinctive of Polynesia" (1970: 14). To date, archaeological results have not negated his hypothesis. This is particularly evident if one removes his 4C class from this group as I have suggested above and regards his variety H, "a class of grooving chisels peculiar to Luzon in the Philippines" (1970: 14), as a specialised development of independent origin. The occurrence, then, of three specimens of Type VI in layer 4 of Sa-3, along with one previously reported from layer V at Va-1 (I, Report 7, p. 133) provides the earliest documentation available at present for their appearance in Polynesia. This is based on the fact that they are lacking from layer 5 at Sa-3 as well as from earlier contexts in Tonga and Fiji (Green 1971: Fig. 2). For this reason, it is to be regretted that all specimens from these early Samoan levels are incomplete, although it can hardly be doubted that the two specimens illustrated here (fig. 61k, l) are from adzes of Type VI. This belief is supported by their high shoulder indices, typical of adzes of this type.

All three specimens have flaked surfaces, with no sign of grinding, except in a few places on A 17/205. Although all specimens are broken, it is obvious they derive from adzes more than 100 mm in length, which in size would equate well with medium length adzes of Type I. In weight they fall with a few other specimens in the upper range of adzes placed in the light-weight category discussed above (see table 13). With their narrow edge, which, as Duff (1956: 178) comments, presumably increased their ability to penetrate a wooden surface, they provide a useful alternative to a hand-held chisel for certain tasks. If so, the functional range of tasks represented by the lighter adzes in this assemblage is further widened.

Duff (1956: 168; 176-178) originally regarded triangular adzes as a Polynesian elaboration resulting from the continuation of an earlier tendency to narrow the front of the quadrangular adze. Initially, this resulted in adzes of his 2C Type, or our Type I, but when carried to an extreme resulted in triangular adzes of his Type 4. He went on to suggest that the adzes of Samoan Type V (his 4C variety) are more likely to be derived from his Type 4B than 4A (1956: 182). This last point, as noted above, is obviously in error, because it can be shown that his Type 4C or Samoan Type V almost certainly precedes the development of the triangular adze in Polynesia (Green 1971: 27, 31-32). The evidence suggests that the whole discussion of the origin of the Polynesian triangular adze should be re-examined.

On the basis of the present evidence, several possibilities suggest themselves. One is to reverse Duff's order and suggest that the triangular adze is simply the result of flaking the sides flat on adzes of Type V. To me this origin appears unlikely, at least from adzes of Type Va, which have too great a width in proportion to thickness for this process to produce the rather narrow and thick Type VI adze under discussion here. Also, it would require a drastic reduction and reshaping of the cutting edge on most adzes of Type V. In the same vein, close study of Type I (Duff 2C) adzes reveals that reduction of their front surface to a triangular section fails to decrease the width of the blade (or of the cutting edge) very significantly (Duff 1956: 168), because when viewed from the front, Type I adzes generally widen from poll to cutting edge and offset any such tendency. Type VI adzes, in contrast, remain almost constant in this respect. Also, as in the case of Type Va, the modification by further reduction of the sides of a low trapezoidal cross-section to arrive at a fairly narrow-based high triangular cross-section is not very feasible technologically when starting with adzes of Type I. In fact, on reviewing the adzes from the early Tongan and Samoan assemblages, the only possibility of direct derivation I see is by extensive flaking of the entire front of an adze of Type Vb, in much the same way as is in evidence on the butt section of A 17/197 (fig. 62c, and plate 15). This process, at least with some modification of the cutting edge, would result in adzes of the right shape. Moreover, the shoulder indices (table 12) also suggest that only the modification of Vb adzes will yield figures in the 65-110 range typically recorded for Samoan triangular adzes (I, Report 2, p. 26).

Technologically, the production of triangular adzes, not only of Type VI but also of Type VII, is most easily accomplished, not by modifying any of the already existing adze forms, but by creating a new one. I believe it reasonable to consider these adzes a Samoan innovation on the following grounds: no good morphological case can be made for the gradual evolution of triangular adzes from one of the existing forms, except perhaps Vb, because chronologically they appear quite suddenly in Samoa with no obvious antecedents, and are already a well-developed form side by side with the only adzes from which they might derive; also, the triangular adze appears unique to Polynesia within the Oceanic area, yet the form is not common, or even present in early Tongan contexts (Green 1968: 103), but is an early and common form in Samoa (I, Report 17, table 27).

Unique Specimens

One complete adze of "thumbnail" shape is, so far as I am aware, of a form unique in Polynesia and one rather difficult to explain functionally. It gives an initial impression that it is a fair-sized fragment broken from the cutting edge of a large adze and refashioned to its current shape (fig. 61m). The very broad cutting edge in relationship to size, and the narrow steep irregular nature of the bevel surface tend to support such a notion. Closer examination reveals few certain indications of its derivation from a larger adze, however, and convincing evidence that the present form was achieved through a process of deliberate, well-controlled flaking, after which the blade part of the front and the bevel were ground. The shape, therefore, is one produced by intention, whether the original piece from which it was manufactured was a waste flake, a broken fragment from a larger specimen, or an adze blank of unusual dimensions.

The steep, narrow bevel along a wide, straight cutting edge with only a very short body length behind it would seem to require special hafting to make it a fully efficient tool. I would suggest its hafting required a slot cut into the flattened top of a fairly short, thin toe type of haft so that the slot in the toe portion conformed closely to the back surface of the adze and left the front of the adze flush with the top surface. Moreover, the usual pattern of lashing around the toe would appear an insufficient and inefficient means of holding this adze firmly in place. Rather, it appears to call for a second thin wooden slab fitted over the entire top of the toe of the haft, and lashed firmly to it. Such hafting would necessitate strokes in which the cutting edge struck the wooden surface at a rather steep angle, fitting with the very steep angle of the bevel, which has no bite unless used with this type of stroke. This reconstruction suggests a tool which seems most suited to the finishing of concave interior surfaces not easily worked with a larger or longer-bodied adze.

The second unique form is in fact probably a chisel rather than an adze. Chisels are not a part of our Samoan classification because chisels as forms distinct from adzes were not able to be identified in the collections. Buck (1930: 364), for instance, attempted to single out some specimens as chisels largely on the basis of length and narrow cutting edge. But he could find little evidence for pre-European use of the mallet with them, and even less on how the supposed chisels were hafted. He concluded, therefore, that they were probably hafted as adzes, and where hafted in the same axis as the haft (i.e. a true chisel), were manipulated by pressure and not a mallet. Several lines of evidence lead to the inference that this specimen is a chisel (fig. 61n). First, even though the poll has been snapped off, it is obvious that when complete the tool was rectangular in section with the corners rounded, and consisted of a linear bar slightly larger at the poll than at the cutting edge. Moreover, in comparison with a Type I adze of similar size (cf. A 17/208, fig. 61b) it presents a more substantial and robust section throughout its entire length. It is an excellent shape for use as a chisel struck by a wooden mallet. Also, the cutting edge is very narrow in relationship to overall length and is formed by two bevels, a narrow one on the front and a larger one in the normal position. Both, however, are steeply inclined surfaces, so that the actual cutting edge lies in a plane one-third of the way between the front and back of the specimen, rather than at the front, as in most adzes. Thus the overall shape, the two blunt, narrow, steeply inclined bevels and the position of the resulting cutting edge, all suggest a chisel, and in this case one most conveniently manipulated with a mallet.

One could, of course, group it among the Type I adzes on morphological criteria, but it appears more reasonable when function is considered to regard it separately.

Unclassified Adze Fragments

With such a substantial collection of complete or near complete and classifiable adzes from layers 4 and 5, a number of unclassifiable adze fragments are to be expected. There are five such specimens from layer 4, one of uncertain context but probably from layer 4, and 10 from layer 5, yielding a ratio similar to that for the 13 and 21 classified specimens from the two layers respectively. This is useful evidence supporting the notion that the frequency of adzes in layer 5 is almost twice that in layer 4, at least for the area excavated. When frequencies are coupled with the fact that layer 5 was actually restricted to a much smaller portion of the excavated area than 4, it is obvious that the numbers of adzes and adze fragments in association with the pavement and structural evidence of layer 5 is easily twice that for layer 4, or for layer V at

Va-1, the other early layer in which an equally large area was exposed (I, Report 7, p. 121). It is also a higher frequency than is reported for any of the later excavated sites where similar areas were involved (Reports 21 and 22, p. 31 and p. 49), or for adzes and fragments collected from the surface of exposed house floors at Luatuanu'u (I, Report 12, table 14). It seems clear then, and in keeping with the functional interpretation of the classifiable specimens developed above, that one of the major activities in the presumed domestic context of layer 5 was wood-working. The quantity of broken fragments and the number of waste flakes, however, attest to other activities in addition to the use of adzes. While some unclassified fragments are from completed specimens, the majority are fragments which appear to represent the later stages of manufacture, abandoned when the specimen snapped in two, or failed to flake properly. There are at most two fragments from layer 4 and three from layer 5, with some evidence of grinding suggesting they were from complete or nearly complete specimens. The remaining examples, most of them of fair size (75-90 cm in length), appear to derive from fragments that were incomplete at the time they were discarded. All bear signs of flaking as the method by which they were being shaped, but few indicate with any certainty the type of adze which was intended. Two with thick sections and narrow widths suggest that adzes of Type VI have been involved, and two, perhaps three, with low flat sections look quite suitable for the manufacture of small adzes of Type I. One looks like the butt end of a Type V adze. In short, no unusual adze forms are indicated when compared with the assemblage of complete specimens. Among the adzes with some grinding, two are probably from specimens of Type Vb and two others are probably from Type I, but again no certainty attaches to these identifications.

No evidence on any of the fragments indicated they were intended for or employed in other roles, hence their designation as adze fragments.

Raw Materials For Oceanic Adzes

None of the adzes or adze fragments in this assemblage has been examined in thin section under the petrographic microscope, because they conform closely to adzes previously examined petrographically (I, Report 3, p. 37). That examination indicated that the two hand specimen categories of dark and light coloured homogeneous fine-grained basalts belong to the oceanic (*versus* the continental) olivine-basalt association typical of the Pacific Islands beyond the andesite line (Thomas 1963: Fig. 1; Turner and Verhoogen 1951: chapter 7; Dickinson and Shutler 1971: Fig. 1). The darker rocks proved to be feldspar basalts belonging to the more alkaline, silica-rich end of the olivine-basalt association and sometimes called hawaiites (MacDonald 1960; McCall 1965: 42; White 1967: IV). The lighter rocks belong to the weakly alkaline, silica-poor end of the same association to which terms like limburgite or nephelinite are often applied. Igneous rocks from Samoa geologically belong to the oceanic olivine-basalt association, while geological specimens typical of the rocks employed in Samoan adzes have been described in the petrographic studies of MacDonald (1944) and Brothers (Kear and Wood 1959: 38-44, 83-84). In short, the adzes, adze fragments, and the various associated basalt stone flakes are probably all of local origin.

Only two quarry sources have so far been reported, a well known one inland of Leone on Tutuila in American Samoa (Buck 1930: 330) and one of less certain use near the base of the western slopes of Mount Vaea on Upolu (I, Report 1, p. 18). Buck's enquiries about quarries in 1927 elicited local information only on the Tutuila source; Buist's enquiries during his site surveys on Savai'i produced negative results (I, Report 3, p. 37), as did our surveys on Upolu. An early missionary's report (Heath 1840) described the situation well:

> It has been stated that the surface of this group is almost entirely volcanic, so that the Geologist will not find much variety. At Tutuila, however, is found the hard stone, (Trap,) of which the Polynesian adzes and other tools were made previously to the introduction of iron. At the other islands the stone is almost uniformly porous, of a dull black color; often a mixture of iron stone occurs, and, in some places, a species of red ochre, which the natives use in painting, or rather printing, their cloth.

Quarry sites, it would appear, are not well known and therefore presumably not a common feature of the Samoan landscape.

To take discussion of the materials composing the early Samoan adze kit only to the point of demonstrating that they are of local origin is to miss entirely, in my view, the importance of the fact that this early adze kit is rendered in rocks belonging to the oceanic olivine-basalt association. However, to appreciate the significance of this it is necessary to reconsider the general framework within which material used for adzes throughout Oceania has previously been viewed (cf. Duff 1956: 164-166). Fundamental to this reconsideration is the hypothesis that the early adze kit of Polynesia derived from ancestral forms in Eastern Melanesia (Green 1971), and not as advocated by Duff (1970), directly from

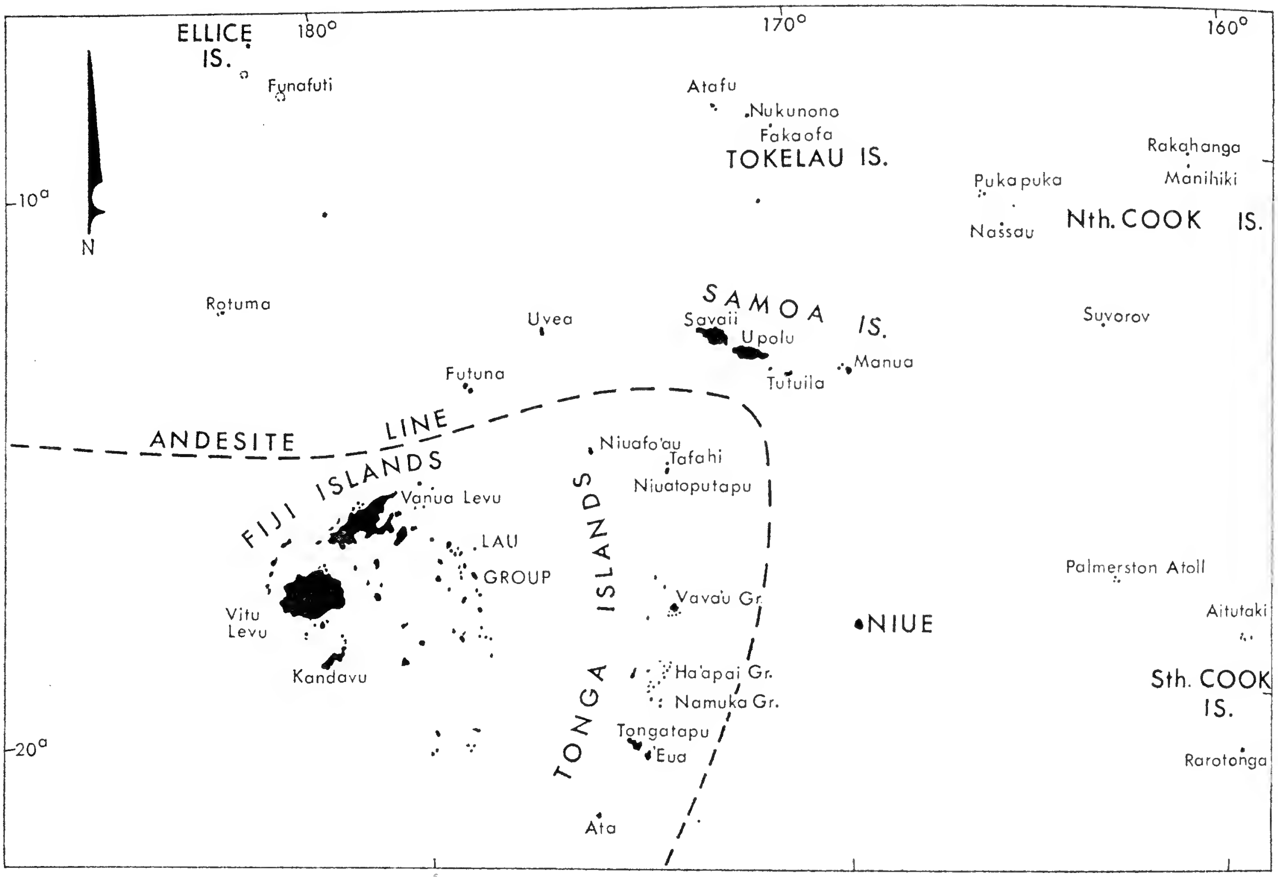

Fig. 63. The geographic position of the Samoan islands and surrounding island groups in relation to the andesite line, based on Kear and Wood (1959: Fig. 35), Thomas (1963: Fig. 1) and Dickinson and Shutler (1971: Fig. 1).

types in the Philippines or more slowly from the same area by way of Micronesia. Postulating that Eastern Melanesia was the immediate source of the Polynesia adze kit makes it possible to reconsider the impact that a change in rock types had on the transfer of the kit from one side of the andesite line to the other, which in geographical terms would be when it was moved from Fiji and Tonga to Samoa, Uvea and Futuna (fig. 63).

An unstated assumption that seems to have prevailed with respect to materials suitable for Polynesian adzes is that the materials most widely and frequently used represent a choice that was almost entirely the result of cultural preference. This has led to a view that the use of varieties of fine-grained homogeneous olivine basalts, which are those most commonly employed, in some way reflects an ancestral preference for these materials which in tropical Polynesia was unaffected by environmental factors. Only in New Zealand, Fiji and Tonga, where other rocks were available and used, did such environmental factors play a role. In contrast, the use of shell in Micronesia was seen as a result of that area's environmental limitations. In actual fact the situation in Micronesia may be much like the use of shell in areas of the Outer Islands of the Southeast Solomons and in the Northern Banks-New Hebrides group. Here to a great degree it appears to be an established cultural tradition which is only in places reinforced by a total lack of suitable rock types. Certainly, as Davidson (1971a: 68-69) shows, the use of shell for adzes in parts of Oceania can no longer be ascribed solely to an environmental factor. Conversely, in most of tropical Polynesia except Tonga the concentration on varieties of oceanic rock or the ventral margins rather than the hinge portions of the giant clam *(Tridacna maxima)* may reflect certain environmental limitations. In short, on crossing the andesite line and entering the oceanic island world of the geologist, the first people to settle Polynesia encountered a rather restricted suite of suitable rock types, continental equivalents of which they had largely ignored previously for adze manufacture, but oceanic varieties of which they were now forced to exploit, especially as a heavier reliance on hinge portions of the larger giant clams, following an early Melanesian as well as Micronesian practice, was not a feasible alternative.

In this respect, a brief review of the New Zealand, Tongan, Fijian situation is instructive. Continental equivalents of the oceanic olivine-basalts are available in New Zealand, particularly in the South Island and Chathams where they were sometimes used for adzes (I, Report 3, p. 37, Duff 1956: chapter V). Rather similar fine-grained homogeneous olivine basalts were used from an early period in the North Island, as the evidence from the Tahanga quarry attests (Buist 1965: 135-137). Greywackes were also used at an early date both in the North (Davidson 1970: 10) and South Islands (Duff 1956: 165). An equally good case can be made for the early discovery and wide distribution and use of the baked argillites and similar rocks (Duff 1956: 165) from either the Nelson area of the South Island or inland Taranaki in the North Island (Hooker 1971). Thus, while rock types almost identical or closely similar to those in tropical Polynesia were available in New Zealand and exploited at an early date, a wide range of other rock types were also encountered and utilised. Some of these, like the argillites, or later the greenstones, came to be preferred, as their wide dissemination attests. In the light of the evidence it would seem unwise to assert, as is sometimes done, that the first settlers were forced by the new and greatly expanded suite of rock types encountered in New Zealand to render their adzes in materials entirely different from those they had been using in East Polynesia from whence they came. More probably it was as a result of experimentation with a variety of these new materials that they came to prefer them as superior to the restricted suite of rocks which they formerly had to employ in tropical Polynesia.

The other area in the Polynesian triangle where the use of oceanic basalts is uncommon is Tonga. Like New Zealand, Tonga lies on the continental side of the andesite line, where rocks of the oceanic olivine-basalt types are locally lacking, but where a variety of other igneous rock types suitable for adze manufacture occur. Poulsen's entire surface and excavated assemblages have been examined in hand specimen and the relevant petrographic assessments made of selected specimens (White 1967). This revealed that all but 2 of 38 adzes were made from a variety of local materials found within the Tonga group, materials belonging to either the dominant tholeiitic association of igneous rocks or the more infrequent calcalkaline-andesite-dacite-rhyolite association. Thus despite their clear Polynesian typological affinities (Poulsen 1967: 226-227) the materials used reflect more closely the situation in the rest of Melanesia than in Polynesia.

Only two of Poulsen's (1967: 197, 202, 215) adzes, both excavated specimens from horizon I of To-6, were recognised as being of a foreign material, hawaiite, the nearest sources of which would be Samoa or Uvea on the olivine-basalt side of the andesite line, or less probably the Loyalty or New Hebrides groups on the continental side (White 1967: IV-V). If these adzes, dated to about the fifth century B.C. (Poulsen 1967: 148-151), come, as seems probable, from the oceanic island part of Polynesia, they have some interesting implications. One is the possibility that one or more of the islands of Western Polynesia, beyond the andesite line, were already settled, and the people in Tonga were in contact with their inhabitants, just as they have been in the protohistoric period. Otherwise it seems unlikely that a kind of rock of restricted occurrence, yet suitable for adze manufacture, would have been found on an uninhabited oceanic island, or that such rocks or adzes made in them would have been brought to Tonga, or brought back by Tongans. Secondly, the two adzes in hawaiite belong to Poulsen's (1967: 199-200) 1a and 2d group, types not found in the three early Samoa assemblages. This suggests that there are earlier assemblages on the oceanic side of the andesite line, perhaps including Samoa, where these earlier Tongan forms were initially rendered in various of the olivine basalts before being replaced by adzes of other forms found in early Samoan contexts but not in Tonga.

As Duff (1956: 164-166; 1947: 317; 1950: 79-80) has often indicated, adzes from Fiji are predominantly in rocks other than the fine-grained basalts of Polynesia. These rocks he sees as coarse grained and resistant, making it difficult to produce adzes of forms other than his Type 2B. From the discussion it is clear he assumes that the fine-grained basalts were the older and preferred type of material employed in rendering the ancestral Polynesian adze forms. He therefore stresses convergence of late New Zealand 2B forms with those of Fiji on the basis of similarity of rocks used in the adzes. It is true that Fijian volcanics, like the Auckland province volcanics of the North Island of New Zealand, belong in large part to the rocks assigned to the calcalkaline-andesite-dacite-rhyolite association. But I do not believe rock types used from them are as intractable as Duff imagines, because a wide variety of adze forms other than his Type 2B was in fact made in them in Fiji, Tonga and New Zealand. For example, the early use of these materials for a variety of such adze forms is confirmed by the Fijian assemblages from the Sigatoka and Yanuca sites found in association with Sigatoka period Lapita pottery and the

Navatu period impressed pottery (Birks and Birks 1968 and pers. comm.), just as it is for the Lapita period of Tonga discussed above.

My impressions on reviewing recent literature for the rest of Melanesia (e.g. Chappell 1966, Bulmer 1964, Specht 1969) and from my own work with the adzes of the Solomons is that hornfelses of contact metamorphic origin and fine-grained igneous rocks of the tholeiitic and calcalkaline-andesite-dacite-rhyolite associations are the main rock types employed. To date, the use of fine-grained igneous rocks belonging to the olivine-basalt associations found on the margin of the andesite line in the Loyalties, New Hebrides (White 1967: V) and Outer Eastern Islands of the Southeast Solomons (McCall 1965: 40-42) has only come to my attention in the Polynesian Outliers of the Reef Group and on Tikopia, though they may have been used elsewhere. But even in the Reef Islands, where all igneous rock had to be imported and shell was the dominant material in the later period, in the early Lapita sites metamorphic and igneous rocks of the tholeiitic or andesite-dacite associations very similar to those in the Lapita sites of Watom, Fiji and Tonga were used, rather than fine-grained rocks of the olivine-basalt associations found on adjacent islands of the area.

In summary, when people crossed the andesite line to settle Samoa and the rest of Polynesia, they found it necessary to manufacture their entire adze kit from a restricted range of fine-grained basalts whose flaking properties and strengths differed from those of the materials previously used. This resulted in changes in adze technology and typology. For example, it appears to have led to a certain amount of experimentation in Samoa, the results of which are reflected in the early Samoan adze kit from Sa-3 and Va-1 as indicated in the section on adze typology. Thus the contrast between ground and finely polished specimens of Tonga (Poulsen 1967: 195-196) and those of Samoa on whose crudity Buck (1930: 356) was inclined to remark, may well reflect a change in rock type. It may also account for the flaked and only partially ground surface on many Samoan adzes, because the production of finished forms did not require more elaborate processing. The important point, then, about the raw material used for the Samoan adzes from Sa-3 is not simply its local origin, but that this origin required the use of a different material from that formerly employed, which had an effect on the technology, the finish, and the typology of the adzes produced.

Basalt Flakes and Cores

In addition to the unclassified adze fragments discussed above, there are numerous flakes and cores in the same fine-grained grey basaltic material. Most of this, as was indicated when discussing the adze fragments above, is either waste material from the manufacture of adzes or broken pieces resulting from the use of adzes on the site.

Polished or Ground Flakes

Ten items in the collection are flakes with one or more ground surfaces. These are thought to be from the use or reworking of complete adzes. The greater number are from layer 5 (table 14A) which is consistent with the greater number of

Table 14

Distribution of Prehistoric Basalt Flakes and Cores at SU-Sa-3

A. Polished or Ground Flakes

Square:	D-6	H-5	I-2	I-4	I-5	I-6	Total
Layer 4	1	0	1	0	0	0	2
Layer 5	0	2	0	3	1	2	8

B. Other Flakes

Square:	E-6	F-5	G-5	G-6	H-2	I-2	H-3	I-3	H-4	I-4	H-5	I-5	H-6	I-6	Total
Layer 3	0	0	1	0	0	0	1	1	1	0	0	0	0	0	4
Layer 4	1	3	4	2	6	0	3	5	4	1	5	0	1	0	35
Layer 5	0	0	4	0	0	0	11	2	8	3	7	11	0	2	48
Occupation A	0	0	0	0	0	2	0	0	0	2	1	0	0	1	6

C. Cores

Square:	I-2	H-3	H-4	I-5	H-5	I-6	Total
Layer 4	2	1	0	0	1	0	4
Layer 5	0	1	1	2	1	0	5
Occupation A	0	0	0	1	0	1	2

adzes and unclassified adze fragments from that layer. All the ground flakes are small (under 60 mm in greatest dimension) and only two from layer 5, when examined under the microscope, exhibit signs of further secondary working or use as tools. The largest (57 by 16 mm) flake, G 17/150, has a fairly sharp edge on one side which appears to have been damaged. Minute deep parallel scratches at a slight angle to a line perpendicular to the edge appear to have resulted from use. A thicker broad flake, G 17/921, has had one pointed end slightly reworked to provide a small projection about 4 mm long and 2-3 mm across. It appears to have served as a hand-held boring tool.

Because so many complete Samoan adzes have extensive flaked areas with little or no grinding, some items in the category of "other flakes" described below may also derive from the use or reworking of completed adzes. They are difficult to separate from those which are the result of initial adze manufacture, however, so that the less meaningful division of "ground" and "other" flakes has had to be employed.

Cores

The distinction between cores and unclassified adze fragments is partly a matter of size (adze fragments all being 75 mm or more in length), and partly a matter of shape and degree of secondary flaking. On larger specimens it is usually possible to identify an incomplete or broken object as one intended to be an adze; the difficulty increases as the specimens become smaller. Of the 11 pieces here classed as cores (table 14C), 5 with a fair amount of secondary working are likely to be unclassified adze fragments. However, they are small, ranging in length from 33-63 mm, and it is difficult to be sure. The other five are simply cores from which flakes have been struck without any indication that the production of an adze was the intended result. Several of these are large, with greatest lengths of 120, 96 and 75 mm. None of the 11 cores appears to have been reused.

Other Flakes

Four flakes from layer 3 are discussed separately below, and only the 89 from layers 4 and 5 are considered here (table 14B). This assemblage is a result of sorting through a larger collection of broken rock gathered by the workmen in the course of excavation under the instruction to keep everything about which they had any question. The entire collection was labelled and returned to the laboratory, where under more rigorous examination with a low-power microscope, only those items with striking platforms or other signs of flaking have been selected for discussion. A very high proportion, if not all of the remainder, are broken bits of stone and natural flake spalls commonly encountered in river gravel deposits, and I do not propose to discuss them further.

The two most striking facts about the flake collection are the differences in distribution between layers 4 and 5, and the high percentage of waste flakes. As table 14B indicates, the flakes in layer 5 were concentrated in squares H-3, H-4, H-5 and I-5, with most of the rest in adjacent squares. This was also the area where one cluster of adzes was encountered in layer 5 and where an alignment of postholes suggesting a screen or fence was discovered (p. 113 and fig. 55). The obvious implication is that the area where adze use and working took place was here on the edge of the house pavement. In contrast, within the house area, layer 5 flakes were few. Layer 4 flakes were more generally distributed, and this fits with the interpretation of layer 4 as a general fill dumped in the area (p. 115).

In keeping with the interpretation of these flakes as reflecting the use and working of adzes, there are only two which exhibit signs of further use after they were struck. This suggests that the manufacture of flakes for tools was not the object, an explanation supported by the low frequency of "non-adze" cores. Nearly all are simply waste flakes, although among them are at least two from layer 4 and seven from layer 5 which appear to be derived from the use of already completed adzes. This means that the frequency of waste flakes is low in proportion to the number of adzes and that such manufacturing as took place on the site was probably the finishing of adze blanks or reworking of existing adzes. Such an interpretation is supported by the small size of the majority of the flakes (fig. 64). They were plotted using the procedures

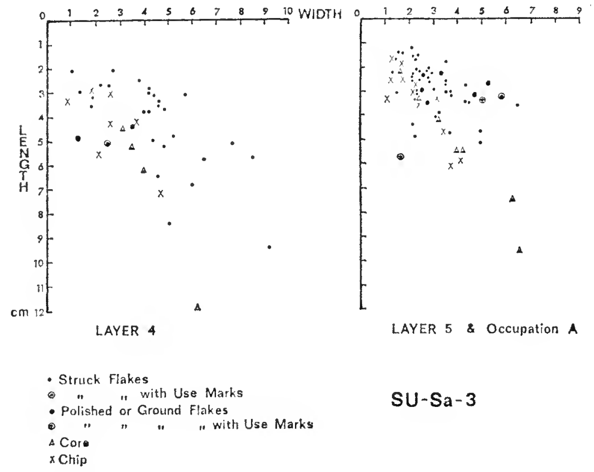

Fig. 64. Length and width measurements on basalt flakes from SU-Sa-3.

described by Davidson for the Lotofaga collection (I, Report 15, p. 249). The results indicate clearly that blades or blade flakes are not a part of the technology, but short square flakes are.

The two probable tools consist of a blade flake from layer 4, G 17/912, one sharp concave edge of which appears to have been used, and one thick flake, G 17/749, from layer 5, the end of which has been fashioned into a projection suitable for boring. It appears to have been used in much the same way as a similar flake tool described above under the category of ground flakes.

Flakes From Va-1

In the description of artifacts from Va-1 at Vailele it was reported: "The full assemblage of flakes from this site will be the subject of a later analysis, for the collection includes not only valid utilised and waste flakes, but also many which are probably natural in origin and represent spalls from the numerous stones in the various gravel layers" (I, Report 7, p. 133). This collection has now been subjected to the same examination and analytical procedures as those adopted for Sa-3 above and is most conveniently reported in a comparative context here.

The results are basically similar. In addition to the 4 polished or ground flakes reported previously (I, Report 7, p. 133-134) from layer V at Va-1, there are 42 other flakes from this layer, the majority of which have well-defined striking platforms (table 15, fig. 65). Although most are

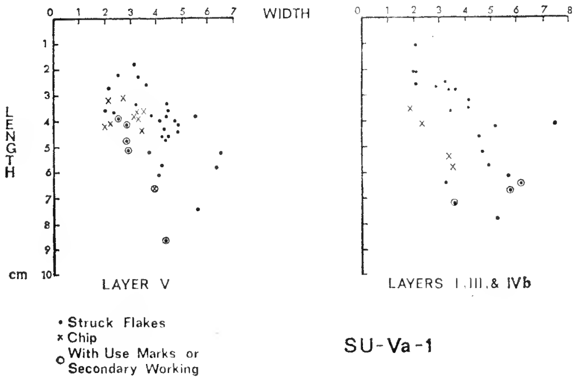

Fig. 65. Length and width measurements on basalt flakes from SU-Va-1.

waste flakes as at Sa-3, seven show signs of further use or modification, which is more than at Sa-3. The distribution of layer V flakes at Va-1 (table 15), in contrast to those of layer 5 at Sa-3, reveals no obvious concentrations. The dispersal is similar to that of other artifacts found in layer V at Va-1 and cited in support of an interpretation that the layer may represent refuse collected from elsewhere and dumped at the site (I, Report 7, p. 122). Thus the layer V flake distribution at Va-1 is like the layer 4 one at Sa-3 for which a dumped fill interpretation has also been advanced. The size distribution of the layer V flakes at Va-1 (fig. 65) is also significantly ($P = .01$) different, layer 5 flakes from Sa-3 falling predominantly in the less than 4 cm length and width category and the Va-1 flakes falling largely in the greater than 4 cm category. The comparative data reinforce a comment above on the small size of the Sa-3 flakes and the suggestion that those flakes reflect the reworking or completion of already shaped adzes or adze blanks. Despite the tendency to a slightly greater size at Va-1, the general uniformity in flake size, the small number of waste flakes and the lack of cores appear to reflect the same practice and not adze manufacture or production of flakes for tools.

There are seven flakes from layer V which are or may have been modified for use or used as tools. Three have fairly sharp edges of convex outline in which use notches from 5 to 16 mm long are present. These flakes could have been used to scrape a rounded wooden shaft or for some similar task. Another has a sharp straight edge 20 mm long which appears to have been used in cutting, and a pointed tip which may have served in boring. Two others with more blade-like proportions have been modified by secondary flaking along the two parallel edges, as if the manufacture of a shaped tool (flake adze?) was intended. The last, G 10/326, exhibits similar proportions and modifications but one end curves to a point, making it the most obvious tool of the seven. It would have served well as a hand-held boring implement.

Little comment is required on the collection of flakes from other layers at Va-1 because in no other layer was their frequency great (table 15). The only cluster was 11 flakes found when cleaning up the section on the north side toward the eastern end of the bulldozer cutting. These all came from a small mound stratigraphically the equivalent of layer III (I, Report 7, p. 119). Three of the larger flakes in the collection, one from layer I, one from layer III, and one from layer IVb, exhibit signs of use or modification. Two have short notches along sharp convex edges which may indicate their use for scraping, while the third is a blade-like flake with one long straight edge.

Silicates

Obsidian

The recovery of obsidian flakes from the pottery-bearing layers of Sa-3 was to be expected in view of (1) its presence in a European period

Table 15

Distribution of Basalt Flakes in SU-Va-1

	Square B-2	Baulk B-2-3	Square B-3	Baulk B-3-4	Square B-4	Baulk B-4-5	Square B-5	Baulk: Cutting II and B-3 or B-5	
Layer Va	1	0	3	0	0	0	2	0	0
Layer Vb	3	1	4	1	2	1	0	2	1

	Baulk Cutting I and A-1	Baulk A-1-2	Square A-2	Baulk A-2 and Cutting II	Cutting II West End	Cutting II East End	South Step 1
Layer Va	0	0	2	0	0	0	0
Layer Vb	1	3	2	1	2	2	1

	North Step 1 to Cutting III	Cutting III	West beyond Cutting III	Totals
Layer Va	0	0	0	8
Layer Vb	4	1	2	34

	Step 1 & 2 North	Step 1 & 2 South	Cutting III	Square B-4	Cutting II B-3-4	West Beyond Cutting III	Totals
Layer I	0	3	2	0	0	0	5
Layer III	0	0	0	1	0	—	1
Layer IVb	4	4	0	—	1	0	9
Mound Layer (equivalent of III)	—	—	—	—	—	11	11

Table 16

Distribution, Type and Size Range of Obsidian Pieces in Prehistoric Contexts at SU-Sa-3

A. Distribution

Square:	D-6	E-5	G-5	H-6	I-6	I-5	I-4	I-3	Totals
Layer 4	1	1	1	—	—	—	1	—	4
Layer 5	—	—	—	—	3	2	4	1	10
Occup. A	—	—	—	5	1	1	1	—	8

B. Types of pieces Cores 6, Flakes 16

C. Size of 17 pieces (5 recovered from charcoal sample excluded)

All pieces:	Length	Range	6-23 mm, average 12 mm
	Width	Range	3-15 mm, average 8 mm
Cores:	Length	Range	11-23 mm, average 14 mm
Flakes:	Length	Range	6-17 mm, average 11 mm

context at Sa-1 (Report 21, p. 33), (2) its frequent occurrence in the basal layer of Va-4 in association with pottery (I, Report 10, pp. 168-169), and (3) the presence of a single core in the Lotofaga site at a somewhat later date (I, Report 15, p. 250). Only by measurement of the hydration rim thickness may it one day be possible to demonstrate whether the piece in the early European period context of Sa-1 is derived from an earlier deposit or in fact reflects a persistence of the use of the material until the very end of the Samoan sequence. At present the weight of the evidence suggests that the pieces in the more recent non-pottery layers of Sasoa'a are derived from the earlier layers along with a few pieces of pottery. On the other hand, the use of obsidian in Samoa, judging from its occurrence in other sites, may have continued for some time after the manufacture of pottery had ceased, in which case its occurrence in non-pottery contexts at Sa-3 will furnish further evidence of this continuance. The question is currently being explored by study of the hydration rims on samples from several sites.

In frequency, the three pieces recovered from the pre-contact aceramic layer 3 almost equal the four from layer 4 (table 16A). In contrast, the 13 from layer 5 and occupation A recovered by the same excavation techniques, and the 5 tiny additional pieces picked out of the charcoal sample taken from an oven assigned to occupation A, represent a marked increase in occurrence (table 16A). Given the fact that samples from layer 5 and occupation A derive from a much smaller area than those of layers 3 and 4, the decrease in frequency from the earlier to the later layers would seem significant. The higher frequency of obsidian pieces in layer 5 matches the frequency of occurrence in association with the predominantly thin fine pottery of layer F at Va-4. The lack of obsidian in layer V of Va-1 more closely parallels the layer 4 situation at Sa-3, whose four pieces could possibly be derived from the layer below. By either interpretation the association is one of low to absent in those layers where thick coarse pottery is dominant, implying a declining tradition of obsidian use in the early pottery part of the Samoan sequence.

Despite the small size of the pieces recovered by normal excavation procedures (table 16C), it is likely that we failed to find many others in layer 5 of Sa-3, and perhaps in the other layers as well. Although the wet, muddy soil precluded the effective use of screens, even with their aid some pieces would have been missed unless the mesh had been extremely fine. This was demonstrated by a carbon sample collected from an occupation A oven at the base of square H-6 (fig. 55). In removing charcoal bits from it for possible dating, I also recovered five flakes of obsidian, the smallest 2 mm square and the largest 11 mm by 7 mm. This indicates that numerous pieces in the size range from 2 mm to 11 mm in length, not otherwise represented in our obsidian collections, are likely to have been missed by the techniques usually employed in excavations in Samoa. More important, it further emphasises the small almost micro-flake nature of this component of the Samoan flake tool tradition, previously commented on (I, Report 10, p. 169). Obviously, any figures based on those samples, or these (table 16C), indicate an average size much greater than actually obtained. The true average length of flakes, for example, is likely to have been somewhere between 7 and 8 mm rather than the 10 mm or more provided by the samples recovered. This qualification must be kept in mind in the discussion which follows.

All four pieces from layer 4 are flakes which fall within the typical size range common to the samples recovered by normal techniques of excavation (table 16C). Only one, G 17/754, exhibits signs of both secondary working and extensive utilisation. Another, G 18/138, is apparently a flake derived from a rolled and bruised natural pebble which need not have been more than 12-15 mm in diameter judging from an edge with the cortex still present. This suggests, along with other instances of this feature and the extremely small size of even the largest cores and flakes, that a restricted detrital deposit was involved rather than a substantial quarry source.

The question of the source has been further explored by Ward (Report 32, p. 169). On the basis of a trace element analysis it would appear that all Samoan obsidian comes from a single source. However, the one nearby source known to have been in use some 2000-3000 years ago, which is on Tafahi in the northern part of the Tongan group and sufficiently close (260 km) for the material to have been imported, was not the source of the Samoan material. At present, an as yet unidentified source in the Samoan group seems more likely.

Five cores and five flakes make up the layer 5 obsidian assemblage, with two of the flakes and two of the cores exhibiting secondary flaking of a type to which White (1968) has recently drawn attention in the Pacific. The bipolar technique, widespread in the world, results in residual "tools" known by various terms. Such pieces are normally classified under flakes and in Australia have usually been called fabricators. White, from Australian archaeological and New Guinea ethnographic data, convincingly shows that they are in fact waste cores, for which he proposes the term scalar core (1968: 664). In producing the desired long and thin flakes from a scalar core by this means, one of the technological advantages cited is that "Raw material is used more economically since much smaller pieces of stone can be flaked without risk of damage to the worker's hand" (White 1968: 661). In Samoa the application of this technique in a micro-size obsidian industry based on limited supplies of raw material would seem most appropriate.

After I had examined small scalar cores in obsidian from White's Lesu site in New Ireland, which are associated with pottery-bearing deposits of approximately the same age as those of Sa-3, I examined the Sa-3 assemblage for evidence of them. One piece, G 17/526, proved to be technologically the same, the crushing on two ends suggesting the bipolar technique of production described by White. He has since examined the piece and agrees (pers. comm.) it is a scalar core. The other two pieces with a similar battered edge on one end only, have been classed here as flakes, although White agrees that they too may be fragments of a scalar core with the other end broken off during flaking. Another pyramidal core, G 17/925, from which several thin flakes have been removed also, has one crushed edge, suggesting it was held on an anvil when the desired flakes were removed. The presence of the anvil and bipolar technique constitutes another element of the early Samoan assemblage which ties it to contemporary and earlier materials in Melanesia.

The other cores are unremarkable, though it is worth noting that in size they are slightly larger than the flakes (table 16C), as might be expected. Several flakes, on the other hand, exhibit interesting features. One, G 17/527, is a "blade" flake, which on one side has several long blade flake scars as secondary working. It has been used. The other, G 18/220, is a large "blade" flake, 16 x 8 x 3 mm in size. It has use damage along both sides, and one end has been worked to a steep blunt form.

The three pieces of obsidian recovered from occupation A by the normal processes of excavation consist of one core, a large used flake and another tiny piece, which is the worked end snapped off a flake before or during use. In addition, there are the five small flakes described above recovered from the carbon sample. All but the largest, 11 x 7 mm, appear to be waste flakes, and carry no sign of use. The large flake, G 18/134, has some use damage along one steep snub-nosed point.

Chert Flake

One flake of pink to rose coloured chert with cortex on one end was found in square I-6, at the base of layer 5. It is a waste flake 18 x 10 x 4 mm in size. A similar chert flake was recovered from an early fill deposit at SU-Le-12 (Report 24, p. 89).

Quartz Crystal

A poorly developed quartz crystal which appears to be unworked was encountered in square I-4 at the base of layer 5. It is 17 mm long.

Grindstones

Because adzes were encountered with some frequency in layers 4 and 5, a number of grindstones suitable for shaping and sharpening them are to be expected if the place is one where adze manufacture and wood-working were common activities. Although no large or complete specimens were recovered, a fair number of fragments from broken stone slabs used in grinding were present. Not only are all specimens fragments, but it appears that they derive from a single type of grindstone in the shape of an irregular flat slab, only one side of which, in most cases, has a concave surface with evidence of grinding. These slab type grindstones may be contrasted with those formed on large boulders, often of a size which rendered their transport unlikely or impossible, with various lineal grooves and hollows or circular basins worn into their surfaces (cf. I, Report 3, pp. 37-38). When we have found the grindstones formed of boulders, they are often at some distance from the central residential area of the house platform, so their absence at Sa-3 is not particularly significant. However, their larger grooves and hollows were probably better suited to the task of overall grinding involved in the original shaping and finishing of an adze as well as sharpening its cutting edge. In contrast the more portable slab grindstones, including some of the larger broken fragments, were probably intended for resharpening an already finished adze during wood-working activity around a dwelling. This presumably was their function at Sa-3.

One set of grindstone fragments stands out from the rest by virtue of the peculiar white stone in which it is made. There are 12 fragments of this one stone, which is identified as a quartz-trachyte known from a number of places in Samoa (P. Black, Geology Dept., University of Auckland, pers. comm.). On the basis of composition it is likely all these pieces belong to the same grinding slab. The other five fine-grained olivine-basalt fragments are larger and each is formed in a material of slightly different composition, indicating that six separate specimens are represented.

Unlike the basalt fragments, both sides on the quartz-trachyte fragments have concave ground surfaces. I have been able to fit together two fragments from the same square, but I have not been able to join any of the others. Assuming, however, that they all derive from the same slab, their distribution is of interest. The largest piece is from square I-5 and was found at the base of layer 4, resting on layer 5. Five other fragments are from layer 5, levels 1 and 3, in the same square and thus below the largest piece. One fragment in square H-5, adjacent to I-5, is from the layer 3 gravel spread, and presumably has worked its way up in the stratigraphy as the result of pit or posthole digging. The other fragments are from squares to the east, two being from H-4, layer 5, level 1, and three being from I-3, one in layer 4, level 2, and two in layer 5, levels 1 and 2. While their close juxtaposition within the site supports the notion that they all belong to one slab assignable to layer 5, their distribution, like that of some of the pieces of pottery which have been joined, indicates that objects in layer 5 became somewhat dispersed after breakage and that one or two have even been removed from primary association with the layer in which they were originally deposited.

A hypothetical reconstruction of the trachyte slab indicates it was perhaps 30 cm in diameter and of an irregular rounded shape. At the outer edges the slab was 26-27 mm thick, but grinding on both sides had thinned the central area to 8 or 9 mm, which is probably why it broke. It has a hardness of a quartz-rich trachyte which would be a much harder rock than a basalt. While not suitable for rough grinding of most basalt stone surfaces, it may have been used either in polishing stone or final grinding of various surfaces. The smooth nature of its grinding surfaces is in keeping with such an interpretation.

The five basalt fragments all come from slabs 30 to 50 mm thick, and in size range from pieces 160 to 180 mm in length and 90 to 95 mm wide to pieces only 45 by 50 mm in size. Two are from layer 4 and the other three from layer 5.

Hammer Stones

Three medium-sized (60-90 mm long) round to ovoid stones probably employed as hammer stones were recovered. The two from square I-6, one in layer 5 and the other associated with occupation A, are both fairly certain examples. One of these, G 17/525, in somewhat dense vesicular basalt, has had one end flattened from intensive use in hammer dressing a flat surface. The other, G 17/686, a dense elongated pebble, exhibits three pitted depressions on its sides towards the ends as well as on one end. The third specimen, G 17/945, a rounder pebble from layer 4 of square H-4, is less certainly identified and has only minor pit marks on one end. Given the number of flakes, adze fragments and adzes in the lower two layers, it is surprising that more hammer stones were not identified.

Pebble Chopping Tool

As previously noted (I, Report 7, p. 134), chopping tools are not commonly reported as part of Polynesian tool assemblages though they may be present. The present example, G 17/529, is a large natural disk-shaped flat boulder, 149 by 147 mm in size and 62 mm thick, which has been unifacially flaked along one edge. It looks like and would serve well as a chopping tool, though proof of the function is uncertain. It was found in layer 4 of square F-6.

Discoidal Stone

The present example, G 18/1, is superficially similar to discoidal anvil stones also noted at Va-1 (I, Report 7, p. 134) in that it is a flat pebble in dense fine-grained basalt whose perimeter has been artificially flattened and whose sides are slightly convex. In size the disk varies from 76 to 84 mm in diameter and is 24 to 26 mm thick. It was found in layer 5 of square H-6 and looks more like a crude Polynesian bowling stone than an anvil or grinding stone for crushing nuts. However, the rather irregular and incomplete nature of the working around the perimeter and its irregular shape detract from its interpretation as a bowling stone, as does a poor rolling action when tested experimentally. Thus, the latter interpretation, more in line with other similar objects, must be given consideration.

Miscellaneous

An unusual piece of shaped dense grey basalt with well-ground surfaces has obviously been broken off one end of a small elongated object (fig. 66). It would, if found in New Zealand, have been identified with little hesitation as part of a stone lure shank. Its context in layer 5 of square H-4 makes the attribution somewhat doubtful, first because the site is well inland, and second because Samoan ethnographic records and museum collections lack lure shanks in basalt. Alternatives suggested by its size and shape, such as the butt of a chisel or the end of a pendant, do not seem convincing and the object remains unidentified.

Another object not assigned to a class consists of a thin piece of quartz-trachyte highly polished on both sides. All four edges are broken, making it impossible to guess at the shape of the original specimen. It does not seem to have been part of a grindstone, or abrading tool, for the object has a uniform thickness of 4 mm. Found in layer 5 of square H-6, it is comparable to broken specimens of similar size and shape from layer V of site Va-1 (I, Report 7, p. 136) and layer F-1b of site Va-4 (I, Report 10, p. 170). In both cases, as with this specimen, the context is an early

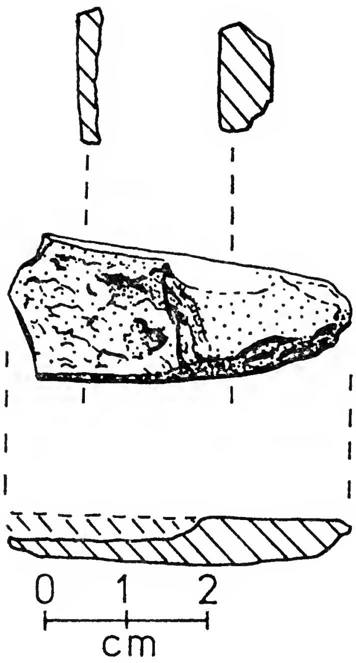

Fig. 66. Broken basalt object shaped like a lure shank, G 18/83, from SU-Sa-3.

one associated with pottery. The previous identifications of the material composing these objects as possibly of zeolitic or travertine origin should be corrected to a more probable grey-white quartz-trachyte, identical to the material of the present specimen.

A final object, also broken, whose function is difficult to establish, is a lightweight grooved piece of extremely vesicular black basalt of rounded shape (fig. 67). Like pumice, it floats in water, and in a coastal location a net float or some similar functional object to which a line passing around the groove was attached would have seemed a likely interpretation. However, no precise ethnographic parallels for such can be cited, and in an inland context the fact that it floats may be immaterial. The object could simply be a piece of easily worked stone, around which a cord could be wrapped when in storage or transport. It was found in layer 4 of square H-5.

Manuports

A number of natural stones of various unusual or appealing shapes were saved by the Samoan workmen during the course of excavation. Such stones are common in Samoan households today, where they often serve as mat weights. In addition, they were formerly used in "one of the processes of bark cloth manufacture and in plaiting fine mats" (Buck 1930: 79-80). It is certain that some of the larger stones saved probably had one of these functions, for their natural introduction into the site is unlikely.

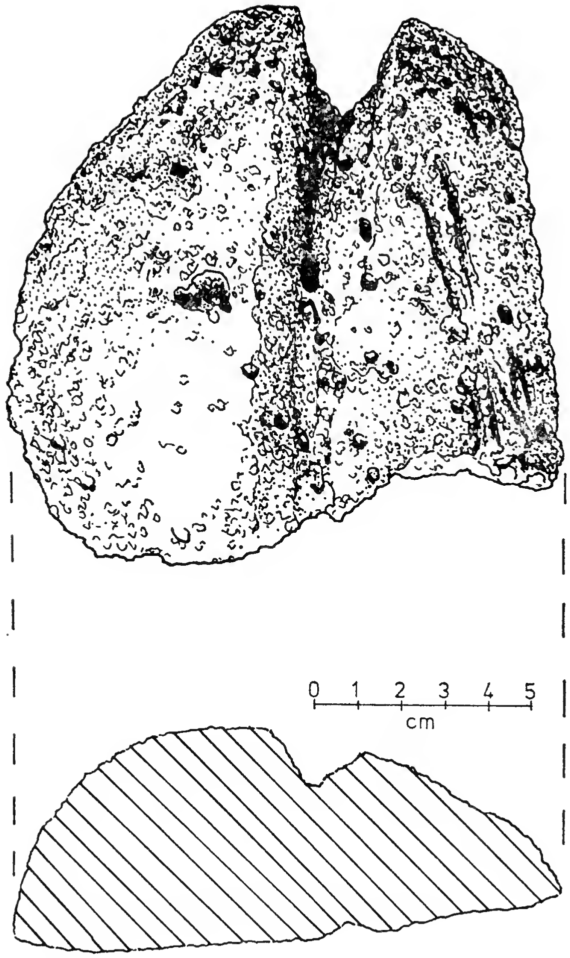

Fig. 67. Black vesicular pumice object with central groove, G 17/942, from SU-Sa-3.

There are three such large oval stones from layer 5, and one from layer 4. Some of the smaller stones initially classed as polishing stones or anvil stones for the manufacture of pottery could have had such function or could have been introduced in the gravel of the floor. Certainly the pottery sherds which carry impressions of stone anvils make their occurrence likely. There are two of these flat circular stones from layer 4 and one from layer 5. In addition, there were seven medium-sized elongated pebbles, five of which are probably indicative of cultural activity. The other two from layer 5 have slightly flattened, but not clearly artificial surfaces, and may have had some unknown function, though I am also inclined to regard them as natural introductions in the river gravel.

Red Colouring Agent

"Red earth" or *'ele* (Buck 1930: 303) derives from a highly weathered lump of decomposed basalt rich in ferric oxide. It is the "red ochre" used in printing bark cloth to which Heath (1840) has referred in the quotation cited above under the discussion of raw materials for adzes (p. 141). Buck emphasises that this is not the primary component of the reddish brown dark dye, *'o'a,* but a brightening agent added to it in dry powder form at the time the *'o'a* is applied to the bark cloth. The process is accomplished by rubbing the lumps of *'ele* on the rough back surfaces of *mageo* shells, *Periglypta reticulata* (Linnaeus), so that the powder falls on to the surface of the bark cloth, which is then rubbed with a bark-cloth rag that has been dipped in the reddish brown liquid dye.

The description accords well with evidence on some of the larger lumps of this material recovered from layers 4 and 5. Both G 18/45-46 from layer 4, and G 18/263 from layer 5 possess numerous fine parallel striations on one or more surfaces which suggest they have been scraped in the manner described to obtain a suitable powder. Although it could have been done with a shell, other rough objects would also have served, for the hardness of the *'ele* is only about 2. Seven additional fragments of *'ele,* all small and unworked, were found among the pottery samples from layer 4.

Buck reported that in the 1920s *'ele* was still traded to districts that had none, citing Lei in Tutuila and Uafato east of Fagaloa as especially famous sources.

The temptation to infer from the presence of *'ele* the manufacture and bright red dye printing of bark cloth is tempered by two complicating factors. The first is that while unrecorded ethnographically the use of this material in graves has been documented archaeologically (Report 21, p. 30), indicating one possible alternative interpretation of its functional role. The second, which follows from this, is that in the past it could have been used for colouring other objects (e.g. the red slip on Lapita pottery) and it was only its late prehistoric and historic use in Samoa which was restricted to bark-cloth colouring or inhumation.

Portable Artifacts From Layer 3

In comparison with layers 4 and 5, only a few portable artifacts were recovered from layer 3. To emphasise this contrast they are all described together here rather than by category under the appropriate class heading above. The difficulty in assigning layer 3 and 4 features to their appropriate occupations, D and C respectively, is also encountered to some extent with the portable artifacts recovered from layer 3 contexts, particularly where they are from features. Some items, like the pottery, are fairly obviously derived from layer 4 and belong to occupation C, but with other items such as obsidian flakes, it is more difficult to be sure. Finally, as with all layers consisting of transported river gravel fills, it is possible that some items were introduced through this means and not as a direct result of occupation on the site. Caution is therefore warranted should the layer 3 materials ever be used to testify to the occurrence of an item at this point in the Samoan sequence.

The one adze fragment found in square G-5 of layer 3, A 17/109, is roughly rectangular in cross-section with an area of grinding on what is presumably the front. It could belong to either Type I or Type II, but its thickness and roughness suggest that Type II is more likely.

Four small basalt flakes were found distributed among as many squares (table 14B). None shows any sign of use or is in any way distinctive. Three are very thin and probably derive from the use of finished stone adzes in the vicinity. Three small (8-16 mm long) flakes of obsidian were also recovered, two from square I-6 and one from I-4. One of the former has been water rolled and its edges rounded, and the other may have been; the third has not, and presents unmodified edges. None of the flakes carries signs of edge damage from use. It is possible that the tradition of working obsidian associated with layer 5 continued on to the period of layer 3, but the low frequency of occurrence in layer 4 and this layer does not strongly support this argument, given the alternative of the derivation of these flakes from layer 5. Thus their presence in layer 3 could equally well be accounted for by the intrusive features cut into layers below, just as with the pieces of pottery. There is some hope that a study of the hydration rims on the flakes may help solve the problem.

A basalt fragment of the portable type of slab grindstone was recovered in layer 3. It is comparable to those described for layers 4 and 5.

Altogether, 39 pieces of pottery were recovered in contexts that may be assigned to layer 3 (table 17). In two squares, I-4 and E-5, the higher than expected numbers are explained by the fact that in cleaning up the river gravel at the base of layer 3, excavation proceeded hard down into layer 4, so that some sherds from layer 4 were included in layer 3 bags. Still, there is no doubt that a low frequency of pottery sherds occurred in many secure layer 3 contexts, as well as in less secure ones difficult to judge, as for example the features noted above. Many of the vessel categories described for layers 4 and 5 are represented, the majority belonging to the thick coarse ware types. Vessel category III has the highest frequency with ten body sherds. There is, in my opinion, no reason to ascribe the continuance of pottery manufacture to the time of occupation D and the river gravel floor of layer 3. Too often in Samoa we have encountered a handful

TABLE 17

POTTERY FROM LAYER 3, SU-Sa-3

Square:	H-2	I-2	I-3	I-4	I-6	E-5	Total
Body sherd	7	1	1	16	4	7	36
Rim sherd	1	0	0	2	0	0	3

of sherds in secondary position to interpret such evidence as indicative of a diminishing stage of pottery manufacture when the excavation context suggests a more plausible alternative.

The much diminished portable artifact assemblage of layer 3 is in many ways both typical of many later Samoan sites and disappointing, for there is no obvious reason to postulate a major change in the nature of site function as domestic throughout the Sa-3 sequence. Rather, I am inclined to view the later layers as typical of ordinary household establishments, and to regard the earlier layers as perhaps having a more specialised domestic status or function. No entirely satisfactory explanation can be argued at present.

CONCLUSION

The prehistoric sequence at SU-Sa-3 provided evidence of four successive occupations, the last of which was aceramic. The first three, belonging to the early end of the Samoan sequence and dating to more than 1800 years ago, were associated with an unusually rich assemblage of structural features and portable artifacts. Their excavation has permitted the achievement of one of the general aims set for the second stage of the Samoan prehistory programme. As a result, it is possible to provide a fairly full description and interpretation of an early domestic occupation from an association in layers 4, 5 and occupation A of an abundance of potsherds, numerous adzes, good structural evidence, and an assortment of other portable artifacts.

Direct evidence of economic activity on the site was lacking, but from the site's location and the assemblage of portable artifacts recovered in it, a household dependent on agriculture and food products similar to those used by Samoans in the early nineteenth century may be inferred. Structurally there is also evidence that a form of round-ended house surrounded by a stone pavement, not too different from those encountered later in the sequence, was present. Finally, there is an assemblage in which the adzes, pottery vessels, and other items all have their analogues in later archaeological and ethnographic contexts. Thus, if the pottery, which was absent ethnographically and lacking in later archaeological sites, is viewed as the equivalent of the wooden bowls known ethnographically but not preserved in later archaeological sites, then the early assemblage of SU-Sa-3 provides a strong case for continuity throughout 2000 years of the Samoan sequence. There appears to be no basis for an interpretation of the early ceramic complex in Samoa as indicating the presence of an unrelated or non-Samoan cultural complex preceding a Samoan one that is aceramic.

The materials from the ceramic layers at SU-Sa-3 are not unique. There is evidence of the probable existence of such occupation layers at two other localities in the upper Falefa Valley where excavations were conducted, although only secondary deposits derived from them and not actual sites of habitation were discovered. This, as discussed by Davidson in the conclusions for the valley (Report 30, p. 161), has important implications about the age and extent of prehistoric occupation in the inland part of Upolu, and indeed for the age of settlement of the entire Samoan island group. There is also evidence that the materials from the ceramic layers of Sa-3 are directly comparable to those from early levels at Vailele. Comparisons between layer 4 at Sa-3 and layer V at Va-1 yield many precise and convincing parallels both in the interpretation of the origin of the deposits and in the materials contained in them. They also have the same radiocarbon age. The materials from the lower part of layer 5 and occupation A, although their greatest age is not securely dated, are certainly stratigraphically earlier and belong to a time more than 1850 radiocarbon years ago. They make it possible to define a closely related, though earlier, stage in the ceramic complex, a stage which could be suggested but not demonstrated by the materials from layer F at Va-4.

These assemblages, from well-separated localities, one on the coast, the other well inland, together make possible a reasonably well balanced reconstruction of this part of Samoan prehistory from which later changes in the sequence can be assessed. They also provide a more adequate basis than existed previously for comparisons with materials of a similar age from Tonga on the one hand and East Polynesia on the other. However, the attention in this report has in large measure focused on within-site interpretations and classifications which make such discussions possible in the concluding sections of the volume.

ACKNOWLEDGEMENTS

The excavations at Sa-3 required a mutual effort to devise a policy which fulfilled successive goals: first, definition of its historic occupation and then of its early occupation in association with pottery. The accomplishment of both goals, without loss of continuity, owes much to the field strategy directed by J. R. McKinlay, which made it possible to turn over to me a completely restructured excavation to finish. The assistance of Kathryn de Nave in this transfer should also be recorded, as should that of Yosihiko Sinoto, who, while on a visit, consented to fill in for a week when my supervisory commitments often required I be elsewhere.

In excavation I can only express admiration for my Samoan co-workers under trying conditions as we struggled with flooding, seepage, mud and rain day after day. It was often discouraging work, rewarded only by the importance of the materials we were recovering. Fata, Isu, Sam, Malaga and other crew members from Falevao deserve to have permanently recorded the contribution they have made to their own history, one which gave them as much pleasure as it gives me to thank them for a splendid effort.

THE UPPER FALEFA VALLEY PROJECT: SUMMARIES AND CONCLUSIONS

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Excavations at a number of sites in the interior of the Falefa Valley provided information which the survey alone (Report 20), and the restricted excavations which formed part of it (Report 28), could not have provided. In particular it is now possible to discuss with confidence the length of time various parts of the valley have been occupied, and make some statements about the nature of the occupations which took place there. Information from the Falefa Valley in turn provides a starting point for discussion of some more general aspects of Samoan prehistory.

CHRONOLOGY

It is now evident, not only that the interior of the valley was occupied some 1800 years ago, but that occupation at that time was already quite extensive. Layers 5 and 4 at Sa-3 provide a valuable assemblage of artifacts and structural information of that period. Of additional significance is the discovery of some potsherds at each of the other localities investigated within the zone of highly fertile alluvial soils. Somewhere very close to the excavations at Lam-1 and Le-12 there must be sites which, like Sa-3, contain more abundant pottery remains from which the sherds found in those sites derive.

Occupation during the pottery-using period was probably confined to the fertile soils on the valley bottom, for no signs of pottery-bearing occupations have been found in the less fertile second zone localities (Report 20), such as Folasa and Vaimaga. Even so, the three localities at which pottery has been found are quite widely separated, suggesting that a considerable area of land in the fertile zone was involved. Moreover it is hardly likely that the only three occupation sites of this period happened to be directly under or closely adjacent to the sites selected for excavation. The conclusion is inescapable: the most fertile part of the interior of the valley was quite extensively populated at a time when pottery was still being made and used in Samoa.

The oldest actual settlement yet uncovered in the valley is at Sasoa'a. The structural remains of occupation B, described in detail in Report 29, show convincing evidence of a small oval-shaped house with associated stone pavement and fence. These were preceded by the hearths, oven and postholes of occupation A. Only slightly later in time are earth ovens and probable cooking shelters of occupation C. The abundant artifacts associated with these remains are a most important assemblage of this period.

The next dated occupation is occupation A at Le-12, thought to date to the fifth or sixth centuries A.D. Pottery use had ceased by this time, but the fragmentary structural remains, pebble pavements and postholes are not unlike those of the earlier occupation at Sa-3.

At about the same time, there is an indication from the fifth to seventh century date from beneath the terrace at Folasa that occupation, or at least bush clearance and cultivation, were spreading to the second zone. A slightly later date from a similar context is the ninth to tenth century date from beneath the mound at Lalomauga. As these dates do not relate to actual occupations, little can be said of activities in these two areas at this time. It appears, however, that people were now expanding their activities on to the less fertile lower slopes of the sides of the valley, as well as maintaining some hold in the valley centre. The move up to Folasa, and probably at the same time or slightly later to Vaimaga and Niule'a, may have been induced either by growing population or by the frequent flooding on the valley floor. It is unlikely that the movement was caused by exhaustion of the fertility of the central valley soils, which even today are constantly being enriched by the addition of new alluvial deposits.

By shortly after the end of the first millenium A.D. there is further evidence of occupation in the second zone, from ovens at Folasa and Vaimaga, as well as continued occupation of the first zone, represented by occupation C at Le-12. In contrast to the "pre-mound clearance" context of dates of the preceding period these are actual occupation layers associated with ovens and other structural remains.

The most intensive evidence of residential occupation comes from the last few centuries — fifteenth to eighteenth at Folasa and Lalomauga, sixteenth to eighteenth at Leuluasi. The imprecision of carbon dates of this period and the difficulties of determining the exact numbers of houses at each site and their life spans make it difficult to decide whether these sites were continuously occupied or continually reoccupied. It is certain, however, that residential use of the inner valley was a regular feature during the last few centuries of the prehistoric period.

The final occupations at Le-12 and Fo-1 are apparently very late in the prehistoric sequence. From these it is an easy transition to the early historic period village at Sasoa'a, which shows such close resemblances to its prehistoric predecessors, as well as some significant differences. The excavation sequence reaches the present time with the small plantation house on the surface of the mound at Lam-1, and the recent pits and ceramic penguin at Fo-1.

Thus the occupation of the valley is seen to span a period of some 2000 years, during which occupation was largely residential and for the most part, apparently, little preoccupied with defence. Some of the undated occupations, those of Le-3 and layer 3 at Sa-3, fit easily into this pattern, but it is unfortunate that the sites at Te'auailoti, which alone of the excavated sites approximated to the category of "bush refuges", remain undated. Short term and unrepeated as they were, however, they can only be seen as marginal in the history of normal occupation of the valley.

Houses and House Sites

One valuable result of the excavations in the valley is the abundant information recovered on house structures. McKinlay has discussed in detail the evidence from Sasoa'a and Folasa. To the houses from these sites may be added the plan of house I at Leuluasi and the small house at Te-5. It can then be said that there is no evidence from this part of Samoa for the use of the *fale afolau* construction in prehistoric or early historic times. This is consistent with the historical evidence (Davidson 1969a: 70). At the same time it must be admitted that the bewildering array of postholes from, for instance, Lam-1, does not permit one to state categorically that this type of construction was not present. All excavated houses, however, for which recognisable plans were uncovered, relied either on central posts as at Le-12 (house I) and some of the Sasoa'a houses, or on no central support at all.

Only the latest houses in the sequence have been shown to have fireplaces outlined in curbstones. This is probably because fireplaces would be dismantled when a new house was constructed on an old platform. Similarly, curbstones delimiting the boundaries of houses tend to have disappeared from the earlier structures on sites which have seen frequent re-use, such as Folasa. On the other hand there is some indication that curbs were already in use in occupation A at Leuluasi. Similarly, the evidence from occupation B at Sasoa'a and occupation A at Leuluasi shows that the use of small stones in pavements is of great antiquity. The use of *'ili'ili* (river gravel) pavements is particularly well documented in the latter parts of the occupation sequences at Sasoa'a, Folasa, Leuluasi and Vaimaga. Some occupation surfaces at intermediate points in the sequences of the more complex sites, notably Le-12 and Sa-3, and the earlier houses at Folasa appear to be lacking in *'ili'ili*, but it is difficult to judge the extent to which *'ili'ili* pebbles have become incorporated in more recent fill layers, or been removed to form new floors on adjacent sites.

Throughout the prehistoric sequence in the valley, and into the nineteenth century, very low house platforms, barely raised above the surrounding ground surface, have formed one category of house site. The historic house sites at Sasoa'a have their immediately prehistoric precedent at sites such as Le-3. The early structural remains from Sa-3 and Le-12 suggest a long history for houses on platforms almost flush with the surrounding ground surface. In this situation, the raised house sites of Lam-1 and the other mounds in this part of the valley provide a problem of interpretation. Today, the height of house foundations in Samoa is closely related to the social status of occupants, and there is little reason to think that it was otherwise in the past. In this case the Lalomauga group of mounds could be interpreted either as a cluster of residences of people of higher status than those normally inhabiting the interior of the valley (people of comparable status with Polailevao, alleged to have lived at Folasa, or Leutelele'i'iti of Falefa). Alternatively they could represent a period when raised mounds were regarded as acceptable house foundations for ordinary people; in this case it would have to be presumed that other areas in the central flat part of the valley were not occupied at the time, since no mounds occur at Sasoa'a, for instance. However, the presence of one mound, albeit a fairly low one, at Leuluasi, and one at Pago, rather suggests that mounds were confined to people of a certain status.

On the slopes of the valley walls houses must be constructed on some form of terrace. Consequently it is difficult to compare the totally flat house sites of Leuluasi or Sasoa'a with the terraced house sites of Folasa, Vaimaga or Te'auailoti. For the most part, however, these terraced sites appear to resemble the flat sites of the valley floor rather than the mounds. This is a subjective judgment, reinforced only by the fact that in a few cases, as at Niule'a, a mound is built on a terrace. It is suggested that the terrace, however great the labour involved in its construction, merely provides a surface which can then be treated like a flat surface — with the addition either of a low house site or of a more substantial mound.

Intermediate between the two types of site is Le-12, which appeared on surface evidence to be flush with the ground, but which turned out on excavation to be built on an artificial terrace. Terrace construction would become a necessity as soon as the sloping sides of the valley were occupied, probably at least as long ago as the first indications of terrace construction at Le-12 and long before the construction of earth mounds at Lam-1.

Excavations were for the most part too limited in area for many details about house sites of earlier periods to be revealed. For details about pavements, surrounding stone walls, and features such as ovens the site survey provides the principal evidence. Large ovens were fairly restricted in the site survey, and obviously fulfilled some function other than that of cooking for the normal family group. Excavations at Folasa revealed the associated smaller *umu,* not normally identifiable from surface evidence alone, which nonetheless probably accompanied every house site. Folasa also revealed a maze of postholes among which the posts of cook houses, and perhaps screening fences, are presumably to be numbered. The antiquity of pavements may be guessed from the apparent presence of some kind of pavement at Sa-3, but no age for the stone walls, particularly typical of Leuluasi, Vaimaga and Niule'a, can yet be given.

Agricultural Evidence

Samoans today are still cultivating the interior of the Falefa valley by techniques which are presumed to differ little from those of their prehistoric ancestors. Modern plantations involve neither stone walls, nor large drains, and workmen and informants showed no interest in identifying prehistoric agricultural features. Consequently these aspects of the archaeology of the Falefa Valley may appear to have been neglected.

The principal modern use of stone walls in Samoa is to contain pigs and recently also cattle. None of the stone walls surveyed appears in its present form suitable for this purpose since almost all are open ended, even where it is possible to assume an adequate original height. Nor do they resemble either the field systems of some Eastern Polynesian island groups, nor the taro irrigation systems of others. The walls at Leuluasi appear to divide off the land of one group of houses from that of another, and sometimes to surround particularly important house sites, a situation which recalls Lu-21 (I, Report 12, p. 190). The walls at Vaimaga and Niule'a are similar, although at Niule'a one wall almost encloses a group of about 12 house sites. The most reasonable interpretation of the stone walls is that they mark boundaries, but are more likely to mark house site boundaries, whether of a *fua i ala* or of a village section, than the boundaries of fields.

A more promising candidate for the category of agricultural evidence is the system of large ditches observed around Sasoa'a and at Folasa. The ditches at Sasoa'a are partially visible on aerial photographs and appear to cover a large area. Their distribution suggests they are nothing to do with the historic settlement of Sasoa'a, but are to be associated with an unknown time in the prehistoric past. They are probably contemporary with the similar system at Folasa. The conclusion reached at Folasa was that the ditches there outline agricultural plots. If this is so, and the ditches once formed an integrated system, the rather fragmentary remains of houses on some of the plots presumably belong to a time when the system as a whole had fallen into disuse. It is unfortunate that time and conditions did not permit a more thorough excavation of the system at Folasa, and such an investigation deserves high priority in any further work in the area. The difficulties of locating and mapping such a system, however, let alone excavating it, should not be overlooked.

Non-Residential Sites

Although the great majority of sites in the valley are to be interpreted as house sites, both on the surface evidence and on the results of excavations, there are a few pointers suggesting other uses of certain sites, or new categories of site which may not be house sites. There is, however, no evidence to suggest that the sites excavated at Sasoa'a, Puna or Folasa were other than residential throughout their known history.

Although most of the evidence from Le-12 suggests residence, occupation B may represent a deviation from the normal pattern of occupation at this site. The evidence for this is discussed in some detail in Report 24. The possibility should merely be noted here that at this relatively early date in its history Le-12 consisted of a structure with stone-outlined depression on its surface. This feature may be compared with the much larger one suggested for Va-1 (I, Report 7, p. 126). Le-12 joins Va-1 and Lu-53, as sites which at one point in their complicated histories may have been used for purposes other than domestic habitation.

Another site which does not fit in with the pattern of domestic occupation is Le-24 described in Report 28. Little can be said of this site except that it is artificial, may have been surrounded by a light fence, and is not a living or cooking site. It must therefore be considered as a possible candidate for the problematical category of religious site.

Those nineteenth century accounts which admit the existence of religious structures in Samoa at all emphasise their diversity (Davidson 1969a: 68-69). Many would probably leave no archaeological evidence, but others might be expected to leave just such perplexing and insignificant remains as are faintly visible at this site and another at Olovalu.

Among the excavated sites, the other which presents a real problem of interpretation is Te-1. There is little evidence that a house was ever intended to be built there. Moreover it seems extraordinary that so much effort would be devoted to constructing a terrace and paving it, merely for a bush refuge, and then not using it. Other house sites on the ridge have house outlines. The possibility must be considered that Te-1 was never intended to be a house site.

To these excavated sites should be added those tentatively identified as other than house sites during the survey — the small pavement with uprights at Vaimaga, the star mound at Sina, and the various structures of irregular outline or unusual design on the more remote ridges of the valley walls (Report 37). Whether these sites are interpreted as religious sites, pigeon-snaring sites or a combination of both, their rarity, irregularity and diversity compared with the many securely identified house sites revealed both by survey and excavation, emphasise the difficulty of adequately recognising and interpreting specialised sites in Samoa.

Burials

Sasoa'a and Folasa provided considerable information about burials of the historic and late prehistoric period, summarised by McKinlay (Report 21, p. 31). The sequence he outlines can be extended considerably further back in time if the burial from Le-12, associated with occupation C, is included. If occupation C dates to the eleventh to thirteenth centuries, as the carbon dates suggest, considerable antiquity for this kind of burial is indicated. Earlier than this nothing is known of burial practices in Samoa. The only other occurrence of human bones in the valley, the skull and teeth fragments from Lam-1, must be considerably later. Their context is uncertain, although it seems most probable that these remains eroded from a shallow grave on the surface of the mound after it was abandoned.

In nothing is the contrast between Samoa and Tonga more marked during the last few centuries of the prehistoric period than in burial customs. The prehistoric burials at Folasa and Leuluasi may be contrasted with those from two burial mounds at 'Atele, Tongatapu (Davidson 1969b). In both areas the burials are presumably those of ordinary people. In Samoa there is apparently a long tradition of burial in shallow graves in or near houses which changed only under the impact of missionary pressure. In Tonga, the first burials may have been rather similar, at least at To-At-1, but thereafter the tradition of separate burial mounds developed which is still favoured, with some modifications, today.

Material Culture

In contrast to the wealth of structural information obtained from excavations in the valley the material culture recovered was disappointing in both quantity and range. An exception is provided by the material from layers 4 and 5 at Sa-3, which constitutes the best assemblage yet known from the Samoan pottery period. The great value of the assemblage is in expanding the range of material known to have been associated with pottery, and in greatly increasing our knowledge of the pottery itself. Both aspects have been fully discussed by Green (Report 29).

The reason for the greater abundance of artifacts in the early layers at Sa-3 than at later residential sites in the valley is not clear. Certainly the later sites are typical of the Samoan situation generally while the Sasoa'a deposits appear atypical. Green has commented on the resemblance between the composition of layers 4 and 5 at Sasoa'a and layer V at Va-1; to these may be added layers 5 and 7 at Le-12. All these deposits seem to be refuse deposits of a kind which is not found in later contexts. They are also apparently refuse deposits used as fill, but except for the Le-12 deposits, their original formation and their use as fill are probably not greatly separated in time. The problem on later sites is undoubtedly due to the cleanliness of Samoans as regards their immediate living area. In coastal situations all rubbish is removed and dumped on the beach or over a convenient cliff; in inland situations it is removed and dumped at a suitable distance from the house, usually on the boundary between the settlement and the bush. A house site is not the place to look for rubbish, a point amply illustrated time and again by our excavations. The question must then be asked whether the greater prevalence of refuse deposits in earlier contexts reflects a tendency to be less scrupulous about rubbish 2000 years ago (perhaps in line with similar Tongan untidiness of a similar period), or whether excavations have very fortuitously uncovered rubbish dumps rather than house areas at the sites from which our early assemblages are derived. In Sasoa'a, however, both an actual house site and a succeeding refuse deposit were found.

Another possibility is that the early deposits of Sa-3 represent the residence of a specialist, or even a specialised site where wood-working was carried out, thus accounting for the abundance of adzes. There is no good reason, however, to argue that Sa-3 represents either, when the evidence it contains could equally well be interpreted as that of an ordinary domestic site.

A minor but interesting point is the possible association of certain stone tools only with pottery-bearing occupations. Two types of stone tool found at Sasoa'a have also been found in other sites in the valley. One is the grindstone of quartz-trachyte, so far matched in the valley only by a piece of similar grindstone from the fill of the mound at Lam-1, in a context where it could well be derived from a pottery occupation. The other is the assemblage of obsidian and chert from Le-12. The case for the continued use of obsidian in Samoa after pottery manufacture had ceased rests on a single piece from a definitely later context at Lotofaga, and pieces in later layers at Sasoa'a which could easily have been derived from the underlying pottery deposits. It is thus significant that the only other worked pieces found in the Falefa valley came from Le-12, from contexts strongly suggesting their association with pottery. The rare chert flakes are confined to one example each from Sasoa'a and Leuluasi.

The other important assemblage from excavations in the valley is that from the early historic period occupation at Sasoa'a. Here the presence of a range of artifacts from house floors is understandable, for the assemblage consists of small broken pieces of durable material such as would be dropped and not removed from house floors. The assemblage is important, because it is the only one of this period. The settlement is known to have been occupied in 1838, although its duration is not known. The presence of more than one successive house structure associated with European items suggests a life of several decades. In this case the small accumulation of artifacts does not appear greatly different from that on late prehistoric sites.

Apart from these two assemblages from the beginning and end of the known sequence, the artifacts from the valley add nothing to our knowledge of Samoan material culture, beyond the uncertain inference, from the presence of *'ele* (Reports 22, 24, 29), that bark cloth manufacture may have been practised throughout the sequence. However, Samoan material culture as described by Buck (1930) included very little that was rendered in durable materials, and particularly in materials that would survive the soil conditions in the valley. Even durable items of fishing gear and ornaments would not last long in the valley, assuming the inhabitants to have possessed either, which is by no means certain. The paucity of remains in sites, therefore, need not be taken to signify that the inhabitants of the valley were any poorer in material possessions than any other Samoans at comparable periods in the prehistoric sequence.

Food Remains and Economy

The almost complete absence of food remains from all sites makes conclusions about this aspect of Samoan life difficult to draw.

The location of the settlements in an inland situation, in which highly fertile soils were evidently preferred, suggests that agriculture was an important aspect of prehistoric life in the valley. It may be presumed that traditional inland foods, such as bush birds and the fresh-water crayfish and eels for which the valley is still renowned, were exploited in the past, although no traces of their remains were discovered. The occasional fragmentary pig teeth found show that the pig was present, at least in the latter part of the sequence. In the absence of evidence to the contrary, it seems reasonable to assume that the subsistence pattern operating in the valley in early European times, and still operating in modified form today, is not significantly different from that operating throughout the prehistoric occupation of the valley.

No evidence was recovered to indicate to what extent the prehistoric inhabitants of the interior of the valley had access to the sea and its resources. Apart from a few fragile shell fragments found in fairly recent contexts at Vaimaga, Folasa and Sasoa'a, no marine remains were recovered. Neither fish bones nor fishing gear (apart from one problematical stone artifact from Sa-3) were found. The frequent absence of such remains even from coastal sites, however, shows that absence of evidence of fishing need not correspond with a lack of fishing activity. It is possible that the inhabitants of the interior of the valley visited the coast to fish. It is more probable that they received gifts of marine food from relatives living nearer to the coast and gave in return gifts of some of the foods they themselves had ready access to.

Settlement Patterns and Social Organisation

Samoan social organisation can be regarded from several different points of view. The concern of the archaeologist working in a situation such as the Falefa Valley, must be with local organisation, with the *nu'u* or parish whose spatial dimension is reflected by the distribution of sites in the survey area. The anthropologist may be equally or more interested in the kinship networks which extend beyond the boundaries of the *nu'u,* and bind together communities and segments of communities which are widely separated in space. Such relationships, although they may be the result of historical events, are beyond the reach of current archaeological techniques. For example, it is only from the evidence of social anthropology and traditional history that the ramifications of the Safenunuivao family from Falefa throughout Atua district can be understood; no archaeological evidence has yet been found to link Falefa more closely with Salani than with Lotofaga.

In the Falefa valley, the archaeologist is confronted with a series of archaeological remains in a geographically discrete area, which today is inhabited by people who participate in a recognised unit of local organisation. Although Falevao is a *nu'u* in its own right, it is more closely related to Falefa than to any other political entity. Moreover, its existence as a separate *nu'u* is widely believed to be very recent. There are reasonable grounds, therefore, for supposing that the eastern part of the valley, from the coast to the Mafa pass, may have formed the territory occupied by one localised political entity for a considerable period of time.

Within the survey area, three different kinds of settlement pattern can be observed. The first is represented by the present village of Falevao, in which the residences of a majority of the inhabitants are fairly tightly clustered around a small open space associated with a church, close to the modern road. A small proportion of village residences are strung out more widely along the road. The second pattern is represented by the very tight cluster of dwellings at Sasoa'a. This settlement is known to have been inhabited in 1838 by the ancestors of people now living on the coast. The third is best represented by Leuluasi, a more dispersed settlement than either of the other two, situated right at the back of the valley, and believed to have been occupied in the late prehistoric period by the ancestors of one family group now living in Falevao. The archaeological evidence from excavations supports the historical and traditional attribution of Sasoa'a and Leuluasi to the early historic and late prehistoric periods.

I have argued elsewhere that each of these kinds of settlement pattern could be a different manifestation of a similar social organisation (Davidson 1969a: 55-56). Placed in a chronological framework, this could be argued as follows. A form of organisation essentially similar to that of the present day existed in the valley in late prehistoric times, in which a number of apparently unrelated families, each with their own titles, acknowledged that these titles together formed a political unit, in which certain titles, then as now, were deemed to be much more important. In late prehistoric times, however, the residences of title holders and their adherents were widely dispersed over the land, with individual title holders residing near their own cultivations. Some remarkable pressure, such as warfare or the unsettling effects of initial European contact, produced an initial response in the form of tight clustering of segments of the population, as at Sasoa'a. This form of settlement in turn was replaced by the looser clustering of larger segments of population in the present villages of Falevao and Falefa.

The question then arises whether Sasoa'a and the modern villages are unique responses to European contact, and Leuluasi represents part of a settlement pattern which lasted for many centuries, or whether the dispersed settlement pattern in turn was one episode in a series of prehistoric changes of pattern. On this question the excavations provided no definite answer, for it is seldom that excavations intended to reveal residence patterns on late sites such as those investigated in the valley will uncover more than a fraction of any underlying earlier occupations. The excavations did show, however, that a number of inland locations had been occupied many times over a long period, which makes the former hypothesis, that dispersed settlement in the interior of the valley was the norm for a long time, not unlikely.

The most significant result of the excavations, from the point of view of Samoan social organisation, is the time scale provided for settlement in a geographical area of Samoa. The essential point here is that settlement in the back of the valley implies related settlement on the coast, and some form of local organisation linking the entire area in some form of community. This is significantly different from a sequence of comparable length from a single coastal site.

The known occupation sequence in the valley extends back for at least 1800 years, with a strong indication from Leuluasi that occupation there probably began well over 2000 years ago. The known traditional history, by contrast, effectively begins with Leutelele'i'iti, whom Krämer (1902: 292, 467) assigned to generation 11 of a genealogy which ended in A.D. 1900 with Mata'afa Tupua as generation 33. Leutelele'i'iti, therefore, lived long after Sasoa'a was first occupied and, indeed, at a period when the valley had already been extensively occupied for more than a millenium. The settlement of the valley, the expansion of population, and the initial occupation of most if not all of the excavated sites, took place in a period beyond the reach of present oral tradition. In view of the continuity in the nature of the occupation throughout the prehistoric period, it is possible that there has been a continuity of social organisation also. The sort of social organisation which now exists in the valley could well have developed before the time of Leutelele-'i'iti. At the very least, the peculiar Samoan combination whereby apparently unrelated family groups combine to form significant local political groups, while kinship bonds radiate out to combine such local groups in assorted alliances, can be seen as the end product of at least 2000 years of occupation during which the nature of occupation and settlement patterns may have changed little until they were exposed to European contact.

The Falefa Valley and Samoa

When the Falefa Valley was selected as one of the survey areas, it was thought that it presented optimum conditions for inland settlement. Direct experience of conditions in the valley, however, and closer study of its soils and rainfall, caused this opinion to be modified. Certainly there is a relatively small area of highly fertile soils in the back of the valley, but part of this area is very swampy and not cultivated today to any great extent. The disadvantages of frequent and severe flooding tend to balance the advantages of the fertile soils. The remaining habitable and cultivable parts of the inner valley have soils which are less fertile than those of large areas in the northwest part of Upolu, for instance. There is no part of Upolu where habitable lands extend further from the coast, but equally there are places where habitable land extends almost as far inland. There would be no other such attractive area 5 miles (8 km) from the coast, but we are considering a type of settlement which extended from the coast for some distance inland, rather than a type of settlement which was confined entirely to remote inland situations. In other words, the area of settlement which extends from Falefa to the Mafa is not, on the whole, significantly more attractive than some other areas of Upolu.

If the Falefa valley presented a uniquely attractive situation, it might be expected that the modern settlements would reflect this. But the concentration of population at Falefa and Lufilufi is not significantly greater than, or as great as, that in parts of the northwest coast, nor does Falefa exhibit political superiority of a kind that might have been expected to develop in a uniquely favoured resource area. The very existence of Falevao and Lalomauga could be claimed as a sign of uniqueness, but the extensive alienation of fertile land in northwest Upolu precludes the existence of modern inland villages there.

Finally, the distribution of prehistoric remains in the Falefa valley does not differ in extent from that running inland behind the large modern villages of the northwest coast. Sporadic visits to various areas showed that archaeological remains are very extensive throughout the northwest part of Upolu, and a detailed survey of a strip in the WSTEC Mulifanua estate found continuous and dense archaeological remains extending about 4 km inland (Report 36). Moreover, this survey revealed more large and unusual mounds, possibly indicative of high ranking persons, than were discovered in the Falefa Valley.

We can thus state with some confidence that the situation in the Falefa valley is not unique. Under these circumstances, it is to be expected that the prehistoric evidence from the valley would be matched by that in other areas. The implications of this are exciting.

The valley was extensively occupied during the period when pottery was made and used in Samoa. Not only at Sasoa'a but at Leuluasi and Puna were pottery-using communities. This implies a substantial population in Samoa by about A.D. 200, for it is not realistic to argue that the inner Falefa valley was the only inhabited area at this time. It is remote from the coast with its marine resources, and it is not outstandingly attractive for settlement, as shown above. Moreover, evidence of pottery use has also been recovered at Vailele and at Apolima. In fact, the only excavated coastal locality which did not yield pottery was Lotofaga, where occupation of the beach front began much later, probably as a result of coastal uplift (I, Report 15, p. 232). In this context it seems very probable that the mound at Moamoa (I, Report 16) did yield pottery — not the abundance of pottery characteristic of Sa-3, but a handful of secondarily deposited sherds such as were found at Le-3, for instance.

The extent of early settlement in the Falefa Valley suggests that by A.D. 200, much of the coast of Upolu must already have been occupied, with actual occupation extending inland in the Falefa valley and possibly at Moamoa, and agricultural clearance, at least, well inland of Luatuanu'u. The failure of the initial surveys to reveal early occupations in coastal locations is undoubtedly due, not to an exclusive concentration of occupation in inland situations, but to the fact that many beach-front locations, on which the search for early sites concentrated, only became available for occupation as a result of geological events, at a later point in the occupation sequence. This was certainly the case at Lotofaga, and probably applied to many other "raised beach" situations around the coasts of Upolu. The early sites, then, are to be found not on low sandy coastal strips, but on the higher ground immediately above them. The only such location investigated, Vailele, certainly produced the expected evidence.

The presumably wide distribution of pottery-using communities suggests that the initial settlement of Samoa was considerably earlier than any sites yet investigated, confirming a belief expressed early in the investigations that the first third of Samoan prehistory might not yet have been uncovered. This view has received confirmation from the recent discovery in the lagoon at Mulifanua of potsherds decorated in the Lapita style, which carry some motifs believed to be relatively early, rather than late, in the development of Lapita decorations (Report 33). It now seems possible that Samoa may have received its first settlers as early as Tonga, and the concentration of pottery-using communities far inland in the Falefa valley is not the result of that valley's unique advantages for prehistoric settlement, but a reflection of the extent to which a sizable population had already built up and expanded to occupy desirable inland situations, as well as a significant amount of the coastline.

The succeeding centuries in the Falefa Valley, therefore, reflect not a sequence of unique events, but a typical series of domestic occupations, such as might be expected in many other parts of Samoa. Occupation B at Leuluasi, characterised by a stone-outlined central pit on a raised terrace or mound, is exceptional, as is possibly Te-1, but in general, in the excavated sites domestic occupation succeeds domestic occupation with remarkable regularity.

The domestic occupations appear to concentrate in the fifteenth to eighteenth centuries. Here, however, the nature of the survey, and the reasons for selection of the excavated sites must be considered. Sites Fo-1 and Le-12 are among the best preserved of any surface remains in the valley, and it is only reasonable to assume that their occupation, in their present form at least, would be very recent. There is no obvious reason why a site selected for excavation because it promised to yield considerable information about the most recent occupation of a given area, should also prove to have been the first occupied and most frequently reoccupied, in that area. The number of house sites, in varying stages of preservation, at Leuluasi, Folasa and Vaimaga, to say nothing of Niule'a, Olovalu and Palapi'i, should not be forgotten. Further investigations in less well preserved sites might reveal an equal intensity of occupation at an earlier period.

In one respect, the remains in the Falefa valley, and in other parts of eastern Upolu, are both typical and atypical of other areas of Samoa. It is likely that the domestic occupations revealed at the majority of excavated sites are typical of such occupations throughout Samoa in the size and structure of houses, their association with various types of oven and cooking shelter, burial customs, and the absence from the immediate vicinity of domestic refuse in any amount. The difference lies in the excellent preservation of house outlines, once vegetation is cleared. In western areas of Upolu and much of Savai'i, where the ground surface is much more stony, house remains have less clarity and house platforms tend to be low mounds of rubble, rather than flat pavements outlined and paved in waterworn stones. The areas surveyed in eastern Upolu, therefore, particularly at Luatuanu'u (I, Report 12) and the Falefa Valley, provide optimum conditions for the recognition and study of individual house sites.

The variation in site types between the Falefa Valley and other parts of Upolu and Savai'i will be discussed in more detail in Report 39, as part of a general survey of the distribution of field monuments. The point to be made here is that on the whole, the upper Falefa valley is characterised by a preponderance of ordinary residential sites and a lack of large and spectacular field monuments which could be interpreted as religious sites or residences of people of rank; or as indications of supra-local authority (Davidson 1969a: 71-72).

The value of the excavations in the upper Falefa valley, then, has been in their contribution to our understanding of the life of ordinary people in prehistoric Samoa, their houses and house sites, and their burial customs. It is reasonable to assume that such evidence in the Falefa valley is similar to that to be expected elsewhere in Samoa, and that in particular the excavated sites in the upper valley represent the inland manifestation of a form of settlement which embraced both coastal and inland areas, uniting in a single community people who lived anywhere in a particular segment of an island. The results document almost 2000 years of everyday life, rather than the high points of Samoan traditional history. Even warfare is poorly represented, for the majority of sites recorded or investigated are undoubtedly peace-time domestic residences. Possible "bush refuges" appear to have been seldom and briefly occupied, while the only fortified refuges discovered were so small and remote that they could hardly have served as major retreats. It is not here that the large and unusual monuments of Samoan prehistory are to be found, and presumably, therefore, the unusual political and religious circumstances which gave rise to those sites are also to be sought elsewhere. But it is only in a framework of carefully documented ordinary and unspectacular data that the extraordinary and the spectacular can be understood.

IX. MISCELLANEOUS REPORTS

INVESTIGATIONS ON APOLIMA ISLAND

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In May 1968, a survey and small excavation were carried out on the island of Apolima. The aim was to investigate exposed beach-front midden deposits. In particular it was hoped that such excavations might provide new data on Western Polynesian fishing gear and non-concentrated midden deposits. Excavations by Davidson at Lotofaga (I, Report 15) had provided some information on non-concentrated middens, but information on fishing gear was in large part still lacking.

During the period of investigations on Upolu in January 1967, a two-day visit was made to the island of Apolima. The possibility of a more detailed investigation of the island was then discussed and as a result, a small excavation and a thorough survey of the island were planned and carried out by the author, who was later joined by Mr L. M. Groube.

THE ISLAND

Apolima is the smaller of the two islands lying in Apolima Strait between the islands of Upolu and Savai'i.

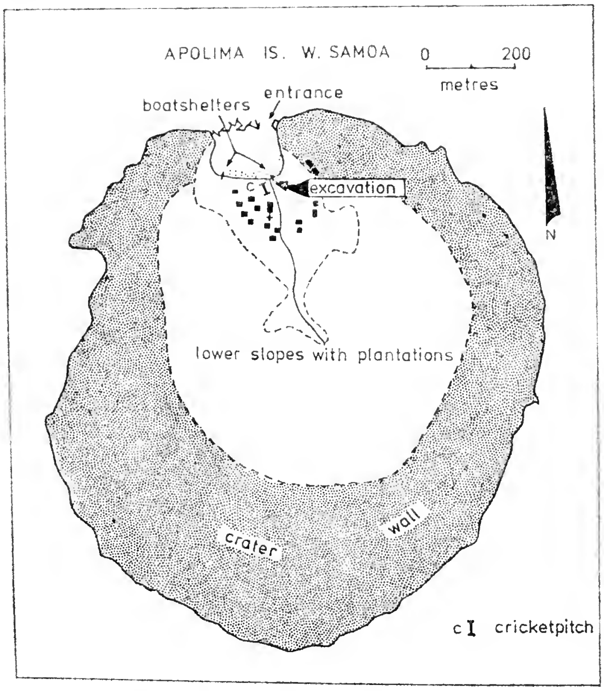

Fig. 68. Plan of Apolima Island, showing position of excavation.

The island is an extinct volcano breached on one side. The flat crater floor, approximately 2.5 m above sea level at low tide, covers an area of less than 1 km^2 and is divided by a stream. The village and plantations are situated here and are protected from the elements by the high crater walls, which rise almost vertically from the sea. The 120-m-wide gap in the old crater walls on the north side of the island opens to the sea. Apolima is almost unapproachable except for this rather hazardous entrance, which leads to a tiny, somewhat protected bay with the only area of beach front and fringing reef on the island (fig. 68).

THE INVESTIGATION

The selection of a locality for excavation proved difficult. It was first thought that the cricket pitch, one of the less disturbed open areas in the present village, would serve, but when enquiries were made from one of the oldest villagers, he revealed that a school and some houses had been situated there at an earlier period. This was confirmed by digging test pits up to a depth of 1.5 m in the area. Only some very mixed deposits were encountered, of little use to the objectives of this project.

An intensive and systematic examination was made of the foreshore of the small bay and both banks of the stream. Nothing definite was found except along the western bank of the stream, near the mouth, at a point close to a boat shelter excavated into the bank. Here some built-up deposits were noticed in section and it was decided to lay out a test square immediately adjacent to the shelter (fig. 68).

THE EXCAVATION

A 3 x 3 m square was set out, divided into four quadrants, a, b, c, and d. Excavation started on quadrant a, followed by c, d and b, and was by natural layers. Thicker deposits were taken out by 10-15 cm spits. All excavated material was washed, screened through a one-quarter inch (6.35 mm) sieve, sorted and weighed. Stones and coral, which were the major components in the layers, were discarded after weighing. Shell, bone and artifactual material was sorted and bagged for further analysis in the laboratory.

Although the procedure was slow, it was the only way to examine the components of the layers thoroughly.

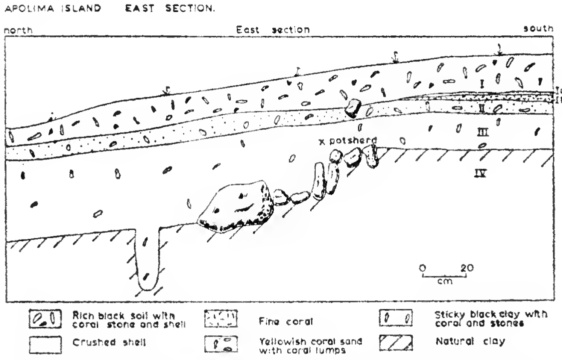

Fig. 69. Cross-section of excavation, Apolima Island.

Stratigraphy

The layers were numbered from top to bottom and were as follows (fig. 69).

Layer I: rich black soil mixed with coral, stone, some shell and bone. The lower part of this layer contained rather more sticky black sandy clay.

Layer Ia: a fine lens of crushed shell which occurred in the southeast corner of the square at a depth of 23 cm.

Layer Ib: this layer had the same placement and size as Layer Ia and consisted of fine coral.

Layer II: yellowish coral sand mixed with coral lumps.

Layer III: sticky black clay mixed with coral and stones.

Layer IV: natural clay.

Analysis of "Midden"

A careful analysis of the composition of the layers makes interpretation of the deposits as primary "midden" improbable. As can be seen in table 18, the main components of the layers were stone, coral and sandy clay. Faunal material assignable to a "midden" component was almost non-existent.

The small amount of shell in the deposits was badly broken and waterworn and does not appear to derive from the use of shellfish as food. It seems more likely that the shells were gathered together with the coral and stone on the small beach and used to form part of the artificially laid deposits built up on the sloping ground directly behind it. The stratigraphy supports this interpretation (fig. 69).

The following species have been identified: *Tridacna maxima* (small waterworn piece); *Trochus niloticus; Cypraea arabica; Cypraea eglantina; Conus striatus; Turbo setosus;* operculum of *Turbo* sp.; a *Cidarus* spine. It is worth noting that the natural occurrence of edible shellfish on Apolima is so restricted that such shellfish are today brought from Manono.

Bone fragments included:

Layer I: An unidentified bone.
Layer II: One piece of human tibia (?) cut, one fish bone.
Layer III: One spine of a sting ray, two unidentifiable bone fragments.

Features

In the eastern half of the square a number of large stones lying on the natural clay may be the disturbed remnants of a floor. The deposit on the southern side of these stones was fairly level, while on the northern side the natural clay sloped away towards the bank. Also, the only posthole in the excavated area was placed just outside these stones. It could have been used to hold the stones and thus the floor in position or it could have been part of a structure built over the level floor. The small lenses, Ia and Ib, may also be interpreted as a gravel spread and part of a floor because they too occur on the level area.

Artifacts

As expected from a limited excavation, the quantity of artifactual material is very small. It is informative nevertheless.

Table 18
Composition of Apolima Beach "Midden"

	Total weight in kilos	Stone	Coral	Bone	Shell	Sand
Layer I	641	12 1.87%	521 81.28%	0.32 0.05%	0.242 0.04%	107.44 16.76%
Layer II	231	4 1.73%	151 65.37%	0.05 0.02%	0.537 0.23%	75.41 32.65%
Layer III	293	21 7.17%	168 57.34%	0.07 0.02%	0.637 0.22%	103.29 35.25%

Layer I: 1 broken adze fragment, probably of Type I.
1 broken tip of a bone implement with a rounded blunted end (burnisher?).
Layer II: 1 broken bone fragment, cut.
Layer III: 2 polished stone flakes, both probably adze fragments.
7 potsherds.

The discovery of sherds of pottery was surprising and unexpected. Most belong to the thin fine ware class similar to that discovered in layer F at Va-4 (I, Report 10, p. 170), and in layer 5 of Sa-3 (Report 29, p. 121). The seven sherds measure in thickness: 5.5 mm (3), 6 mm (1), 6.2 mm (1), 7.5 mm (1) and 9 mm (1). In shape, the sherds are undiagnostic and presumably derive from the body of one or more bowls. The temper is generally very fine. Green examined the appearance of the sand grains which protrude from the sherd surface. On this basis, five sherds were assigned to ferromagnesian basaltic temper. Two are probably of feldspathic trachytic temper.

Conclusion

Although the main aim of this project, namely the recovery of additional data on midden deposits and their contents, was not fulfilled, some of the evidence recovered has nevertheless proved important to Samoan prehistory.

The presence of potsherds on Apolima indicates that without doubt pottery in Samoa was once wide-spread. It is now known from early contexts at Vailele in the centre of Upolu, the Falefa valley to the east and Apolima off its western end. Whether the pottery found in Apolima was manufactured locally, or traded there from Upolu, was not established. Still, when pottery was in use, it was more widely distributed than one might infer from the evidence of surface surveys, which have proved uninformative on the subject.

The presence of pottery also suggests that Apolima was populated in the early part of the Samoan prehistoric sequence. This is not surprising, bearing in mind its strategic location between the islands of Upolu and Savai'i. A wide range of adze types found during brief visits to the island also supports this view (I, Report 17, p. 260).

This excavation once again demonstrates that pottery in Samoa may at times occur in secondary contexts and not always in deposits dating to the time of its manufacture. This makes it difficult to predict whether a site is old or not solely on the basis of a few sherds of pottery, a situation also encountered in sites in the Falefa valley and at Vailele (Report 40, p. 245-246).

The absence of a coastal midden on the beach front at Apolima is perhaps not too surprising. The local environmental situation is not favourable to its concentration there, and all surveys to date have shown that any concentrated midden build-up in Samoa is very unusual. By and large it seems that coastal villages are built on prehistoric land surfaces over which the midden components are dispersed, accumulating only slowly in favoured localities of present day villages or being returned to the sea, conclusions also reached by Davidson (I, Report 15, p. 252). No other archaeological surface features were discovered during the survey of the island.

ACKNOWLEDGEMENTS

I would like to thank the Rev. Siosi and his family of Apolima Island for their hospitality during our stay on the island; Mr L. M. Groube, with whom I discussed the project and who gave valuable help in the field; and Roger Green, who helped with its writing. Shell identifications were made by Dr A. W. B. Powell, Auckland Institute and Museum.

AN INVESTIGATION OF THE SOURCE OF THE OBSIDIAN FLAKES FROM TWO SAMOAN SITES

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A form of natural volcanic glass was recovered from excavations in two sites on Upolu, one at Vailele (SU-Va-4) and the other at Sasoa'a (SU-Sa-3). In both cases the volcanic glass, designated "obsidian" by Green (I, Report 10, p. 169), came from early cultural layers associated with pottery. There is no known source of volcanic glass in the islands of Western Samoa, although Green (I, Report 10, p. 169) has raised the possibility of its local occurrence in the Fagaloa Volcanics surrounding the Falefa Valley.

The siliceous magma required for the formation of a true rhyolitic obsidian appears to be absent from Western Samoa as Kear and Wood (1959) found no volcanics as siliceous as that reported by Lacroix (1927: 53) for the volcanic island of Tutuila in American Samoa. On the other hand, Kear (1967: 1446) reported the occurrence of minor andesites in the Fagaloa Volcanics of Savai'i and Upolu and a volcanic glass in many respects closely similar to rhyolitic obsidian possibly could derive from these. Again, Tutuila is a possible source of obsidian, although the only glassy materials reported from this locality are those seen in thin section (MacDonald 1944: 1342). Similarly, MacDonald has noted (1944: 1354) the description of a greenish-brown lapilli in a tuff from Apolima and Fanuatapu islands in Western Samoa. This is probably the Vini Tuff described by Kear which, because it had its point of eruption at sea, is characterised as the ultimate case of very localised glassy textures in Western Samoa (Kear 1967: 1450).

The nearest known source of a volcanic glass to be exploited appears to be that located on the island of Tafahi, an extinct volcano in the Tongan Group, only 260 km south of Savai'i and Upolu. This report is of an investigation which sought to

TABLE 19

PROVENANCE OF GLASS SPECIMENS USED IN ANALYSIS

	Sample Number	Context	Number of Specimens Analysed
Samoan Sites:			
SU-Va-4	Lot 34	Sq. S-2, top 5 cm layer F	6
	Lot 29	Sq. N-1 extension, 10-20 cm level layer F	6
SU-Sa-3	SU/G 17/923	Sq. I-4, layer 5	1
	SU/G 18/235	Sq. I-5, NW quadrant layer 5 (level 2)	1
Tongan Sites:			
Falehau area of Niuatoputapu	NTT 108-09, 114 122-24	surface	6
Lolokoka	LK 1, 2	excavated test pit	3*
Tongan Source:			
Tafahi	Tefitomaka 2	*in situ*	2
	Tefitomaka 3	*in situ*	2
	Tefitomaka 4	*in situ*	6

* LK 1 sample divided into two sub-samples for analysis

answer the problem of whether the volcanic glass in Samoan sites derives from the Tongan source.

The material used in the analysis includes glass from, firstly, the Samoan sites of SU-Va-4 (I, Report 10, pp. 168-169) and SU-Sa-3 (Report 29, p. 148); secondly, there is included for purposes of comparison a sample from an assemblage collected or excavated from Lapita sites in the Northern Tongan Group by Garth Rogers during 1971. The sites are located around an old beach line on the island of Niuatoputapu (Rogers MS), the surface specimens coming from sites in the Falehau area and the excavated sample from the site of Lolokoka. Only 7 km away is Tafahi, the volcano which supplied the third category of material, the source samples collected from *in situ* deposits (fig. 63). They were taken from the land called Tefitomaka which is associated with a small protrusion on the side of the mountain.

A total of 46 specimens were sent for examination, of which 33 were large enough to be analysed (table 19).

The method used to characterise the glass has been discussed in detail elsewhere (Ward 1972: 128 ff.). Briefly, an analysis of trace element content of both the source and site material permits direct comparison of one with the other in terms of a selected part of its chemical composition. Previous work in this field has demonstrated the unique elemental composition of sources of obsidian in various parts of the world, and the efficacy of the method in sourcing obsidian (Cann, Dixon and Renfrew 1969; Ward 1974). Instrumental

TABLE 20

RESULTS OF TRACE ELEMENT ANALYSIS

	Sample Number	Otago Accession Number	Element composition in parts per million			
			Zr	*Mn*	*Rb*	*Sr*
Samoan Sites						
SU-Va-4	Lot 34	AS 044	239	1302	215	49
	,,	AS 045	200	1381	228	55
	,,	AS 046	203	1373	203	34
	,,	AS 047	224	1314	226	39
	,,	AS 048	197	1365	246	42
	,,	AS 049	196	1413	256	58
SU-Va-4	Lot 29	AS 050	166	1260	145	17
	,,	AS 051	214	1390	234	58
	,,	AS 052	210	1565	228	34
	,,	AS 053	244	1593	259	49
	,,	AS 054	123	1398	158	35
	,,	AS 055	201	1559	201	39
SU-Sa-3	G17/923	AS 042	236	1839	252	53
SU-Sa-3	G18/235	AS 043	213	1378	249	65
Tongan Sites						
Falehau area	NTT 108	AS 031	18	1917	27	202
	NTT 109	AS 032	27	1750	08	200
	NTT 114	AS 034	39	1946	18	206
	NTT 122	AS 035	10	2318	14	200
	NTT 123	AS 036	26	1720	26	227
	NTT 124	AS 037	38	1842	20	204
Lolokoka	LK	AS 039	13	1819	10	141
	LK	AS 040	18	1804	09	154
	LK	AS 041	55	1776	10	219
Tongan source	10 specimens					
N = 10	Mean		58.0	1354.6	26.1	233.4
	SEM (P = 0.05)		10.2	110.2	2.6	8.7
	% SEM		17.6	8.1	9.8	3.7

methods of analysis (in this instance X-ray fluorescence spectrography) enable quantitative data to be determined rapidly. It must be emphasised, however, that the method does not allow the analyst to say with certainty that the raw material from which an artifact was constructed originally derived from a certain source of raw material, only that, until contradictory evidence is available, the most likely source is the one to which the trace element data of the site material most closely fit.

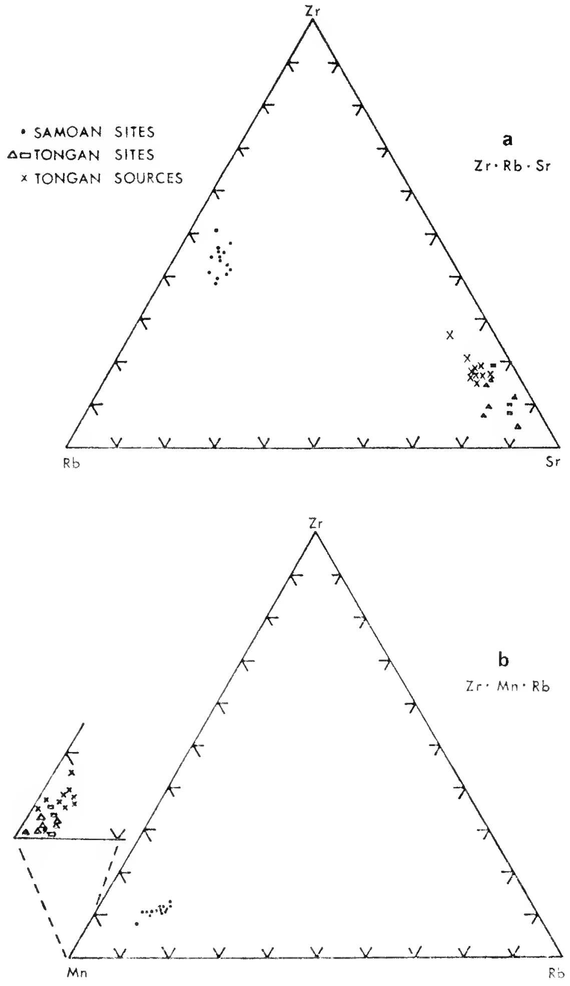

Fig. 70. Ternary plots of the relationship of obsidians from archaeological sites in Samoa and Tonga and the Tongan source on Tafahi Island. a. Zirconium-Rubidium-Strontium; b. Zirconium-Manganese-Rubidium.

The results of the present analysis are presented in table 20. It should be noted that, whereas the data from the *source* material is given in summarised form in the table, it is represented in figure 70 according to the nine individual results. The data for each of the *site* specimens are represented individually in the table (each datum being subject to statistical error of approximately $\pm 15\%$) as well as in the figure. Since very few groups are involved, it is convenient to represent the relationships of the site specimens to the Tongan source material in the form of ternary plots (fig. 70a, b). In both the plots the Tongan site material falls within the range of the Tongan source, and the Samoan site material is clustered some distance away, the difference being particularly noticeable in the plot of elements Zr-Rb-Sr (fig. 70a).

The conclusions drawn from this investigation are summarised briefly as follows. It is highly probable that the glass in the Lapita sites of Niuatoputapu was derived from the Tongan source, but much more unlikely that the Samoan sites glass is related to that from the Tongan source. Location of the probable source of the material from the two Samoan sites must await further geological investigation in the area; in particular the possibility of deposits in the Fagaloa Volcanics of Western Samoa should not be overlooked.

ACKNOWLEDGEMENTS

The volcanic glass specimens included in this analysis were supplied by R. C. Green and Mr Garth Rogers. Acknowledgement is made to Professor D. S. Coombs, Dr R. W. Henley and Mr E. A. McKenzie, of the Department of Geology, University of Otago, where the analyses were carried out.

POTTERY FROM THE LAGOON AT MULIFANUA, UPOLU

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The pottery found by Peters (Report 31, p. 166) on Apolima, and the indications that early sites with pottery were associated with the most fertile soil zones in the inner Falefa Valley, had suggested to Davidson (Report 30, p. 161) that similar sites might exist in the Mulifanua part of Upolu, in conformity with the expectation that early sites with pottery would occur in association with the most favourable localities throughout the island. Her surveys in the area (Report 36) had failed to identify such sites, although in view of our experience elsewhere in Samoa this was not seen as particularly significant.

Additional evidence for the occurrence of such sites in the Mulifanua area is now furnished by the recent recovery of potsherds from the lagoon at that end of the island, next to one of the principal passes in the barrier reef. This pass, used today by the ferry service between Upolu and Savai'i, lies some 800 m off the coast between Paepaealā and Sanafili, directly northeast of the large coastal village of Fuailolo'o (fig. 81). Here a wooden wharf jutting out some 200 m into the shallow lagoon has long served as a terminal for ferry boats, although the depth of water, especially at low tide, makes it a marginal mooring for boats of any size. With the impending purchase of new and larger ferries, the Government of Western Samoa decided to improve the wharf facilities and dredge a more adequate boat channel to it. Tailings recovered from the dredging were deposited behind a stone retaining wall which is part of the new wharf facilities.

During these operations, an engineer with Polynesian Airlines, L. Cowles, was attracted to the tailings as a possible source of marine shells to add to his collection, and in the process of searching the surface debris picked up a piece of pottery with distinctive decorative markings. Subsequent searching yielded additional pieces, and his discovery soon attracted the interest of others. His findings were initially brought to our attention, along with a sample of the sherds, by Trevor Hansen, who was in Western Samoa at the time on business. As an archaeologist who had worked with us there, he immediately

TABLE 21

A CLASSIFICATION OF THE MULIFANUA LAPITA POTTERY COLLECTIONS

Category	Hassall	Hansen & Cowles	Subtotal	Total
Unclassified plain sherds	292	167		459
Classified plain sherds				40
Everted jar rims with round lips	5	1	6	
Everted jar rims with flat lips	1	0	1	
Collar jar rims	2	4	6	
Angular jar wall profiles	14	7	21	
Jar wall with exterior flange	0	1	1	
Angular dish wall profile	1	0	1	
Plain bowl rims	1	2	3	
Slab construction of wall	1	0	1	
Modified sherds				20
Plain pottery discs	2	1 + 1 (?)	4	
Red slip ware body sherds	6	4	10	
Striated surface rim and body sherds	4	2	6	
Decorated sherds				44
Appliqué treatment	0	1	1	
Dentate and appliqué treatment	1	2	3	
Dentate stamp treatment	18	11	29	
Incised line treatment	10	1	11	
TOTALS:	358	205		563

recognised their significance. Through the efforts of Cowles and others and the resident engineer on the ferry terminal project, a fairly large collection of potsherds has now been assembled (table 21) and deposited in the Auckland Institute and Museum, to be held in safe keeping for the Government of Western Samoa.

The Collections

The sherds initially gathered by the resident engineer in charge of the dredging, T. T. Hassall, were picked out of the dredge tailings at Mulifanua between noon and 2.00 p.m. on February 28, 1973. This collection consists of 358 sherds, 19 pieces of turtle bone, 2 pieces of coral and a possible stone flake. It appeared the items were dredged from dark grey silty sand below 0.9 m of hard cemented coral crust which required explosives to break it up before dredging. The collections made by Cowles and Hansen consist of 205 pieces gathered before mid-February 1973. Together, all collections provide a total of 563 sherds for analysis (table 21).

The 459 plain body sherds derive from vessels whose walls varied in thickness from 4 to 18 mm. Many of the sherds are quite large, measuring between 5.0 and 9.5 cm in the longest dimension. Most are virtually indistinguishable from the thin fine ware sherds of site SU-Sa-3 (Report 29, pp. 121 ff.), except that some definitely imply the use of the jar in addition to bowl forms. This is particularly true of sherds which derive from the necks of jars which in some cases had a fairly constricted mouth.

An additional 40 plain sherds may be classified under more useful comparative categories. Six are thickened and rounded rims of everted form from fairly open-mouthed jars (fig. 71c, f), while 6 others are collar rims identical with forms from Tonga described by Poulsen (1972: 20, 46, 71). The largest of these sherds is illustrated here (fig. 71a). There is also one slightly everted jar rim with a flat lip. A body sherd with a massive flange added to the exterior surface (fig. 71n) is similar to those encountered in Tonga by Poulsen (1972: 20, 47, 71). In addition, there are 21 body sherds with the type of angular wall profiles found at either the shoulders or bases of jars of shapes usually encountered in collections of Lapita pottery (Birks 1973). One of these sherds has an old hole on one edge which may be purposeful but is more probably the result of some natural agency. A flat base-angled sherd (fig. 71i) matches those of the typical Lapita dish form; another of the same type appears in the decorated category (see below).

Plain bowls are represented by rims of one probable, and two certain bowl-shaped vessels with fairly open mouths. Two rims have rounded lips, one with a marked thickening on the interior (fig. 71c) and the other with only a slight thickening. The third is more incurved and has a flat lip and red slip on its interior (fig. 71d).

Construction details evident on the plain sherds are few, but at least one sherd provides definite evidence of slab-building. Other thick plain sherds also suggest this technique. Sherd surfaces are in general quite similar to those described for the thin fine variety of plain ware from Samoa (Report 29, pp. 121-126).

A number of sherds have been modified but do not carry deliberate designs on their surface. These include four plain sherds which have eroded or worked edges and a roughly circular form. One is probably, and two (3.5 cm in diameter) are certainly deliberately rounded pottery· disks similar to those described from other Lapita sites (Poulsen 1967: 271; Birks 1973; Rogers, pers. comm.). The other may simply be a sherd eroded to this shape. Ten sherds, which lack decorative patterns, carry the remains of what is almost certainly red slip on their surface, a feature which is also in evidence on the one plain bowl rim (above) and on some of the decorated sherds (below). There are six sherds with irregularly striated surfaces. Some of them exhibit impressions not unlike those found on the surface of the only certain jar form present in the previous collections of pottery from Samoa, pieces of which were found in the lowest deposit at SU-Va-4 at Vailele (I, Report 10, p. 174 and plate 17). Comparably marked pieces have been found in Tonga and New Caledonia (Golson 1971: 71). Other striations may be simply marks resulting from the fabrication process. Included in this group are a collar rim sherd, a neck sherd and one with wall profile angle.

The 44 pieces with surface decoration consist of one with appliqué, 11 with incised, and 32 with dentate-stamped designs. The last are typical of the decorative technique considered to be the hallmark of the Lapita style of pottery. This is the first time that sherds with such decoration have been found in Samoa, although some 8500 sherds had been examined previously. Incised decoration had been encountered before, but it had been restricted to a single pattern of incision or impressing confined to the lips of bowls (Report 29, p. 128). Many of the decorated sherds are worth describing in detail, using the method of analysis evolved by Mead (1973) for the Lapita pottery of Fiji. Reference will also be made to similar motifs coded by Poulsen (1972) for Tongan pottery.

The one sherd on which only an appliqué decoration occurs is a large piece with a vertical bar, VB2.1, added to the surface. Other sherds with three-dimensional elements in combination with dentate-stamped designs are as follows: a neck sherd with N1.1 nubbins set in a Type A

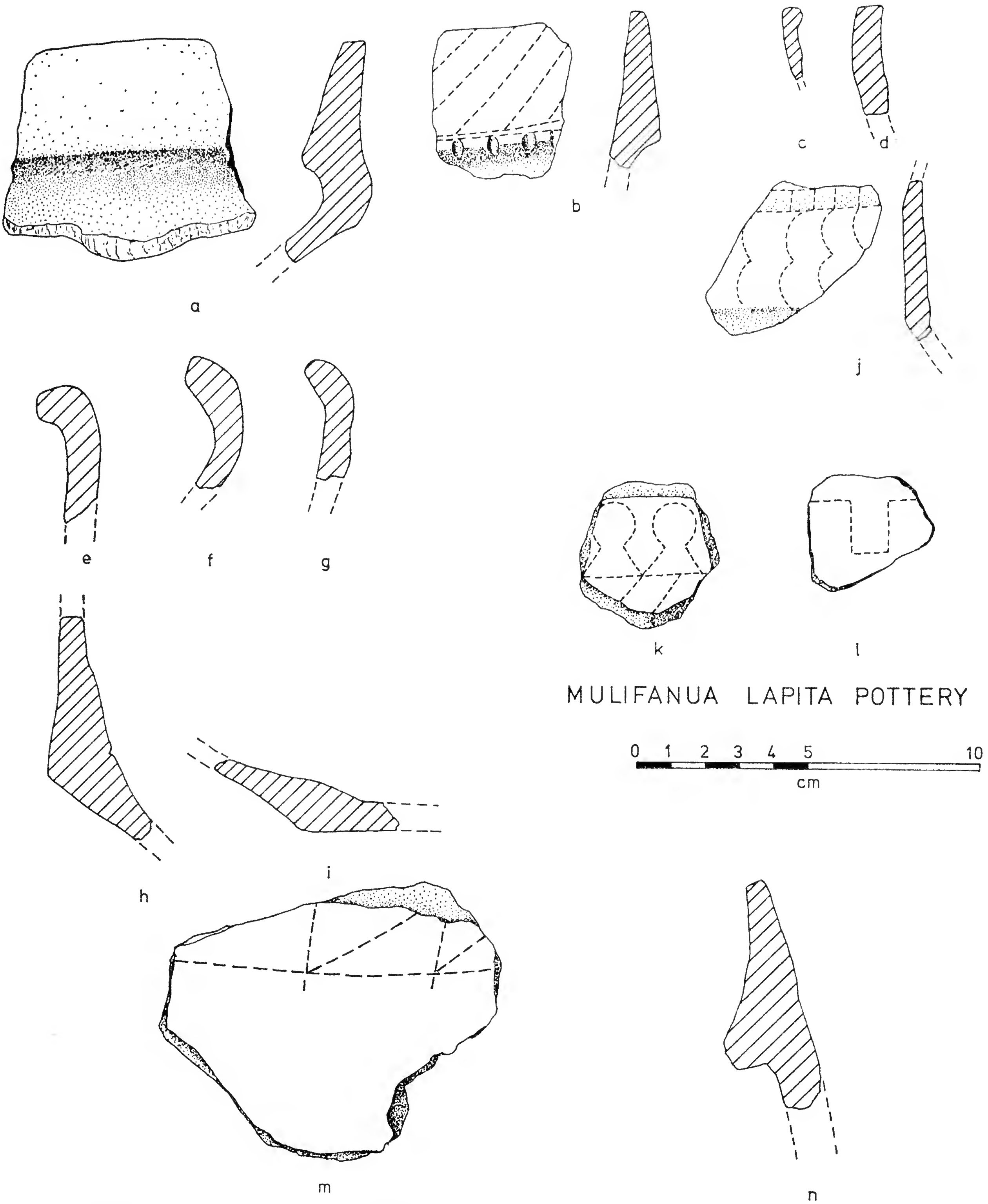

Fig. 71. Potsherds from the lagoon at Mulifanua, Upolu.

zone formed by a dentate-stamped GZ1 zone marker; another neck sherd decorated with the same pattern except that the nubbins are of type N1.2; and a body sherd with a transverse bar, TB3.1, the raised surface of which is stamped with well-spaced lines of design element DE5. The last sherd also carries traces of red slip in the angle between the body of the sherd and the bar. Above (or below?) the bar are remnants of a dentate-stamped design using element DE1. These four sherds and the "plain" sherd with a flange, although of limited number, encompass most of the three-dimensional design elements found on the pottery of Fiji and Tonga.

Twenty-nine other pieces carry two-dimensional decoration in the form of dentate stamping, sometimes with incised notches along the line of a wall angle on the exterior of the vessel. The only noteworthy feature of the dentate stamps used is the length of some of the individual indentations, which appear to be slightly longer than those usually encountered. Many of the decorated sherds are small or badly eroded and the pattern is uncertain, but 13 are worth describing in some detail. Among the sherds with indistinct designs there is one with a flat base profile angle from a dish, several other sherds with wall angle profiles from jars, and seven neck sherds with traces of design elements DE1, DE5 or DE6.

More clearly marked pieces include a sherd with collar rim and neck (fig. 71b) on which GZ1 appears at the base of the rim and repeated vertical notches directly below it on the angle formed by the rim with the neck. Above GZ1, DE6 appears as a continuous series. An everted rim has the design on the interior surface in the form of a Type F zone in which the lip is one boundary marker and GZ2 at the rim base the other, the division of the zone being made by pairs of DE5 lines. The straight rim of another jar has GZ1 at the base of the rim on the exterior surface and notches across the lip. Two rims from open bowls carry designs on the exterior surface. One uses the rounded lip and a line of GZ2 below to form a Type H zone in which DE1 is repeated around the pot. The other has a flat lip across which lines of DE5 are repeated, while just below the lip there is a hole through the rim. On the exterior, below a line of GZ1, traces of DE1.2 (?) form an undefined pattern. A sherd from the neck of a jar has repeated vertical notches on the angle formed by the juncture of the neck and the body of the vessel. The neck is also set off from the body by a line of GZ2, below which are traces of a pattern using DE1. It most closely approximates to Poulsen's (1972: 80) number 12 under the B set of motifs. Another neck sherd without the notches, but with the same dentate-stamped pattern, is also present. A third neck sherd has a Type A1 zone defined by GZ1, in which DE1 is continuously repeated around the vessel, yielding a motif closely approximating to Mead's (1973: Fig. 2.25) M1. It also qualifies as one of Poulsen's (1972: 80) B motifs.

Besides these rim and neck sherds, there are five body sherds with distinctive designs. The smallest carries a remnant of Mead's (1973: Fig. 2.54) M27 (fig. 71.1), while the largest has a Type B zone in which DE6 has been placed, the whole executed in single lines (fig. 71m). The resulting pattern is the same as Poulsen's (1972: 85) P1 motif. A sherd with a trace of red slip has Poulsen's (1972: 83) K4 motif, which is Mead's (1973: Fig. 2.39) M12.2 (fig. 71k). On another body sherd there is a series of short lines of DE5 at the juncture of the neck and body above a line of GZ1. Below GZ1, DE1 and DE6 appear to form a complex pattern, but the sherd is too small for the motif and pattern to be identified with certainty. Finally, there is a nicely decorated sherd from the side wall of a vessel on which the angular junctures with the base and shoulder are present. It is divided into a Type B zone using lines of GZ2 below which DE2.1 has been repeated (fig. 71j). In Poulsen's (1972: 79, 81) notation this would be a combination of motifs A3 and F1.

A decorated sherd which we did not receive appears in a photograph of the collection taken in Samoa. It looks like a body sherd beginning at the neck of the vessel. In the centre of the sherd is a Type A zone filled with a series of DE2.1. The upper boundary of the zone is defined by GZ2 above which is an M1 pattern with the points of the crescents touching the zone marker. Below the lower boundary there is another line of GZ2 and below that another M1 chain, again with the points of the crescents touching the zone marker, although here a line of DE5 occurs between each pair of crescents. In Poulsen's (1972: 79, 86) notation this would be a combination of motifs A3 and P28.

The two-dimensional decorations on sherds from Mulifanua in Samoa, therefore, all belong within the range of patterns recognised from Fiji and Tonga, although because of their limited number the full range of decorative motifs in the Fijian and Tongan collections is not in evidence. Still it is worth noting that among the 563 sherds collected to date, at least 44 or about 8% belong to the decorated category. One striking feature is the fairly common occurrence of vertical notches on the profile angles of vessel walls. The restricted range of identifiable motifs also makes unwise any attempt to fit this collection into the decorative chronology of sites for Fiji and Tonga. However, there is sufficient material to state that it is the highly distinctive dentate-stamped Early Eastern Lapita with its complex rim forms to which the Samoan material is related, and not the less often dentate-stamped Late Eastern Lapita assemblages which follow in these areas.

Incised decoration using the same motifs as those executed by the dentate technique is a minor but common component of assemblages of Lapita pottery. In this respect the Samoan material is no exception. The presence of some incised decoration in the collection ties in nicely with its occurrence on some lips of the plain pottery bowls known from later Samoan assemblages. In this collection one collar and one everted jar rim (fig. 71g) have a similar incised pattern on their lips. Another collar rim and an everted jar rim sherd have encircling lines of GZ3 on their exterior surfaces below the lip. A bowl sherd with a rounded lip has a similar line, but on its interior surface. As well, there is a neck sherd with a GZ3 zone marker. Finally, there are five incised body sherds, three with incised designs on the exteriors and two with designs on the interiors. One of the two with interior incising also has red slip on the interior surface. Both probably derive from bowls. The only one of the three exterior designs which can be classified may be assigned to Mead's (1973: Fig. 2.54) M27, a motif which also appears on a dentate-stamped sherd described above. Together these 11 sherds serve to establish the incised technique as part of the decorative system of Lapita pottery in Samoa.

Origin of the Pottery

Because of the contrast in form and decoration to all pottery previously examined from Samoa, the possibility that some of the sherds, especially those with Lapita decoration, were imported and not of Samoan origin needed to be examined closely. For this reason, a selection of nine sherds, representing the range of hand-specimen variation present in the Hansen collection, was sent for analysis. Two of these were fragments broken from sherds with dentate-stamped decoration; the rest represented hand-specimen determined variations in pieces of plain pottery.

As is discussed in detail by Dickinson (Report 35, p. 179), all have proved to have a type of temper previously established for Samoa. This is a ferromagnesian basaltic temper derived from coastal sands whose composition is not only of the type expected from Samoa, but whose composition varies according to the locality from which the sherds come in a way which is predictable from the local geology. The conclusion is not just that the pottery was made in Samoa, but that it was locally made somewhere within the geological province in which it was found. This and the fact that the temper is virtually indistinguishable from the temper associated with the thin fine ware variety of pottery at Vailele and Sasoa'a indicate that Lapita pottery is part of the Samoan ceramic tradition. In this context it is significant that none of the sherds belongs to the distinctive Lapita temper types from Tonga which Dickinson has examined.

Age of the Collections

The deduction that these collections should be placed before rather than after the already-dated Plain Ware pottery horizon in Samoa is based on a number of lines of argument. One is that the archaeological evidence indicates that after the third to fourth century A.D. pottery was no longer being made in Samoa. Another is that the later coarse ware variety of pottery has a type of temper different from either the Lapita material or the earlier variety of plain, fine ware whose temper is the same. Moreover, the decline through time of the limited decoration in the Plain Ware period and the restriction of the varieties of vessel forms being produced, suggest that this collection with its wide range of decoration and vessel forms preceded the Plain Ware pottery horizon by several hundred years. As this horizon at several sites is fairly firmly dated from just before the first century B.C. to the third century A.D., a date before 300 to 400 B.C. is implied for the Lapita collection. Still other lines of argument for its early age are its geological position and our failure to find any sherds of this period in our excavation of sites with pottery. Such a placement, of course, is consistent with its position in the Tongan sequence, which follows a trend similar to that outlined here for Samoa (Groube 1971: 305). There, a date before 400 B.C. would certainly apply to comparable materials, with an age of 600 B.C. or more providing a more reasonable estimate.

Implications of the Collections

Early in the Samoan programme, I argued that it seemed unlikely that we had as yet recovered any material from the first third of Samoan prehistory, if the estimates of antiquity of settlement in East Polynesia were correct, and the hypothesis that Eastern Polynesians came from West Polynesia continued to be supported (Green and Davidson 1964: 47). This view was reinforced by our discovery of sites of comparable age to those at Vailele well inland in the Falefa Valley and the Luatuanu'u area. This and the evidence of pottery from Apolima suggested to us that by the first century A.D. population in Samoa was sufficiently great for occupation to be widely spread, especially as the evidence indicated that settlements had by then been established inland as well as on the coast. To us, this implied the occupation of Samoa for sufficient time for the best locations on the coast to be taken and for the population to grow to a point where it was desirable to occupy similar situations inland.

In contrast, Groube (1971: 279) expressed the opinion that our archaeological examination of Samoa had made unlikely my earlier statement that the first third of Samoan prehistory was as yet unexplored. In his view there seemed no reason, linguistic or archaeological, to conclude that Samoan settlement was earlier than 300-200 B.C. unless the dates for East Polynesian settlement were pushed back before A.D. 400 (Groube 1971: 279).

In a comment on his article (Green 1972b: 84-85), I agreed that the process of becoming Polynesian began in Tonga, but suggested that the arrival at a truly Polynesian cultural complex was not achieved until after the settlement of Samoa and others of the truly Oceanic islands of West Polynesia located to the east of the andesite line. I attempted to demonstrate this for the adzes and shell ornaments, but had to accept that the main changes in the pottery took place in Tonga, the transfer to Samoa marking a further and final stage in the ceramic tradition.

Two lines of argument reopen the conclusion drawn by Groube. One, set out in Report 40 (p. 247), concludes it is probable that the earliest sites in the Marquesas associated with evidence of pottery manufacture have not in fact been found, and the settlement of that island group dates back to the first century A.D. or before. The second recognises that as long as claims for settlement of Samoa earlier than the third century B.C. rested solely on indirect evidence, they could be rejected and correlated with our failure to find sites with pottery decorated in the distinctive Lapita style. Thus the presence of sites with a related type of Plain Ware pottery dating from the first century B.C. to the second century A.D. appeared consistent with the hypothesis that the initial change from the earlier decorated Lapita style to the plainer pottery assemblages had taken place in Tonga, and only after this was the latter part of the tradition transferred and established in Samoa. If this were the case, it was legitimate to conclude that the Polynesian homeland was in Tonga, the one location exhibiting those changes by which people with Lapita pottery slowly developed into Polynesians. With the discovery of Samoan pottery in the Lapita style, it would now be reasonable to argue that, in fact, changes in the Polynesian direction took place in the pottery, adzes and shell ornaments of Samoa as early as, or earlier than, those of Tonga. In short, it appears Samoa has an equal claim to be regarded as a homeland in which Polynesian culture, though not necessarily the language, initially evolved by differentiation out of an ancestral Lapita cultural complex.

There are two lines of evidence supporting the view that people with Lapita pottery had crossed the andesite line and explored and settled some of the nearer volcanic high islands, including Samoa. One is the Lapita pottery from Samoa, the other is the use of hawaiite in adzes from the Lapita levels of sites in Tonga (see Report 29, p. 143, for a discussion of their implications). Both lines of evidence, along with the probable date for the earliest settlements in East Polynesia, support the interpretation that the known 2000 year part of the Samoan sequence documented from archaeological excavations fails by as much as a third, and certainly by 500 or 600 years, to reflect the length of time that the Samoa group has in fact been settled.

THE FERRY BERTH SITE, MULIFANUA DISTRICT, UPOLU

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During August 1973 I had opportunity to spend a few days in Western Samoa. There I followed up the unexpected discovery of an extensive submerged off-shore deposit of Lapita pottery revealed during the deepening of the Upolu-Savai'i inter-island ferry channel and turning basin. Green (Report 33) has adequately reported the circumstances of the initial discovery, the principals involved and the significance of the find. The purpose of this note is to amplify his report from additional data not available when he wrote.

Evidently, the interest of the men who first noted the pottery waned somewhat after they had collected and sent some 500 sherds to Green. However, the project engineer, Mr T. T. Hassall, continued to keep close watch on the fill being dredged from the turning basin to enlarge the land area adjacent to the new ferry berth. He took daily fixes on the location of the barge pump intake as the basin, west of the new berth, was shaped and deepened. It soon became evident that the sherds were heavily concentrated in a narrow band that paralleled the beach about 125 yards (114.3 m) off-shore. No sherds occurred further out on the reef, and few were closer in; the major deposit was as shown in figure 72, which records the original distribution plotted by Hassall during the dredging of the basin.

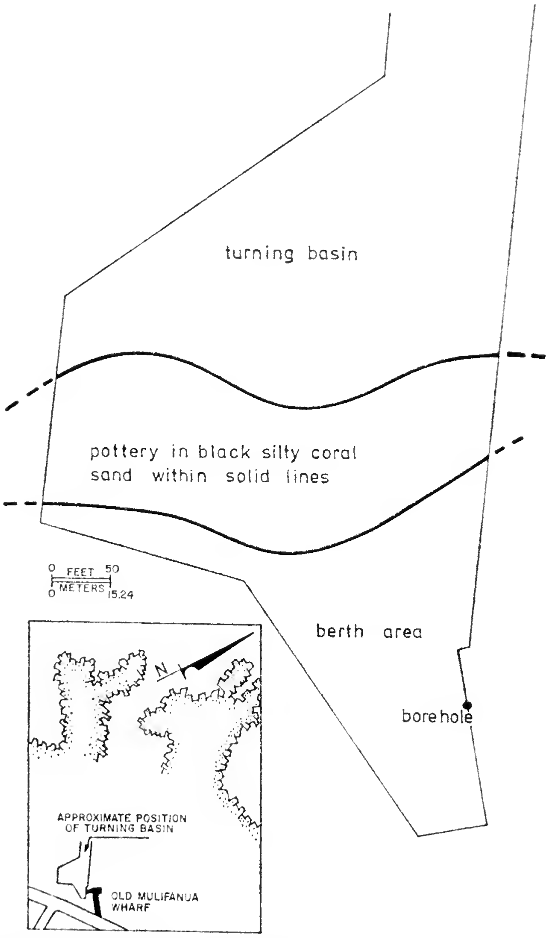

Fig. 72. Location of Lapita deposit in turning basin. Can be correlated with figure 73.

Hassall not only kept the record of horizontal provenance but took time to collect some 2000 additional sherds, which have now been deposited with the Auckland Institute and Museum. Some 5% of these are decorated, a few are red slipped, and one has arch-like fillets apparently along the rim. Inside the arch are geometric designs done in dentate stamping (plates 16 and 17). In other attributes, such as decorations "inlaid" with white pigment, incised lines across the lip, the several rim shapes, the cazuela bowl form with sharply angled shoulder, and the friable paste, the second and larger Hassall collection supports Green's conclusion that the Ferry site is pure, evidently early, Lapita. Ascribing an age of 2800 to 3000 B.P. is entirely reasonable.

Broken human bones, including skull fragments, were also recovered but were not saved. The only other artifact recovered is a grooved abrading stone of fine-grained basalt.

From Hassall's records it was also possible to construct a schematic cross-section of the reef sediments and the condition of "storage" of the sherds. Briefly, there were a few sherds included in the basal portion of the 3-ft-thick (0.9 m) layer of cemented coral and shell. Hundreds of tons of explosives were required to shatter this cap, which extended over the entire turning basin. The major sherd deposit, however, was in the coral sand sealed *beneath* the cemented capping layer. Water was here about 6 feet (1.8 m) deep. The sand (actually a mixture of coral sand and stag-horn coral fragments) was 10 feet to 12 feet (3 m to 3.7 m) thick, unconsolidated and permeable. The sand-coral layer lay upon shattered basalt under which was solid basalt bedrock. This sequence was revealed in a single core, taken where the sheet piling for the ferry berth was to be driven, but seemed to characterise the entire basin area. Figure 73 shows average thicknesses and depths for the basin.

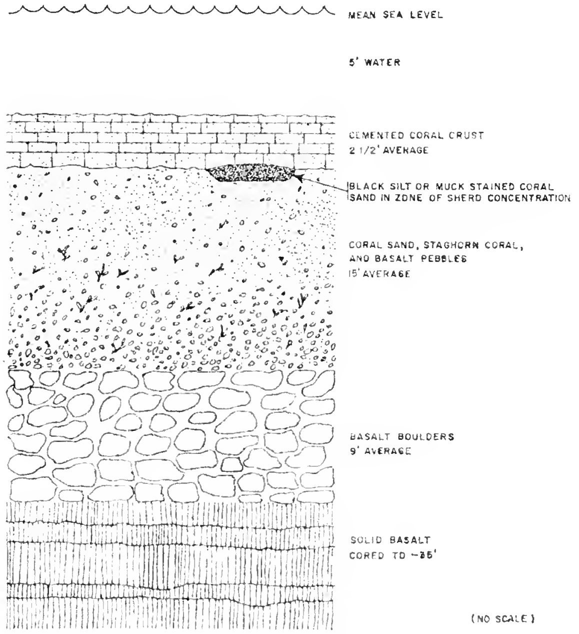

Fig. 73. Cross-section of Mulifanua Ferry Berth Site; "average" measurements are based on core log, and daily measurements recorded during dredging operations.

Figure 73 also shows a zone of dark, high-humus content sand where the sherds were most abundant. The black soil was interpreted by Hassall as "muck" or bog soil; I interpret it as the dark organic stain that normally develops in archaeological sites where occupancy is long or intensive. The heavy organic content and stain are merely resultant from the chemical and biochemical reduction of the midden and trash that accumulated over the area during the period of occupation.

Although it is reasonably clear from figure 72 that portions of the site lie undisturbed under the cemented cap, it is equally clear that these portions cannot be investigated by normal underwater techniques such as free diving, snorkelling, or scuba-diving, because of the sealing cemented stratum. That is not an important point. The present need is *not* to establish the existence of a pure Lapita village; with present data that seems to be already accomplished. The present need is to recover material from a comparable site on land, with the possibility of learning provenances and stratigraphy under full control, hopefully in association with structural features and radiocarbon-datable organic material. Limited search in the Mulifanua area failed to turn up any kind of site, let alone a Lapita one, along the existing shore, although there are sites inland (Report 36).

Out of the search, however, two or three major questions arise. Are all the 3000-year-old beaches of Northwest Upolu now submerged because of subsidence brought about by some sudden local tectonic action? It seems necessary to assume a rapid sinking of the village, because a gradual subsidence would have subjected the sherds to wave action with subsequent scattering of the debris; the sherds show no such wave battering. Wave action would also have spread, or entirely dissipated, the thick layer of organic-stained midden that marked the old village at the time of dredging. Hence, I argue sudden local subsidence. (It may be that a concentration of debris on a beach behind a shallow lagoon 800 m wide would not get the wave battering I envision. The force of the waves would undoubtedly be diminished by the reef. The point of rapid local subsidence is therefore open to question.) The next question, if the inferences above are sound, becomes: how extensive was the sinking of the ocean floor and where should beach villages of Lapita age be sought today? I see no present solution, lacking detailed study of coastal and reef geology (see next to last paragraph and figure 74), except to search the beaches both east and west from the ferry berth. On purely practical grounds, working westward makes more sense because to the east the coastline has been much altered in recent years by the construction of sea walls, revetments, and the reclamation (land-filling) of small areas from Mulifanua to Apia, where the villages are so numerous as to constitute an almost continuous single settlement along the coast, with the family plantations inland as much as 4 miles (6.4 km). Test pits in the villages would be the only answer, difficult as they might be to negotiate. This should be done, but villages are smaller and less numerous to the west, so search might be easier to pursue there. In any case, the Mulifanua area, one of the most fertile in Upolu, would have beckoned the Lapita potters, who would have been the first human inhabitants; the assumption is being made, of course, that they established plantations wherever villages of the size of the Ferry site were developed.

It is obvious that *no* easy answer to the question of the whereabouts of other Lapita villages occurs to me. My best answer at the moment is to presume them to be buried and to look in road cuts, open utility ditches, to walk the scattered sand beaches, to make test cuts, and to have, above all, faith and patience. The importance of a land site where a sequence can be developed from Lapita upward in time warrants the tedious programme of search proposed above.

The above is based on the premise that Lapita sites are likely to occur only on Upolu, an invalid premise. Equally likely and logical is that they occur on Savai'i and should be sought there as well.

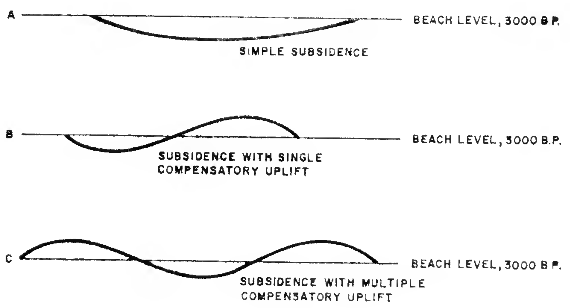

Fig. 74. Possible submergence-uplift phenomena.

But it would be helpful if still another question were answered before the steps outlined in the paragraph above were implemented. This concerns the nature of the subsidence and any correlated adjoining land movements. Was the subsidence a simple event as diagrammed in figure 74a, or was it more complex, as in figure 74b or c?

In sum, the Ferry site can be accepted as a Lapita village. It adequately documents and supports the extending of the time span of Samoan prehistory back to perhaps 3000 B.P. Further search for one or more other Lapita sites in Samoa is urgently justifiable.

ACKNOWLEDGEMENTS

The assistance of Tuala K. L. Enari, Secretary to Government, Mr T. T. Hassall, Project Engineer for Wilkins-Davies on the Mulifanua ferry channel and berth enlargement project, and many other residents of Western Samoa is appreciatively acknowledged. Partial subvention of the costs of my reconnaissance in Western Samoa, authorised by the Directors of the Associates of the Utah Museum of Natural History, is equally appreciated.

TEMPER SANDS IN SHERDS FROM MULIFANUA AND COMPARISON WITH SIMILAR TEMPERS AT VAILELE AND SASOA'A (FALEFA)

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Nine sherds from the Hansen collection recovered during dredging at Mulifanua, Upolu, Western Samoa (Report 33) were examined petrographically at Stanford University in thin sections prepared by R. Laniz. In all the sherds examined, the dominant grain types in the temper sands are olivine crystals and fine-grained polycrystalline fragments of basalt. These are the main grain types to be expected in sedimentary detritus derived from the bedrock of northwest Upolu. Temper sands in the nine sherds are representative of the ferromagnesian basaltic temper type recognised previously in sherds from Vailele (Va-1, Va-4) and Sasoa'a (Sa-3) on Upolu (I, Report 19, pp. 271-272). Some of the Mulifanua sherds, however, contain mixtures of this characteristic volcanic sand with calcareous sand from reef detritus. Neither of the feldspathic temper types found in some sherds from Vailele and Sasoa'a (I, Report 19, pp. 272-273) is represented in the Mulifanua materials. The ferromagnesian basaltic tempers in Mulifanua sherds are essentially indistinguishable from similar tempers in Vailele sherds, but both these sets of tempers can be distinguished from ferromagnesian basaltic tempers in Sasoa'a sherds on the basis of the ratio of olivine grains to pyroxene grains. This means of distinction can be justified geologically on the basis of the distribution of outcrops of potential source rocks on Upolu.

SAND GRAIN TYPES

The dominant sand grains in the ferromagnesian basaltic tempers are (1) basaltic rock fragments representing pieces of the finely crystalline, even partly glassy, groundmass of basalts, and (2) ferromagnesian silicate mineral grains representing phenocrysts of sand size embedded in the groundmass. Small amounts of opaque iron oxide grains ($\sim$1%) and plagioclase feldspar grains (trace) derived also from basalt are present as well. In four of the Mulifanua sherds (SU/P 19/54, 56, 69, 79), subordinate amounts (1%, 25%, 1%, 10%, respectively) of calcareous grains also occur. Such grains are not present in any thin sections of sherds from either Vailele or Sasoa'a.

SAND GRAIN PROPORTIONS

The ferromagnesian basaltic tempers include two compositional subtypes, termed lithic and crystal-rich here. In the lithic type, 55-65% of the grains are basaltic rock fragments, with only 35-45% being ferromagnesian silicate mineral grains. In the crystal-rich type, only 35-45% are basaltic rock fragments, with 55-65% being ferromagnesian mineral grains. The percentages quoted are frequency percentages of numbers of grain types. As the basaltic rock fragments commonly have, on the average, roughly twice the diameters of the mineral grains, the volumetric proportion of mineral grains in both temper subtypes is less than the grain frequency percentage.

The textures of both subtypes vary considerably, but the crystal-rich sands tend to be better sorted or better rounded, or both. Both subtypes probably tend to represent coastal beach sands, but sands of the crystal-rich subtype apparently represent placer concentrations of relatively dense grains from the hydraulic winnowing of sands of the lithic subtype. Proportions of crystals and rock fragments in the lithic subtype are much closer to the proportions of phenocrysts and groundmass in the lavas of the bedrock.

Ignoring admixtures of calcareous grains, three sherds (SU/P 19/3, 54, 69) from Mulifanua contain examples of the lithic subtype, and the other six sherds (SU/P 19/2, 19, 44, 56, 77, 79), examples of the crystal-rich subtype. Although the two subtypes were not recognised previously (I, Report 19, pp. 271-273), each of the subtypes is represented in half of the six Vailele sherds and half of the four Sasoa'a sherds containing a ferromagnesian basaltic temper examined in thin section.

VOLCANIC ROCK FRAGMENTS

The most common basaltic rock fragments in the ferromagnesian basaltic tempers have intergranular textures, and commonly contain microphenocrysts of olivine that typically is altered to complete or partial rims of iddingsite along the crystal margins. The abundance of grains of this type is in accord with petrographic descriptions of the dominant rocks in the main volcanic units on Upolu as reported by R. N. Brothers (Kear and Wood 1959: 38-40, 42-44). Basaltic rock fragments with intersertal textures are subordinate, and those with subophitic textures are minor. Rare grains of brown basaltic glass representing tephra from ash showers, probably associated with lava fountaining or the construction of cinder cones, also occur. In one Mulifanua sherd (SU/P 19/79) these glass fragments are about equal in abundance to the other basaltic rock fragments.

Ferromagnesian Silicate Grains

The only ferromagnesian silicates in the ferromagnesian basaltic tempers are olivine and clinopyroxene. The olivine is commonly, but not ubiquitously, altered in part to bright red iddingsite, which occurs as fringes at the grain margins and in diffuse bands along the fractures within the grains. The abundance of bright red iddingsite in the Mulifanua sherds gives some of them a different megascopic appearance from most Vailele and Sasoa'a sherds. The clinopyroxene ranges from colourless augite to pale green diopsidic augite to pink or lavender titanaugite.

Although not noted previously (I, Report 19, p. 272), the ratio of olivine to pyroxene is distinctly different in sherds from Vailele and Sasoa'a, and the ratio in the Mulifanua sherds is similar to that at Vailele, as table 22 indicates. The table expresses the mean and the range in the frequency ratio of numbers of olivine grains to numbers of pyroxene grains in ferromagnesian basaltic tempers in sherds from the three sites.

Table 22

Ratio of Olivine to Pyroxene Grains in Ferromagnesian Basaltic Temper

Site	Sherds (N)	Mean Ratio	Ratio Range
Mulifanua	9	4.3	2.6 - 5.2
Vailele	6	3.6	2.6 - 4.5
Sasoa'a, Falefa	4	0.7	0.4 - 0.9

My previous statement (I, Report 19, p.271) that pyroxene is commonly more abundant than olivine was evidently in error, except as applied to Sasoa'a sherds from Falefa. In Mulifanua and Vailele sherds, olivine is dominant, with a frequency of 25-50%, whereas pyroxene has a frequency of roughly 10% only.

The predominance of olivine at Mulifanua and Vailele is explicable by its abundance as a phenocrystic mineral, to the virtual exclusion of pyroxene in that role, in both the Mulifanua Volcanics, which underlie most of northwest Upolu, and the Salani Volcanics, which underlie the slopes directly south of Apia, as is discussed by Brothers (Kear and Wood 1959: 39-40, 42). On the other hand, the older Fagaloa Volcanics which underlie the slopes around the Falefa Valley and northeast Upolu are virtually unique on the island in containing phenocrysts of clinopyroxene in some lavas (Kear and Wood 1959: 38). It is notable also that microphenocrysts of pyroxene within basaltic rock fragments apparently occur only in Falefa sherds, and are absent in sherds from the other two sites.

Implications of the Data

1. Tempers in sherds collected from Mulifanua are ferromagnesian basaltic coastal sands, of lithic and crystal-rich subtypes, containing sorted and rounded detritus with compositions and textures to be expected from the erosion of the lavas in the Mulifanua Volcanics, the bedrock unit exposed most extensively in northwest Upolu.

2. The tempers are essentially indistinguishable, both compositionally and texturally, from ferromagnesian basaltic tempers in sherds from Vailele, and tempers which might be found along the whole intervening coastline would probably be similar as well.

3. Ferromagnesian basaltic tempers from Mulifanua and Vailele have a distinctly higher olivine/pyroxene ratio (~ 2.5-5.0 *versus* ~ 0.5-1.0) than ferromagnesian basaltic tempers from Sasoa'a in northeast Upolu, where the influence of exposures of the old Fagaloa Volcanics, which are restricted to northeast Upolu, is probably responsible for the marked change in the composition of detritus derived from local bedrock.

4. These sherds are distinguishable, on the basis of their temper, from other Lapita sherds I have examined from Tonga, Fiji, the New Hebrides and the Southeast Solomon Islands (Dickinson and Shutler 1971; Dickinson 1971, and unpublished petrographic reports).

SITE SURVEYS ON UPOLU

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Site surveys were carried out in a number of areas of Upolu during the Western Samoan archaeological programme. They varied from single visits to specific sites, through general reconnaissance surveys, to more intensive surveys of selected regions. The most detailed was the survey of the inner Falefa Valley described above (Report 20). Two earlier surveys of similar intensity at Vailele and Luatuanu'u have already been published (I, Reports 6, 12). Records of other surveys provide valuable additional data on the nature and distribution of archaeological sites on Upolu, and the results are described here, as part of the basis for the discussion of the Samoan structural evidence which follows in Report 39.

1964 SITE SURVEYS

Brief reconnaissance surveys were carried out in several parts of eastern Upolu in 1964. No detailed mapping was done and little clearance of vegetation was attempted. Tape measures were used, however, and reliable measurements of some individual sites obtained. At the time of the survey, topographical maps of Upolu were not available, although in some cases preprints of contour strips forming the basis of the future map series, and aerial photographs, were used. Descriptions of all sites recorded, together with relevant maps and aerial photographs, are filed at the Auckland Institute and Museum.

SOLOSOLO

As a continuation of the Luatuanu'u site survey, brief exploratory visits were made to sites inland of the modern coastal village of Solosolo. The sites are clustered in two named areas, Malae and Utuave, which were approached from Luatuanu'u. The land between Malae and Solosolo was not explored.

Solosolo is situated at the eastern end of Vainamo Bay on the north coast of Upolu. Two substantial streams enter the coast at either end of this bay. The mouth of the Tuafalelo stream is at Solosolo Village itself, while the Namo River, the boundary between Solosolo and Luatuanu'u, reaches the coast at the western end of the bay. Between the two streams is a broad, gently sloping flow of Salani Volcanic rock[1] which provides a contrast with the steep rugged hills of Fagaloa Volcanics on either side. On this gently sloping plateau the majority of the present gardens of Solosolo people are located. About 3 km inland, southwest of Solosolo, the western arm of the Tuafalelo Stream and the Namo River converge so that the ridge between is only about 150 m wide. The first site recorded in the survey is located at this point (grid reference on topographical Sheet 23, 288652).

Site SU-So-1 is a large defensive ditch and bank across the ridge. Like other defensive earthworks in this part of Upolu, it is constructed to prevent access from the coast, with the bank on the inland side. An unusual feature of this fortification is the apparent incorporation of a star-shaped earthen mound in the bank at the western end. This mound has three "arms" on the side away from the bank and measures 16 x 10 m.

Other sites nearby include a ditch-like feature running up the ridge in approximately the same posititon as the modern track, and an enclosure formed by a free-standing stone wall up to 1 m high. The ditch, SU-So-3, resembles similar features interpreted as sunken paths at Luatuanu'u (I, Report 12, p. 192), and is probably to be so interpreted.

About 500 m above SU-So-1, the ridge reaches its narrowest point. Here are two more defensive ditches about 30 m apart. These mark the beginning of the land known as Malae, an almost flat plateau, bounded by the now diverging rivers on either side, and backed by steeply rising hills. In 1964 this area was extensively planted in taro.

Seven sites were recorded at Malae. Two, near the foot of the hill at the eastern side, are earth terraces without visible signs of stonework, while the others are all low terraces or platforms with some signs of paving, stone facing on the terrace front, or curbstones. Clear house outlines

[1]All references to geological formations in this report are to Kear and Wood 1959: map 2. References to soil classes are to Wright 1963: land classification map of Upolu. Comments about old village sites shown on geological and soil maps also refer to these two maps.

were visible on two. These sites are very similar to those in the Luatuanu'u survey area, particularly those on the gently sloping Tula-i-Pu'e.

Above Malae the Namo River enters a steep gorge, and some distance further inland divides into two major branches. Between these two branches is a fairly gently sloping broad ridge known as Utuave. In 1964, Utuave was largely in bush, with small areas just then being cleared for Solosolo gardens. It is a large and confusing area, and the sites recorded are probably representative but by no means comprehensive. From the lower end of Utuave it would be possible to walk right to the main central ridge of the island, and there could well be other sites, including fortifications, further inland than we went.

Fourteen sites were recorded at Utuave. The present track up from the eastern branch of the river passes through an area of terraces with steep scarps which appear to be defensive, and intended to defend this approach. No ditch and bank fortification was seen. Other sites include a series of small artificial terraces with no stonework; a larger isolated earth terrace with no stonework; several low rectangular stone platforms, only one course high; a large stone platform with vertical retaining wall on at least one side; two large rough stone terraces; a low five-sided structure outlined in stone; and a probable house site with oval surrounding paving.

Low stone walls are common. One free-standing wall forms a circular enclosure about 33 m in diameter, but the remainder of the free-standing walls run right across the ridge, or peter out. Some appeared to be paths rather than walls.

Several large raised rim ovens were seen. One is distinguished by a surrounding ditch, a feature not observed elsewhere. Diameters of this oven are 4.5 m at the top of the rim, 9 m at the base of the rim, and 12.5 m at the outside of the ditch.

A perplexing feature is a number of deep circular pits between 2 and 3 m in diameter. No explanation was obtained for these.

No traditional information was obtained for either Malae or Utuave, although both places are quite well known to Luatuanu'u people, and Malae was also described to Green by an Aleipata man. Their history is probably known in Solosolo.

Both Malae and Utuave could be regarded as fortified refuges. Both, however, contain residential sites of some substance, which may represent peace-time occupation, in addition to the war-time use indicated by the fortifications. Land for cultivation and occupation is restricted behind Solosolo, compared with Falefa and Saluafata, for example. Moreover, Wright has classed the soils of much of the area as of moderate to low fertility (Classes 4a and 10b) with an area of soils of low to very low natural fertility (Class 6a) at Utuave. Solosolo is a large village at present, and was a large village in the early European period. It seems likely, therefore, that its hinterland would have been extensively used and occupied. This is confirmed by the nature of the sites. It is interesting that Utuave was only just being cleared for gardens in 1964. A similar situation was experienced in many other parts of Upolu, where sites, including obviously undefended sites, extend beyond the limits of present cultivations, into the bush.

Sauniatu and Solaua

Brief visits were made to Sauniatu and Solaua inland from Lufilufi and west of Falevao and Lalomauga. Sauniatu is a Mormon village, in which early adherents of the Mormon church in Samoa took refuge when they were persecuted in their own villages. Solaua is an extensive privately owned plantation now managed by the Coxon firm. Both the Solaua plantation and the Sauniatu village plantation present reasonable conditions for locating and recording sites, since both are sporadically grazed by cattle.

In this part of Upolu an extensive flow of Mulifanua Volcanics extends from the centre of the island in a northeasterly direction to Falefa, forming part of the western wall of the Falefa Valley. Both Sauniatu village and most of Solaua plantation are on this area of Mulifanua Volcanics, with soils classed by Wright as of low, and low to very low natural fertility (Classes 5a and 6c). To the south of Sauniatu and the main part of Solaua, however, are small areas of high and moderate natural fertility (Classes 1a and 3a).

Despite the low fertility of the soils in much of the area, archaeological remains are extensive. Four separate complexes of sites were distinguished and numbered SU-Sau-1 to SU-Sau-4. Individual structures in each complex were given a sub-number. Two other sites, isolated from the others, were numbered SU-Sau-5 and SU-Sau-6.

I originally went to Sauniatu in search of a remote inland "village" shown on the geological and soil maps as Solosolo-uta. This village appeared to lie well to the west of Solaua, in the inner recesses of the same valley. The name proved unknown to informants at Sauniatu, who, however, led me to a place in the same general direction known as Fatumanava (SU-Sau-1). Fatumanava lies in the bush to the west of Solaua between two branches of the stream which runs through Solaua to form part of the Falefa River. Only the southern of these two branches is shown on the topographical map (Sheet 23). Fatumanava is only about 5 km directly inland from the nearest point on the coast, at Fusi, but rather more than 8 km walking distance from Lufilufi, the nearest accessible part of the coast.

Principal structures observed at Fatumanava were a star mound, and several square stone platforms. The star mound has seven points, covers an area approximately 13.4 x 15 m and is up to 1.5 m high. The four square platforms vary in width from 9 m to 12 m and in height from 60 cm to 1.8 m. The highest is apparently earth with stone facing, and has an earth floor with some river gravel. The widest, however, which is only 60 cm high, has stones all over its surface.

Other features in the area include a small rectangular pavement 3 m x 4.25 m; an elongated stone heap 2.4 x 1.2 x 1 m; a network of low stone walls forming small square enclosures; and a low irregular earth mound with partial stone facing.

Fatumanava is situated on rising ground, partly in bush and partly in weed-covered clearings. Informants were not certain whether it might have been occupied when the German plantation at Solaua was at its peak. The plantation originally extended much further west, and rubber trees can be seen in the bush quite close to Fatumanava. There was no definite indication, however, that the site is recent.

The other complexes recorded are unnamed. SU-Sau-2 is a discrete complex of remains in a small arm in the southeast part of the valley, towards the southern limit of the Sauniatu plantations. It is on an area of highly fertile soils, in contrast to the much stonier and less fertile soil on which the larger complexes of SU-Sau-3 and 4 are situated. The area is swampy and some sites take advantage of natural eminences, while others are constructed so that their surfaces are a safe distance above the surrounding swampy ground. Among the sites recorded are three isolated earth and stone mounds, up to 1.5 m high, two of which have been robbed of stones for road construction; a group of six low circular stone mounds connected by stone causeways; a low paved platform of trapezoidal shape; an oval to round house about 9 m in diameter with surrounding pavement set about 50 cm above the surrounding ground; and a large raised rim oven. The principal structure, SU-Sau-2/6, is built on a spur above and behind the other sites, deep in the recess of the valley. The site consists of a flattened and partly paved area on the spur with a large oval house, 12 x 6 m, in the centre. An irregular stone wall surrounds the site, and extends behind it to the east to form a swampy enclosure. To its far wall a raised stone platform is attached. On the other side of the platform is another, smaller swampy enclosure, with single walls running from the far corners into the swamp, and to another low stone platform. The position and direction of the walls suggest they may have functioned as paths. The size of the house, the neatness of the walls, and the dominating posititon, set this house aside from the other sites in the complex.

Closer to Sauniatu, in the village coconut plantation, is a large complex, SU-Sau-3. The land here is very rocky, swampy, and uneven. Sites tend to be built on higher ground, and often consist of natural rises, or small promontories in the swamp, which have been partly faced on one or more surfaces. Otherwise they are indistinguishable from natural outcrops. The area is also characterised by stone mounds on the lower ground, linked to each other and to the higher ground by stone walls, which presumably served as paths. There are also swampy enclosures formed by stone walls. Recognition of sites is complicated by recent robbing of stone for coconut guards and road construction. Numbers have been assigned to 12 particularly interesting sites, but these represent only a fraction of the total. Although the sites are in poor condition, both rectangular and round structures are identifiable. Individual house outlines are not visible on them, and no large ovens or star-shaped structures were seen.

The largest of the Sauniatu complexes, SU-Sau-4, is very extensive. Its total area was not determined. It is bounded in the south and east by the river, and in the west by the rising ground at the edge of the valley. Sites are scattered all over the flat and extend for an unknown distance to the north, beyond the boundaries of the Coxon plantation. There may be a continuous scatter of sites all the way to the coast. Outside the Coxon plantation it is not possible to distinguish sites easily from the road, although there are some conspicuous earth mounds further north. SU-Sau-4 exhibits the dispersed type of settlement observed at Leuluasi. It covers a much larger area than Leuluasi, however, probably amounting to several hundred acres. Unfortunately, that part which is in the centre of the former German plantation is much disturbed by plantation walls and roads, and would be difficult and unrewarding to map.

Sixteen individual sites were numbered and recorded to give some idea of the range of structures present. These include rectangular stone platforms with vertical walls, up to 60 cm high; a vertical-sided platform with five straight but unequal sides; a low circular paved platform; round or oval mounds, with and without stone facing and paving; and a rectangular partly paved area surrounded by stone walls, with curb-outlined access path from one corner, and house indicated by gravel in the centre. Stone walls surround some sites, and partially outline others, and there are numerous complexes of low walls in the area.

Once again, no large ovens or star-shaped mounds were observed. The vast majority of sites appear to be residences built on platforms of varying types.

In the Coxon plantation is a small steep hill rising about 76 m above the surrounding plain. It has twin peaks, with a slight saddle between the lower northern eminence and the main peak to the south. An isolated site, SU-Sau-6, was recorded in the saddle, consisting of a flat four-sided area of ridge narrowing to the north. It has a low retaining wall, sometimes only of one course, on three sides, while to the south there is an unfaced scarp on top of which is also a line of stones.

The southern and highest peak of the hill appears to have been strongly fortified at one time. A European house, now in ruins, on the summit has destroyed any evidence there, and the road to the house on the south side has also damaged the earthworks, although they can still be recognised. On the north side, however, the defences in heavy bush are well preserved and consist of a series of discontinuous ditches and scarps.

The sites described above were all recorded in one and a half days. If the experience of the Falefa Valley survey is a reliable indication, more sites like SU-Sau-2 should occur in the bush at the back of the valley. Even if the sites recorded comprise the total for this area, they are sufficient to demonstrate occupation on a scale similar to that at the back of the adjoining Falefa Valley.

It is significant that the soils here are for the most part considerably less fertile than those of the inner Falefa Valley. The hill on which SU-Sau-5 and 6 are situated is too steep for cultivation, and its soils were mapped by Wright as Uafato hill soils, similar to those on the steeper slopes of the Falefa Valley. SU-Sau-1, 3 and 4 are all situated on Avele silty clay loams and clays, and Solosolo clays. Only SU-Sau-2, on or near a small area of highly fertile soils, can be regarded as occupying a situation comparable to the highly fertile first zone on which Sasoa'a and Leuluasi are situated.

The important result of this brief Sauniatu survey is in demonstrating that a form of dispersed settlement comparable to that at Leuluasi, and of greater extent, exists on the flat land at Sauniatu and Solaua, as far inland as the Falefa project area, but in a place where the ground is much stonier, and the soils considerably less fertile.

VAIGAFA, AFULILO, ETEMULI AND MAUGA ALI'I

Eight days were spent investigating old settlements tucked away in the shadow of the central mountain ridge, just south and east of the Mafa Pass. These investigations centred on the old village of Vaigafa, but sites further to the east, along Richardson's track, were also visited (fig. 75).

Almost every Samoan has heard of Vaigafa, which is mentioned in the proverb *o tua o Vaigafa i nei* (Schultz 1965: 106). It figures in many traditions, both as an important settlement, and as a famous place for catching pigeons. Indeed, the war god Vave was believed to appear there in the form of a pigeon (Krämer 1902: 23). According to Krämer, Vaigafa was founded by Fata and Puga, and was the residence of several Tui Atua, notably Polailevao, himself famous for pigeon snaring. Here, too, Tupuivao came to catch pigeons, and to indulge in cannibalism (Krämer 1902: 286, Schultz 1965: 106). Here was a famous sanctuary for wrong-doers, in the form of a sandalwood tree (Krämer 1902: 286). According to Lotofaga tradition it was from Vaigafa that Vaootui set off to be overcome by the alliance of Leifi of Aleipata and Falepuavave of Lotofaga, so that the title of Tui Atua came to Mata'utia (Krämer 1902: 294).

The traditions suggest that Vaigafa reached its peak as a settlement in the time of Polailevao, and probably ceased to be politically important at the time that Mata'utia became Tui Atua, although it continued to be a famous pigeon-snaring place for long afterwards. It is difficult to estimate the time of any of these events, but it may be noted that Krämer assigned Polailevao to generation 17 of his 33 generation geneaology, six generations after Leutelele'i'iti and seven before Tupuivao. Calculations similar to those applied by Green in discussing the probable periods when Salima and Tupuivao lived (I, Report 6, p. 103) suggest that Polailevao was born between A.D. 1380 and A.D. 1450 and therefore flourished in the fifteenth century.

A radiocarbon date for charcoal recovered from a large raised rim oven, Vai-54, at Vaigafa, suggested that occupation of the area ceased only in the late eighteenth or early nineteenth century (Green and Davidson 1965). Salani traditions describe events which apparently took place there in the eighteenth century, and the subsequent removal of the people of Vaigafa to a place not far from the present coastal village at Salani. It might be expected, therefore, that remains of widely different ages would be present in the general area known as Vaigafa.

To our surprise the precise location of Vaigafa was not generally known to most inhabitants of Lotofaga and Salani, the nearest coastal villages. They did, however, identify certain associated features, notably the pool where the Tui Atua used to bathe, held sacred until quite recently when it was partially filled in during road construction, and the small volcanic cone of Mauga Aliʻī where the Tui Atua are variously believed to have lived, or to have been buried.

In this part of Upolu, the gently sloping formations of Mulifanua Volcanics, which form much of the southern half of the island, meet the older, higher and more rugged mountains of the Fagaloa Volcanic series. The sites recorded are all on the Mulifanua formation, close to the base of the older hills. Adjacent are some very extensive swamps, and the surrounding land is also poorly drained (fig. 75). Wright classed the soils here (apart from the swamps themselves) as deep soils of low to very low natural fertility (Class 6a). There is thus no obvious reason why the area should be attractive for settlement.

Archaeological remains were found to be very extensive in the place where Vaigafa is believed to have been. In 1964 the land was mostly in heavy bush; a small section close to the road cleared of bush and in fallow presented even more difficult conditions for site survey.

For reasons of convenience, Vaigafa was divided into six areas, designated A to F (fig. 75). Altogether 64 sites were recorded in these areas. I have no doubt that there are many more.

Areas A and B were most thoroughly recorded. These are really one, and the division results from the manner in which they were recorded. Together they form a well-defined geographic unit, bounded by the river, by two smaller streams running into the river, and by the mountain ridge behind. There is one obvious point of access to the settlement, where the modern road crosses the river. Here the river passes over a low fall, and under normal conditions the rocky area at the top of the fall offers a natural ford. There is no other easy crossing. On the Vaigafa side of the crossing is a round mound, Vai-17. It

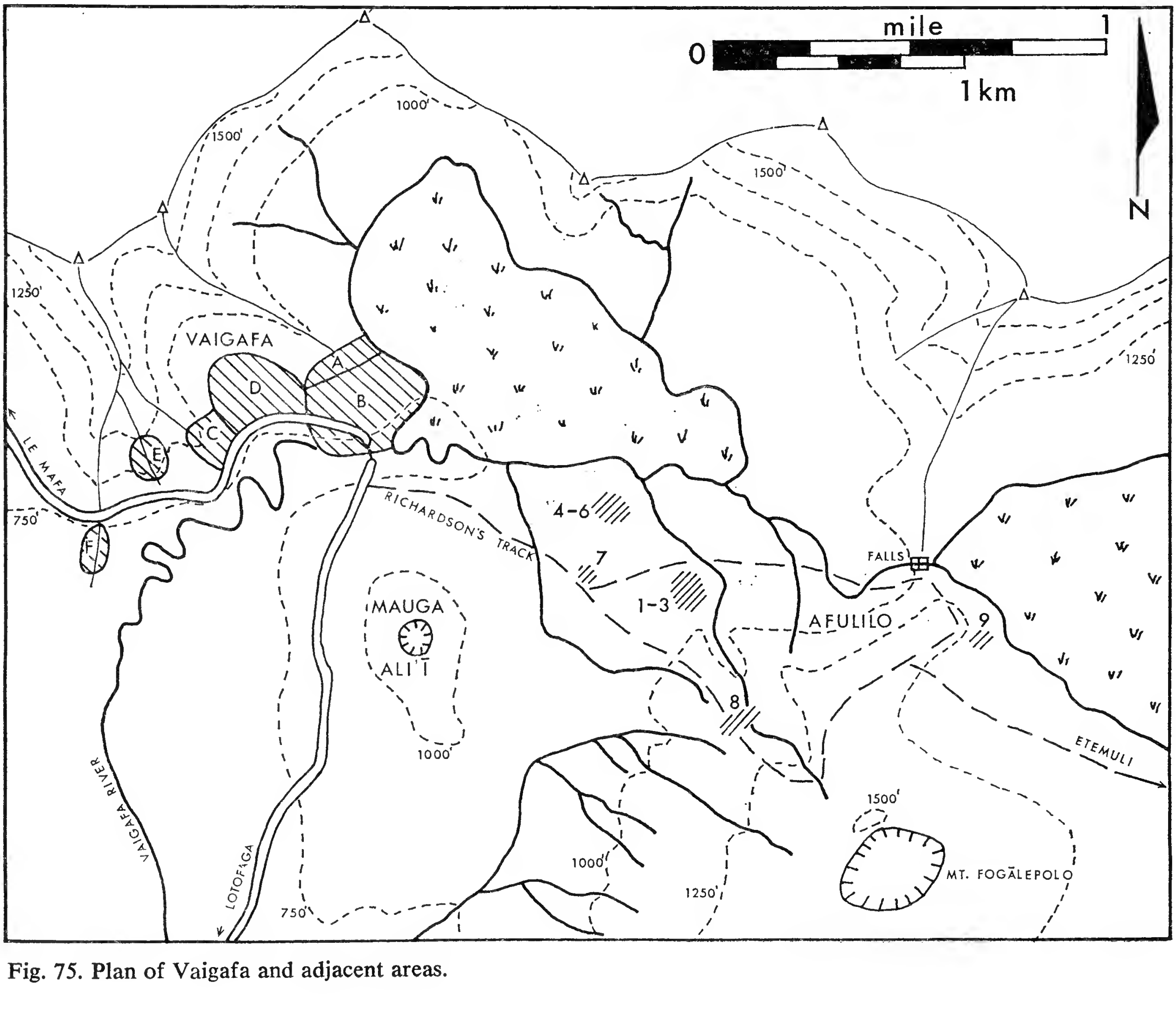

Fig. 75. Plan of Vaigafa and adjacent areas.

is about 20 m in diameter, with straight sides and a flat top in two levels. On the side facing the bridge it is about 3 m high. From this mound, a path, Vai-18, curves to the north and west of the settlement. This path begins as an earth wall, 1.2 m high, with a ditch on either side, and a paved surface. It becomes lower and lower until it is merely a line of stone paving, and peters out. For the first part of its length the path runs through cleared and weed-covered land. Only two other sites were observed here, Vai-19, an oval house outline with pavement on one side, and Vai-20, a similar pavement without visible house outline. Both these sites are set directly on level ground, and were found only by accident; there could be many others in the same area. Once the path enters the bush, house sites are more easily discovered. Fifteen separate structures, most of them definitely house sites, are distributed on either side of the path. They were catalogued as Vai-1, Vai-2, Vai-21 to 31. These sites include low raised rectangular platforms, house outlines with pavements on one side, house outlines with oval surrounding pavements, and one irregular-shaped five-sided raised platform. Where house outlines can be distinguished they are generally large (see below, Report 39, p. 234).

The majority of these structures are concentrated in the centre of the area bounded by the streams and the hill. Closer to the river are extensive complexes of walls and ditches, which may be part of an agricultural system similar to that mapped at Folasa, although each of these complexes at Vaigafa includes walls as well as ditches. Site Vai-33 lies on the flat river terrace east of the raised path Vai-18, and consists of a complex of walls and ditches with no other visible structures associated. To the west of the path lies Vai-32, which consists of a series of earth and stone walls, and terraces. Two walls run approximately at right angles to the modern road, and the western of these makes a right-angled turn and runs west along the edge of the bush. All residential structures recorded in Areas A and B are north and east of this wall. The wall runs into another site to the west, Vai-34, which is a ditched and banked enclosure with a series of internal divisions, ditches and slight terraces. Most walls are of earth, but at least one is of stone. This complex is in the bush right at the edge of the cleared land. Immediately to the west of this complex is another, Vai-35. A traverse around this complex revealed it to be a ditch and bank enclosure, with 13 unequal sides and a total perimeter of about 180 m. At one point it touches a stream bed, and at its south-western corner it is close to the modern road. No structures were observed inside, but it is covered in very dense bush which makes observation difficult. A stone or earth wall, Vai-37, was also observed on the south side of the modern road, running towards the river. This may be a continuation of Vai-32. The only other site recorded on this side of the road is a large oven, Vai-36.

Structures at the other side of the settlement, in the part originally recorded as Area A, are strung out along the base of the ridge. They are far more dispersed than those in the centre of the complex, and are distributed in a more or less linear arrangement. Fourteen sites were recorded here, some of which include several structures. The centre of this line of structures is just upslope from the end of the road Vai-18 and its cluster of houses, while the two ends of the line are far to the northeast and southwest. The majority of sites are terraces, which occur singly or in groups. Some have pavements, and/or retaining walls, and others have no evidence of stonework. One was observed with a small house outline. The most impressive is Vai-4, which consists of a lower earth terrace with a paved surface but no wall, and behind it another terrace with a gently sloping surface and a retaining wall up to 1.8 m high on one side.

Other structures in this area include several raised rim ovens, one of which is adjacent to a stone pavement and was alleged to be for cooking heads, rather than *ti (Cordyline fruticosa)* root; an elongated stone heap or mound 4 m long, said to be a burial place; and a curious wall or path, partly a terrace, partly a ditch, with a paved or stone-constructed bank, extending for some distance along the foot of the hill just below the other sites.

The sites described above undoubtedly constitute the principal section of Vaigafa. It lies in a clearly defined area with a path leading into the centre about which residences are tightly clustered. Closer to the river are the complexes of ditches and walls which may be cultivation areas, and further upslope at the foot of the hill is a strip of more scattered structures, also bordering a path, which are presumably also residences. Whereas houses in the centre are clearly defined, the residential nature of the rear group of sites is more ambiguous, and it is probable that the two sets of structures are not contemporary.

The other areas of sites recorded as part of Vaigafa lie further to the west. Immediately west of Areas A and B is Area D, lying in a small flat valley between two arms of the ridge system, and crossed by several streams. It was in bush in 1964 and was not thoroughly explored. A major site type in this area is the large raised rim oven, although various kinds of structures also occur. Sites Vai-45 to Vai-55 were recorded here, and include three isolated ovens (one of which, Vai-54, was excavated and the charcoal from it dated as late eighteenth or early nineteenth century); a group of ovens; a site with two ovens and a small house; and another of three ovens and a small house. There are also low, square, round, and irregular platforms, one good round-ended house outline, and a small stone heap.

Area C is a slope to the west of Area D at a point where the road and the river approach close to the foot of the hill. The seven sites recorded here include a house platform close to the road; an earth terrace with an oval house outline; an isolated oven; two series of terraces, one small and rough, the others large and broad on the main ridge; and high on the ridge above them a flattened ridge end with scarp on three sides, and several small terraces below. This last site was said to be the residence of the chief of Vaigafa (as opposed to the Tui Atua).

Area E lies to the west again on a lesser ridge between two main arms of the ridge system. A series of terraces (Vai-61) here is said to have been destroyed when the road was put through. Surviving sites recorded (Vai-56 to 60) are all terraces, one without stonework, the others with facing and/or paving. The uppermost, Vai-60, is on a flattened ridge end with low retaining wall on three sides, and a small oven on the inland side.

The western limit of Vaigafa, according to my guide, is Area F, another branch of the ridge system. The sites recorded on this ridge are south of the road, although there may well be more terraces above the road. The three sites recorded here (Vai-62 to 64) are a transverse ditch, a flattened area of ridge with stone-faced scarp at one end, and a flattened area with scarp and terrace all around.

Sites now damaged by the road are reported to have existed closer to the Mafa, but we did not visit them. My guide was adamant that Area F was the western limit of Vaigafa, and it seemed to mark a natural topographic boundary.

The remains at Vaigafa are extensive. Moreover, many of the sites are clearly residential. Those in the central cluster in Area B appear to represent a planned settlement, even if a relatively small one. It may, however, be much more extensive than we realised. The enclosures and systems of ditches and walls require detailed mapping before they can be properly understood, but in these heavy, poorly drained soils, agricultural systems seem a probable interpretation. An unusual feature of the area is the number of large ovens.

On the other side of the river less than 1 km from the bridge is the volcanic cone of Mauga Ali'ī. It was alleged that several Tui Atua lived on this hill or were buried on it, and it is regarded as a place of some importance traditionally. It has very steep sides and a deep steep-sided crater, but the rim is relatively flat and level.

Eight sites were recorded on the crater rim, fairly evenly spaced around it. The first, SU-MA-1, is a large paved platform with irregular straight edges, which peters out on the flat rim to the south and has a retaining wall of up to 60 cm on the north side. To the north and west, on the outer slopes of the mountain, are up to a dozen small terraces and pits. The next site, proceeding round the rim in an anti-clockwise direction, is another irregular platform, also occupying the entire breadth of the rim, with stone facing up to 90 cm high on the outer edge. An area of cooking stones and small depressions presumed to be ovens follows, then a single large terrace on the outer slope below the rim. Site MA-5 is a most unusual stone structure, which my guide believed to be a series of graves of Tui Atua (fig. 76). No evidence of skeletal remains was seen or reported.

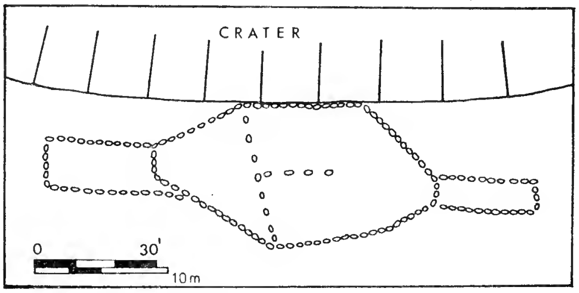

Fig. 76. Sketch plan of SU-MA-5 on the crater rim of Mauga Ali'i.

The site appears to be built entirely of stone, and has a vertical stone wall of up to 2.4 m on the crater side. Some distance beyond this site the crater rim becomes lower and broader. At this point there is a pronounced artificial scarp, with traces of stone facing, accentuating the difference in level. There are several pits at the base of the scarp. Situated on the inner side of this broad area of rim, rather more than half way along, is a large star mound. This has ten rather irregular arms, with vertical stone walls and a flat surface. The maximum breadth between two extremities is about 27 m. There is a shallow ditch around the side which faces away from the crater. The final site is at the top of an unmodified natural scarp. It is another low pavement of rounded rectangular outline, lying lengthwise on the narrow rim. A second visit to Mauga Ali'ī in late 1965 revealed more small terraces on the outer slope of the rim, but no other major sites.

At the time these sites were first recorded they were something new in our experience. The star mound was, in fact, the first one we had seen, although I had read of one on Manono (Calkins 1963: 165). My guide advanced some fanciful interpretations, namely, that MA-1 was the residence of the Tui Atua, MA-8 the residence of his 12 wives, and MA-5 their burial place, although MA-7 was dismisssed as a *tia* and of less interest. Since the same informant provided Vaigafa with a hospital and a church, as well as some lurid details on the oven for cooking heads, even to the associated chopping block, his identifications are not beyond suspicion. Even so, there are other less specific traditions associating Mauga Ali'ī with people of very high rank.

I have described these sites in detail, since they all belong to the category of irregularly-shaped specialised sites situated on remote ridges. In this case the sites are very well preserved, and they are situated on a remote ridge which is turned in on itself in the form of a circular crater rim. In other respects, however, these sites differ little from those recorded at Maugatia and Mata'itoa high above the Falefa valley. The question of their function will be considered in Reports 37 and 39.

Etemuli is a village section of Lotofaga, and now occupies part of the eastern end of the modern coastal village. It is said that formerly Etemuli was located far inland, close to Vaigafa; that it moved to a position slightly less than 1 km inland of the road through Lotofaga in early European times, and moved again to its present site about 1925. About 6 km from Vaigafa along Richardson's track, which runs along the centre of the island to Aleipata, are a small stream and a piece of land known as Etemuli. The original settlement of the present Etemuli section of Lotofaga is believed to have been located here. Etemuli presents a marked contrast to Vaigafa. The most noticeable features are free-standing stone walls which appear to run for long distances in the bush. One wall almost surrounds a large area which contains one large oven and several stone-faced terraces. This incomplete enclosure is open in the centre of its east side. A branch of the wall runs off diagonally from the southeast corner in a north-easterly direction, and extends for an unknown distance in the bush. The enclosure is on the east side of the Etemuli stream, and there appeared to be some more low terraces or platforms between the enclosure and the stream. The land is partly in dense bush, and partly in weed-covered clearings; under either conditions sites are hard to locate. Only a single visit was made to this area, and we have only the one guide's assurance that this was the site of Etemuli. It seems probable that Etemuli was a dispersed settlement of small low house foundations, and differed considerably from the more nucleated and planned settlement of Vaigafa.

Several small groups of sites were found between Vaigafa and Etemuli, in the vicinity of land known as Afulilo. Only one of the sites is actually at Afulilo, but it was convenient to number all the sites with this name. Vaigafa itself is shown in this area on the geological and soil maps, but there seems little doubt that its correct position is that described above.

Sites Af-1 to Af-7 are all in the bush between Richardson's track and the river, below Afulilo falls. Without exception they are low, unimpressive and difficult to find, so that there may be more sites here than we located. The recorded sites consist of two low rectangular platforms (Af-1 and Af-4); a low earth mound with partial stone facing on one side (Af-7); a flat area enclosed by an old stream meander, with some small ovens on it (Af-6); two areas of small stone heaps (Af-3 and Af-5); and a curious zigzag stone facing at the bottom of a slope (Af-2), which looks like three points of an irregular and incomplete star structure.

Site Af-8 is a ditch and bank across Richardson's track at a strategic point where the track passes up one of the narrow ridges on the side of Fogālepolo. It is built to prevent access from the west. The bank is up to 1 m high, with a 3 to 4 m scarp to the ditch, which is 1.5 to 2 m deep. The fortification extends for about 200 m.

The last site is an isolated one close to the upper track to Afulilo falls, and was said by my guide to be the only one in this area (the true Afulilo). It is a five-sided platform with vertical stone walls and an earth floor. There are several irregular small "internal ramps", but the overall impression the site presents is quite different from a star mound.

The generally small and scattered remains at Afulilo are in marked contrast to the concentration at Vaigafa. Certainly the land at Afulilo is damp and the soils poor, but Vaigafa is not much better. Apart from the absence of walls, Afulilo is more like Etemuli in the nature and dispersal of sites. It appears that the concentration at Vaigafa is exceptional, and demands a particular explanation, in contrast to the small and scattered remains that are typical of this damp, infertile and generally unattractive area in the centre of eastern Upolu.

Other South Coast Sites

Less intensive exploration was devoted to other parts of the south coast near Lotofaga. The results, again, indicate the extent of remains, and so are worth placing on record.

An extensive complex of platforms and walls exists in the area grazed by cattle owned by Fonoti, on the east side of the road, about 3.5 km inland from Lotofaga. This site complex was recorded by Golson (I, Report 1) who obtained the names Safeau and Malaeliua for it (Golson pers. comm.). It is the only area beside the road between Lotofaga and Vaigafa which is periodically grazed by cattle, with the result that the structures are readily visible. Other mounds or platforms exist further inland, but were not recorded. Another site, not mentioned by Golson, is a ditch and bank fortification which extends across the ridge between the Fagatoloa River and the next stream to the east, about 1 km above the Sopoaga Falls. The ditch is 0.5 to 1.2 m deep, the bank up to 1.8 m high. The interesting thing about this fortification is that it is apparently built to prevent access from inland — the bank is on the seaward side.

A special trip was made to a site known as *le malumalu o le pisaga,* about which there are many stories in Lotofaga. The site is situated on the edge of the bush on a ridge between two streams, close to the eastern boundary of Lotofaga village lands with those of Vava'u. It is some distance inland. There are many stone walls and probable house platforms and at least one large oven. The *malumalu o le pisaga* is a rounded rectangular structure, which may be either earth with stone facing and paving, or a stone platform. It is about 1 m high and between 12 and 15 m square. It is thus no different from a great many other platforms of similar dimensions, except for its slightly irregular outline. The feature of interest is a small vault on the surface near the east side which had been revealed when a tree fell, disturbing the surface of the mound. The vault, which was about 30 cm square, had stone sides and a coral base and top, and contained fragments of a skull stained with red ochre. No mandible was present.

The *pisaga* were a company of *aitu* (spirits) who were greatly feared in Lotofaga until relatively recently. Their sweet voices could often be heard in the evenings as they travelled down to the coast to fish from the rock also known as Pisaga, east of Lotofaga. Many deaths in Lotofaga were attributed to them. Today their origin is shrouded in confusion, one version even suggesting that they were a Fijian cricket team, killed by Samoans. Whatever their origin, however, they are generally believed to have resided inland and travelled to and from the coast along a ceremonial road, which still exists as an archaeological site at its coastward end, and may indeed continue to the area of the *malumalu.* The term *malumalu* was applied to the residence of an *aitu,* which could be a tree as well as a house (Pratt 1862: 145). This was the only site I saw which was specifically identified by Samoan informants as a *malumalu,* although it is probable that the Bishop's Mound at Moamoa (I, Report 16, p. 245) was another such. However, some doubt must arise whether this particular site was always known as the *malumalu o le pisaga,* or whether the identification was made at the time the skull was exposed. On the whole I am inclined to accept that the site has always been known, and to believe my guide's claim that only members of the family who control the land were prepared to go near it. Tradition recounts that there were rows and rows of skulls, so the reality was disappointing, although there could be many more small vaults which are not visible on the surface.

It thus seems possible that the *malumalu o le pisaga* is a pre-European religious site. It appears to be part of an extensive settlement area, and if the platform and the other remains are contemporary, the former would have been a *malumalu* within a settlement, rather than in the bush. In this case it seems likely that the malevolent attitude of the *pisaga* has developed since their former adherents became Christian; the same may be true for many other feared *aitu* throughout Samoa.

Half a day was spent at the alleged site of "new Etemuli", where the ancestors of the present people of Etemuli are said to have lived between about 1830 and 1925. The sites here proved disappointing in the extreme, consisting only of low amorphous pavements greatly disturbed by pigs. One extensive stone pavement with coral limestone curbs was said to have been the site of the church; there was, however, a complete absence of European construction materials. The site of new Etemuli is most comparable to that of Falevao-i-uta (Report 20, pp. 7-8). In both cases such structures as exist are extensively disturbed by cattle or pigs and seem always to have been low and unimpressive.

One other excursion was made, in an attempt to locate an old village named Nu'utele, shown on the geological and soil maps as well inland of Lepa. The site was not known to informants in Lepa, so a general traverse was made from Lepa to the crater lake shown on topographical Sheet 27 as Lake Olomaga, but known to my guide as Lano o Lepa.

A large and impressive fortification was discovered. A very large double ditch with a huge inner bank extends between two main branches of the Sinoi stream, behind Lepa village. The bank is on the seaward side of the ditch, defending against attack from the north (inland). Thus the triangular area enclosed by the two converging branches of the stream and the ditch system is a large and strongly defended fortification. Our guide advanced no name beyond *'olo,* but stated that this was a fortification in which the people of Atua took refuge from the people of A'ana. It is the most massive fortification yet seen in Samoa.

Within the fortification there are many terraces, mostly low, on gently sloping ground, some of which have remains of stonework on their surfaces. The area is grazed by Lepa village cattle which disturb the stones. One large raised rim oven was seen.

A considerable distance further inland, near the inland limit of the village plantations, a much longer and less imposing ditch and bank fortification was observed, also designed to protect the ridge from attackers from the centre of the island. Between the two ditches are traces of a sunken path. Just below the smaller ditch there is a nine-pointed star mound in earth without stone facing, and other low mounds and terraces exist in the same general area. No further sites were seen in the bush or on the rim of the crater of Olomaga. Conditions in the bush were not conducive to site identification, and my guide on this occasion was not interested in or familiar with archaeological remains.

The most interesting feature at Lepa is undoubtedly the particularly large fortification. Of the forts so far recorded in Upolu, this one most closely fits the descriptions in early European accounts (Heath MS 1838; Stair 1897: 254; Turner 1884: 190) of large forts in which the entire population of a section of the island might take refuge.

A reconnaissance was made along the coast between Lotofaga and Sapo'e. Both the present-day villages of Matatufu and Sapo'e appeared to be built on midden deposits rather like those at Lotofaga, but no beach-front sections were exposed. However, on the now uninhabited sandy coast between the two, at a place named Letaupe, cultural deposits were visible in a very extensive sea-cut section, which extended for about 100 m, with structural remains in the form of floors, ovens and postholes at various levels. The deposits were at least 1.5 m deep in places, and the base of the cultural deposits was nowhere exposed. The site appears to be situated on a raised beach backed by a swamp. This site is particularly interesting as evidence of an extensive coastal settlement with some time depth (probably comparable to that at Lotofaga) in an area not now inhabited.

INTENSIVE SURVEYS, 1966

Three areas were selected for intensive survey in the 1965-66 field work season. The sites in the Falefa Valley proved so interesting and so numerous that a large part of the season was spent there. The remaining time was divided between short but concentrated investigations at two other project areas, Aleipata and Mulifanua, and general reconnaissance in other areas.

Aleipata

Two weeks were spent on the Aleipata survey in April 1966. Since time did not permit a really extensive survey, the land running inland from one village, Lalomanu, was selected (fig. 77). This was because useful contacts could readily be established in this village, and a guide was available who was knowledgeable about and interested in, archaeological remains and former settlements.

The south coast of Upolu between Lepa and Lalomanu consists of a narrow coastal strip, along which the modern road runs, backed by high steep cliffs. These consistently reach a height of about 150 m above sea level along most of the coast, sloping down and diminishing towards Lalomanu. Today access to the plateau above the cliff is almost exclusively from Lalomanu. In the past, however, there has also been access via the cliff, and traditions refer to occasional occupation on the coastal strip, as well as on the plateau above.

The land rises steadily but gradually from Lalomanu to the west until the southern cliffs are about 150 m high, when it levels off, but continues to rise to the north, towards the centre of the island. The underlying geological formation is volcanic rock of the Salani Volcanics. There are several cones and craters of this series in the area, including Lua o Tane and Lua o Fafine close to the southern cliffs, and the large Lano o moa and Lano further north. Mt Olomauga, in the extreme northwest of the project area, is a complex volcanic cone of the Mulifanua series, which reaches a height of 533 m above sea level.

Wright has classified the soils of much of Aleipata and the south coast as of moderate to low natural fertility (Class 4a). In the northwestern part of the project area the soils are of Class 5a (low natural fertility). Steepland soils exist around the various volcanic cones and craters. Water supply is poor away from the coast. Much of the present day village supply comes from coastal springs.

The survey area began at the western side of the small volcanic peak of Taimasa and extended west over an irregularly shaped area to Mt Olomauga (fig. 77). In a two-week period it was possible to gain only a general impression of the nature and distribution of sites. The lack of maps and aerial photographs in the field made precise localisation of most sites impossible and only approximate positions are shown in figure 77.

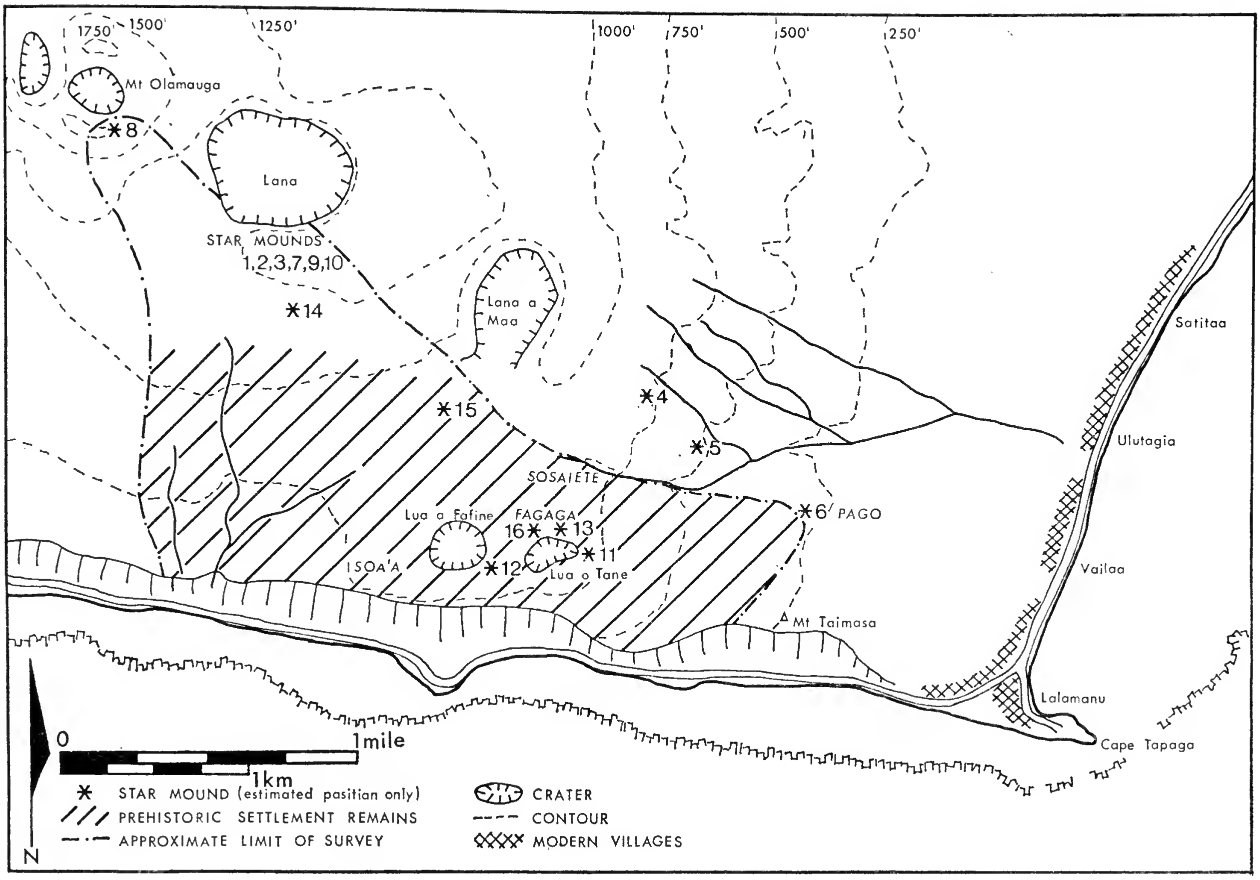

Fig. 77. Plan of Lalomanu survey area.

Complexes of residential sites and stone walls are wide spread over the present village plantations and in some areas extend for short distances into the uncleared bush. These sites are found throughout the area which Wright has mapped as having Class 4 soils and extend on to those of his Class 5. A number of specialised sites, particularly star-shaped mounds, were found far into the bush, where they were generally not associated with other kinds of sites.

Simple versions of traditions were collected which explained inland settlement as related to certain important persons. In particular, the former settlement of Fagaga was said to have been occupied by adherents of Aitutau (now a Tulafale in Lalomanu) who lived inland and served Leifi, who resided on the coast at Lalomanu, in the days before the development of the principal Lalomanu title, Fuataga. The other important person believed to have lived inland was Tualemoso of Vailoa. Certain specific sites were attributed to him.

Specialised Sites

The most striking feature of the Lalomanu survey was the large number of star-shaped mounds discovered. My guide believed them to be for pigeon snaring, and interpreted their locations as particularly suitable for this purpose. A considerable portion of the survey was devoted to finding and mapping these sites, sometimes in appalling weather conditions. Since they provide our best sample of this type of site, they are described here in detail. Outline plans are given in figure 78.

The sites Lal-1 to Lal-3 are situated in the bush close to the edge of the large craters. Lal-1 is closest to Lalomanu village and Lal-3 furthest away. Lal-1 is situated on gently sloping ground with a steep cliff along its eastern side. It is built of earth with stone facing, highest on its southern side. There is a ditch on its north-western side.

Lal-2 is also situated on the edge of a steep cliff, which in this case is on the northeast side of the site. It is on flattish land, and is built of earth with stone facing largely intact on some arms. It is almost 2 m high all round. My guide asserted that this was the most successful *tia* in the district, more pigeons being caught here than anywhere else.

Lal-3 is situated away from the edge of the crater, on almost flat ground. It is built of earth with some stone facing and is about 1.2 m high on all sides, with a flat earthen surface.

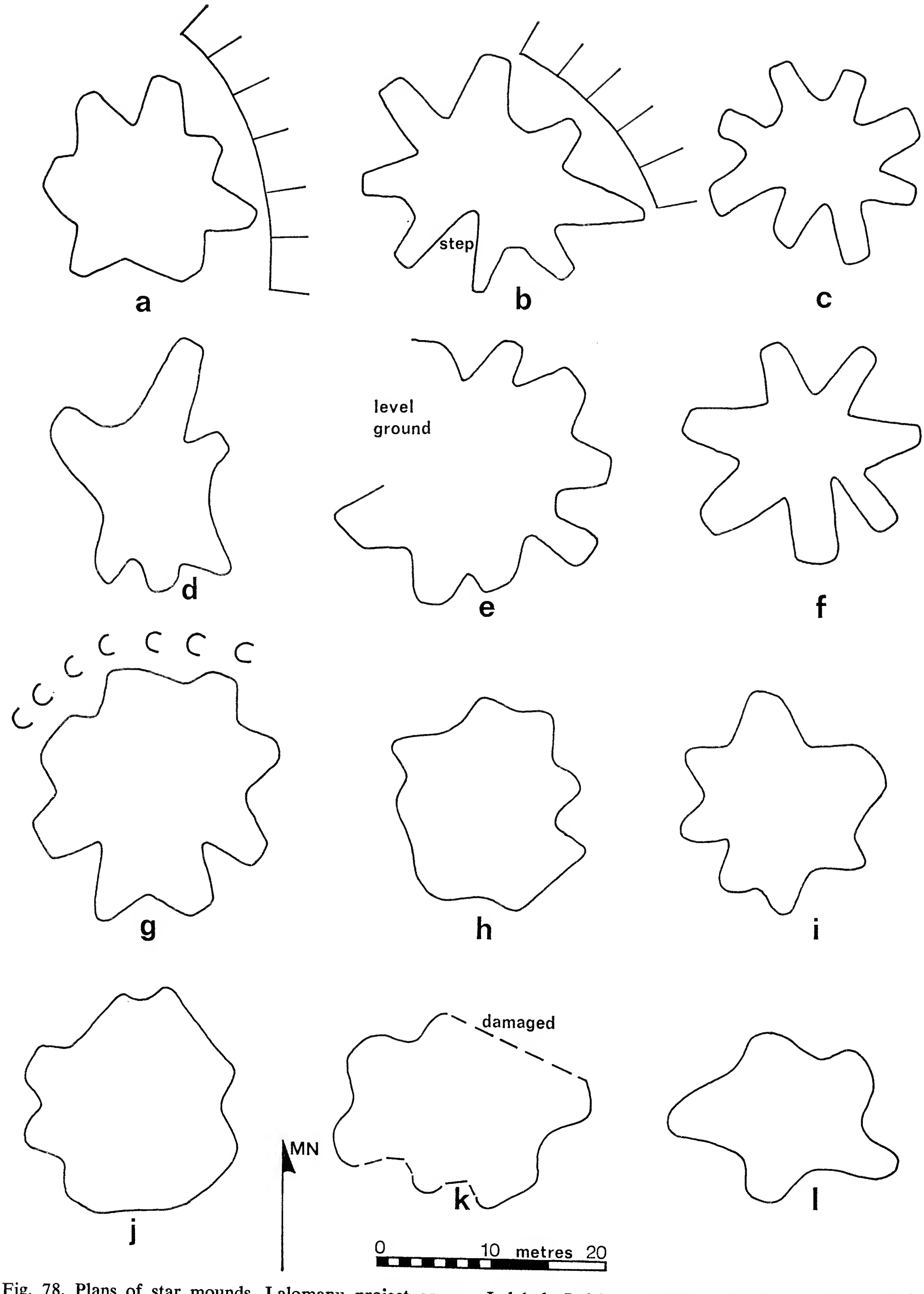

Fig. 78. Plans of star mounds, Lalomanu project area. a. Lal-1; b. Lal-2; c. Lal-3; d. Lal-4; e. Lal-5; f. Lal-6; g. Lal-7; h. Lal-9; i. Lal-10; j. Lal-11; k. Lal-13; l. Lal-14.

Sites Lal-4 to 6 were reached by diverging from the main track in from Lalomanu somewhat west of Taimasa, and crossing two gullies to come out fairly well up a ridge between two streams. Lal-4 is located on this ridge in land which in 1966 was devoted to the cultivation of *ta'amu (Alocasia macrorrhiza).* The ridge slopes fairly steeply to the southeast, and on this side the mound is highest; the two other southern arms are high, while the three northern points are low. The mound is largely of earth, with traces of stone facing on the western side. This site is so oriented that it appears to face directly down the ridge towards Nu'utele Island.

Lal-5 is situated further down the same ridge, on the edge of a steep spur above a patch of bush. This was alleged to be Tualemoso's *tia,* and the land around it, including the bush below, was said to have been sacred. The site is almost a terrace rather than a mound. It is very high on its southeast side, but fades out altogether on the northwest. It is faced with stone. The arms are relatively short, and it appears as if the star shape has been superimposed on an existing terrace. The only other feature noted on this ridge was a sunken path.

Lal-6 is on the other side of the stream gully, on flat land known as Pago, north of the hill named Taimasa. It is a stone mound with vertical walls only 60 to 90 cm high. Although stone walls are numerous at Pago, other structures were not observed during our brief visit.

Lal-7 is situated in the bush beyond Lal-3. It is constructed away from the crater on land which slopes steeply up to the north. The northern arms of the star, which are surrounded by a shallow ditch, are only 60 to 90 cm high, while the two southernmost arms are 2.4 to 3 m high. This mound also appeared to be earth with stone facing. The bays between the higher arms are now collapsing.

Lal-9 and 10 are in the same general vicinity as sites 1, 2, 3 and 7, but closer to Olomauga. Lal-9 is on the edge of the crater, which in this case is directly north of the site. The land slopes slightly down towards the crater rim. The site is earth with stone facing, only about 30 cm high on the south side and 60 to 90 cm high on the northern side. Lal-10 is in the bush on gently sloping ground away from the edge of the crater. It is built of earth with no evidence of stone facing, and varies in height from 60 cm to 1.2 m.

Lal-11 is on the eastern side of Lua o Tane. At first it appeared to be round; clearing revealed that it was another star mound. Lal-13 is on the north side of Lua o Tane. It is in bad condition, and could be only partly mapped. It has an earth core with stone facing and stone extremities, where these are preserved. It is on the edge of the crater rim, where the ground slopes gently to the west.

The exact location of Lal-14, discovered in a taro plantation not far from Lano, is uncertain. It has an earth centre and stone arms.

One other star mound, Lal-15, was not mapped. It is situated on the western end of a low but pronounced ridge due north of the western side of Lua o Fafine. It is a particularly well preserved example with eight or nine arms. Adjacent to this site is a well-built rectangular terrace with stone facing on three sides.

All of the above sites are quite clearly star mounds, and are fairly typical in size, shape and construction, of examples so far discovered throughout Western Samoa. The arms vary in number from six to nine, and the shape from very regular to decidedly irregular. Some are entirely of earth, others entirely of stone, while the majority have an earth centre with stone facing, and sometimes solid stone extremities. Some are on flat land, others on gently or steeply sloping ground, and although many are built on the edges of steep cliffs, an equal number are not. There is also considerable variation in height. No example was found with a central pit, and site SS-Sp-11 on Savai'i remains unique in this respect (I, Report 4, p. 72).

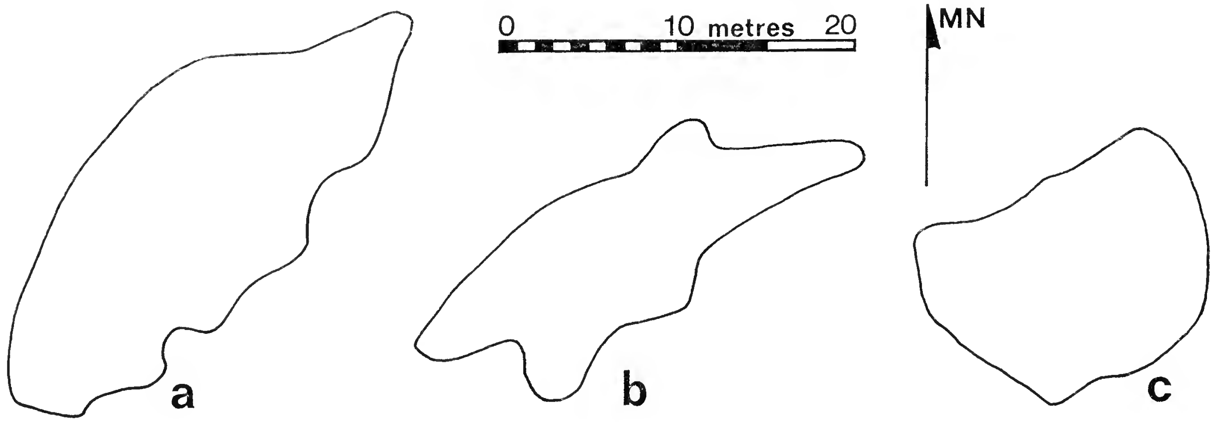

Fig. 79. Plans of irregular structures, Lalomanu project area. a. Lal-12; b. Lal-8; c. Lal-16.

Several other sites discovered during the survey have elements of the star shape, but are so irregular or so elongated that they cannot really be described as star mounds (fig. 79).

Lal-12, situated on the raised eastern rim of Lua o Fafine, is part of a complex of ditches and scarps. As one approaches from the north there is a 1.5 m scarp, a level area, a 1.5 m and then a 3 m scarp down to a shallow transverse ditch. At this point there are terraces on the eastern slope. Beyond the ditch, there is an area where the rim is very narrow, and from here there is a fine view towards Falealili in the west and down to Lalomanu in the east, as well as northeast over much of Aleipata. The rim then slopes up gently to a small terrace at the back of which there is a 4.6 m scarp leading to the summit. This is very small, and is entirely occupied by the stone-faced structure illustrated in figure 79a. To the southwest, a large transverse ditch with inner bank appears to mark the end of the site.

Lal-8 is the only structure discovered on the rim of Mt Olomauga. Like Lal-12, it is constructed to fit a narrow area of rim.

Lal-16 is situated on the northern side of Lua o Tane, about 37 m west of Lal-13. It is made of earth with a stone facing, 30 cm to 60 cm high, and only its situation differentiates it from a number of the presumably residential platforms described below.

Other Remains

The land known as Sosaiete lies to the north of the main track up from Lalomanu, between it and the ridge on which Lal-4 and Lal-5 are situated. Here sites appear to be continuous from below the beginning of the survey area up to and beyond the bush line. The land known as Sosaiete is somewhat clearer than the land nearer the coast, and it was possible to recognise and measure structures. Despite my guide's assertion that Sosaiete was a brave man of the old days who lived here, it seems more likely, as another informant suggested, that the land is known by this name because it was set aside in the nineteenth century for the support of missionaries.

A significant feature of Sosaiete is a sunken path, with stone walls along either edge. This path, which cuts diagonally across the modern track, is said to have been Tualemoso's path, and to have led from Vailoa to his house some distance further inland.

Remains at Sosaiete are characterised by stone-faced terraces; low stone platforms, sometimes irregular and sometimes rectangular; stone heaps, many of which appear too small to be house platforms; and a great many low stone walls, some of which run into Tualemoso's path at right angles. About 25 platforms and terraces which could be house foundations were noted in a traverse through the area. These are often built of rough stones, sometimes with smaller stones on the surface, but all those cleared lack the *'ili'ili* and house outlines of the Falefa and Luatuanu'u districts. Although the majority are rectangular or irregular, one oval foundation was noted.

Similar remains continue west above Sosaiete. These, too, are amidst complexes of low stone walls and stone heaps. A further 22 substantial foundations were recorded here, four of which are partially enclosed by a stone wall.

A perplexing feature of this area is several large long stone heaps, which measure three to four times more lengthwise than across. They are generally rough and uneven and did not appear to be house foundations. Typical dimensions are 16 or 17 m long and about 4 m wide.

Closer to the southern cliffs, on the slopes of Mt Fagaga and around Lua o Tane, was said to be the old settlement of Fagaga. This location is some distance east of that shown on the geological and soil maps. No detailed clearing or measuring was carried out here, but it was obvious that there are numerous terraces on the northern slopes of Lua o Fafine, as well as scattered platforms and walls further to the east. Signs of occupation were also observed on the seaward side of Lua o Tane, and for some distance to the east again. Principal remains here are discontinuous walls, one as much as 1.5 m high, and very low and scattered foundations and pavements. My guide asserted that the burial place of Fagaga people was between Lua o Tane and the cliffs.

To the west of Lua o Fafine close to the cliff is a flat area known as Soa'a. Close to the cliff edge is a small round mound with vertical sides (Lal-17). This is built of earth with stone facing. A more oval platform, made of stone, was observed closer to Lua o Fafine. From the cliff edge at Soa'a inland to the edge of the bush is an extensive complex of remains, including numerous low platforms, associated with stone heaps and walls. In one place a stone wall forms an enclosure, but most walls are discontinuous. Although the majority of house platforms are rectangular or irregular, some oval-shaped ones were seen. A similar complex of remains exists to the west on the other side of the principal stream on this part of the coast.

A selection of platforms and terraces is shown in figure 80. Although the difference between these platforms and those of the Falefa project area is striking, it appears to be largely due to the differences of terrain and geology between the two areas.

Summary

The survey at Lalomanu was not begun with any prior knowledge or any special expectation

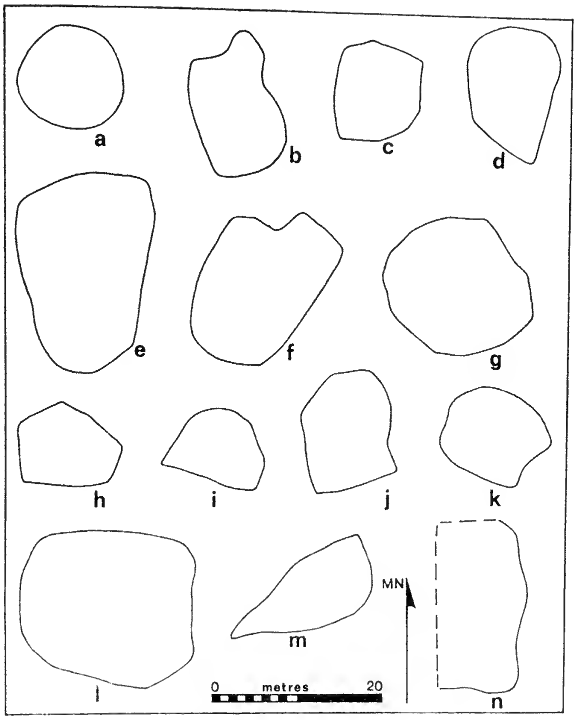

Fig. 80. Plans of platforms, Lalomanu project area. a. Lal-17; b. Lal-40; c. Lal-47; d. Lal-49; e. Lal-36; f. Lal-48; g. Lal-61; h. Lal-54; i. Lal-55; j. Lal-60; k. Lal-78; l. Lal-79; m. Lal-77; n. Lal-74.

beyond the general prediction that there would prove to be archaeological sites on the plateau inland from the present village. The discovery of such a large number of star mounds was surprising. The reasons for such a concentration will be discussed in more detail in Report 39. Here it should be noted that six of the sites are in the "*vao matua*", the bush beyond any present plantations, and beyond the limits of other sites. To these may perhaps be added Lal-14, which is right on the edge of the bush in a new clearing. Two more sites are on the edge of Lua o Tane, while three others, although close to other complexes of sites, are situated on the edges of ridges in commanding positions. Only the site at Pago is in flat, well cultivated land, close to the modern village, and surrounded by other sites. The three sites illustrated in figure 79 are all on the edges of craters. This distribution confirms the hypothesis that these sites are not part of a normal pattern of residential occupation, and must have had a specialised function.

The survey also revealed the now expected pattern of terraces, platforms and walls dispersed throughout the present cultivated area west of the village, and extending in some places into the bush and on to less fertile soils. Two principal old access paths were noted, at Sosaiete and between Lal-4 and Lal-5, and other possible paths were seen but not explored at Fagaga. Some of the stone walls may also be paths. Stone walls are often discontinuous, although at least one enclosure was seen at Soa'a. The stone walls which run across Sosaiete often appeared to be boundaries of sections of land containing one or more platforms or terraces and some open space without structural evidence.

Although there is such a concentration of star mounds, no really large mounds of more orthodox shape were found. Nor were any large ovens discovered. The only fortification seen is that on the rim of Lua o Fafine.

Mulifanua

The third project area selected for investigation in 1965-1966 was at Mulifanua in the northwest tip of Upolu. Here the extensive Mulifanua block of plantations controlled by the Western Samoa Trust Estates Corporation (WSTEC) provided an opportunity to assess the distribution and nature of sites in this part of Upolu without extensive clearing.

The western end of Upolu is composed of rocks of the Mulifanua series. The land rises gradually but unevenly from the coast to several small volcanic cones and craters towards the centre of the island. Wright classed the soils in this area in his Class 3b, very stony soils of moderate natural fertility. The abundance of surface stones and boulders is reflected in the types of archaeological sites, which closely resemble those of SU-Sau-3 and SU-Sau-4 at Sauniatu and Solaua, also situated on rocks of the Mulifanua series.

The northwest part of Upolu is characterised by a broad shallow lagoon and fringing reef. The abundant resources of the lagoon are an attraction for settlement in the area.

Settlement pattern and customary land holdings in this part of Upolu have been disturbed by a series of historical events. In 1865 the nucleus of the Mulifanua plantation was established (Lewthwaite 1962: 142, fn. 30), alienating much of the land from Samoan customary control. More recently the construction of the flying boat base at Satapuala and then the construction and extension of the airport at Faleolo have further dislocated coastal settlement.

The traditional coastal villages of Satapuala, Sagafili and Mulifanua (the last embracing Fuailolo'o and Lalovī) were all of some importance (Krämer 1902: 156-157). Krämer described the burial mounds of many important chiefs, including Galualemana, Vai'inupō, Tuimaleali'ifano Sualauvī, I'amafana and Nofoasaefā at Faleolo, and noted the association of the point at Toloa with the ancient hero, Pili. He also mentioned the relationship between Mulifanua, as *aiga a tai* and Afolau, lying inland of Sagafili, as *aiga a uta* (1902: 14, 157). Afolau is mentioned in a number of traditions and genealogies (Krämer 1902: 50, 104, 191, 241).

The Mulifanua plantations are very extensive, far too extensive for the archaeological remains of more than a small section to be explored in the time available. Moreover, different sections of the plantations are devoted to different crops, with corresponding differences in the visibility and accessibility of archaeological remains. After a general reconnaissance of the plantation by vehicle, therefore, a strip was selected running inland from the entrance of the plantation at Paepaealā (fig. 81). This part of the plantation is planted in old, high coconut palms, with relatively weed-free grass beneath. The principal obstruction to archaeological survey was an undergrowth of fern, absent in places but in others very dense, completely obscuring archaeological sites.

The plantation is divided into relatively small units by a network of roads and stone walls. These units obviously cut across prehistoric settlement patterns, but nevertheless proved convenient for recording. The procedure adopted consisted of walking through each block noting the presence of archaeological sites of various kinds and obtaining simple measurements, by tape or pacing, of a representative selection. No plane table mapping was done.

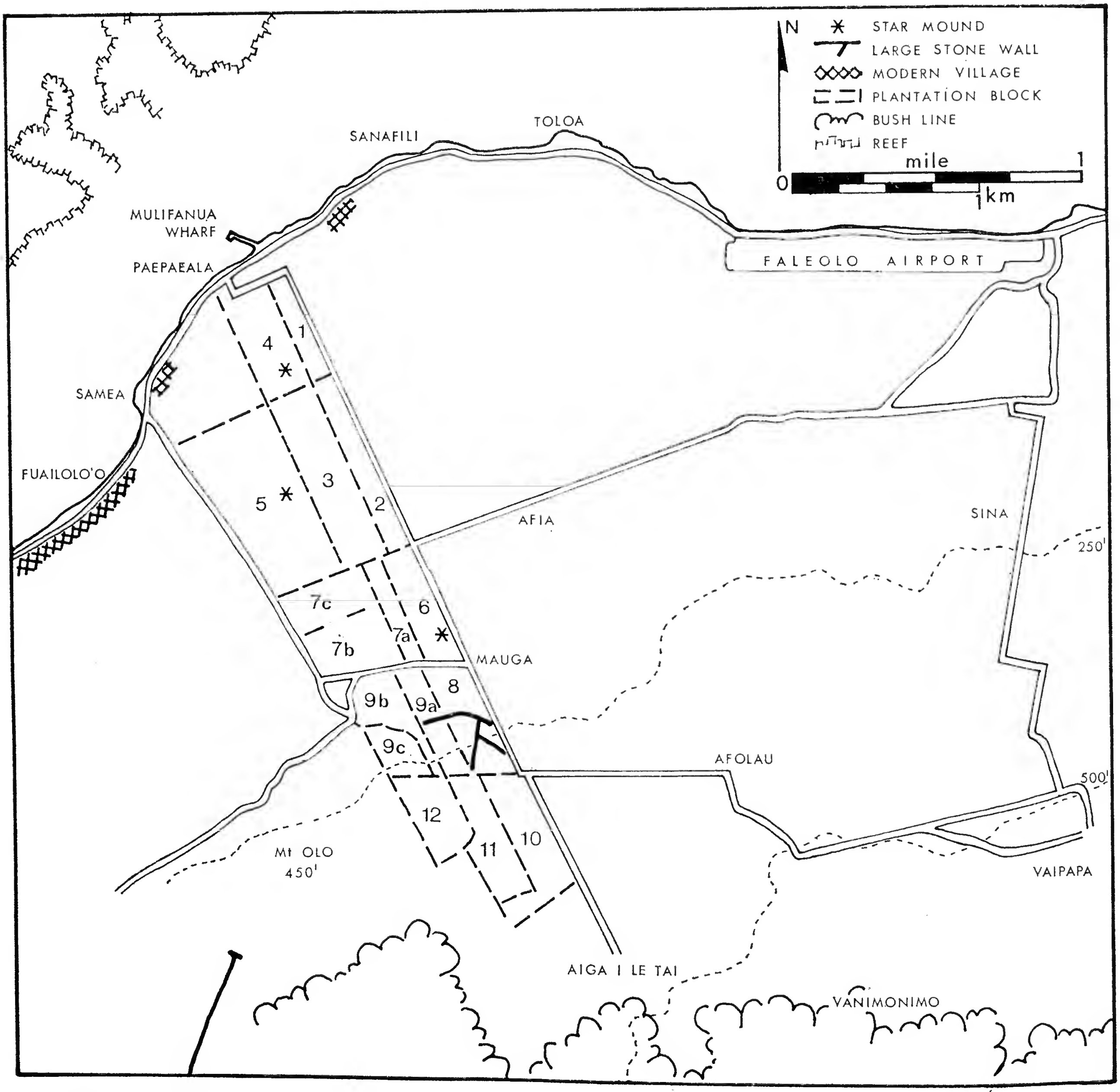

Fig. 81. Plan of Mulifanua survey area.

Very few parts of the survey area were found to contain no archaeological remains. Indeed it can be said that there is a continuous distribution of sites from the coast to Aiga i le tai. It was not ascertained whether sites continue in the bush beyond Aiga i le tai, although Mr P. W. H. Kelly, General Manager of WSTEC, in 1966, gave it as his opinion that bush then being cleared in the inner part of the plantation was secondary and had grown since abandonment of settlement and cultivation in the centre of the island.

Sites throughout the survey area have been disturbed by European plantation activity, particularly the construction of roads and European stone walls, and the construction of stone guards for coconuts. Many of the more impressive field monuments have apparently been robbed of stones for these purposes. In two areas, the coastal zone, particularly Block 4, and the central part of Block 5, concrete foundations and other similar remains indicate intensive European interference. Despite these difficulties, however, the overall pattern of site distribution is clear.

The principal remains are stone walls, both large and small, and various types of pavements, platforms and mounds. No unequivocal examples of raised rim ovens were seen, and no fortifications. Some of the walls appear to be paths, as there are examples of single walls dividing to form parallel walls with a sunken way between, and a number of instances where single walls appear to link mounds together rather than enclosing them or forming boundaries between them. The stones used in constructing walls and platforms are almost without exception rough, and with the passage of cattle and frequent disturbance during plantation activity many structures are in poor condition. As a result it was often difficult to distinguish between boundary walls and stone paths, and between stone heaps resulting from agricultural clearance and the smallest house platforms. (A glance at recently abandoned house platforms in modern villages in this part of Upolu shows how quickly they can deteriorate to amorphous stone heaps.) Moreover, the shape and dimensions of the larger platforms and mounds were often difficult to determine. There appeared to be no clear-cut distinction between platforms and mounds; rather there is a continuous gradation in both height and horizontal dimensions, from small low platforms, virtually pavements in some cases, to large and high structures, with small high structures and broad low ones also present. In the summary below, sites are divided into platforms and mounds on an arbitrary basis — platforms are low structures less than 1 m high, although sometimes extensive; mounds are 1 m high or more.

In Block 1, despite the presence of modern walls, seven platforms and six mounds, including both round and square examples, were noted. There are two stone-walled enclosures, a sunken path with walls on either side, and three other areas where low stone walls are particularly noticeable. Two of the platforms are extensive with dimensions of over 20 m; one oval mound measures 17 x 21 m across its surface. One unusual additional site was noted consisting of a circular mound with diameter of 13 to 14 m, on top of which is what appears to be a three-pointed star mound.

European remains are even more noticeable in Block 4. Despite these, seven platforms; two mounds; two enclosures (one with a small platform inside); and five areas of walls were noted. In the lower part of the block, stone walls occur alone; in another area they are associated with, and run into platforms. There is one star mound in this block. A single wall leads away from this mound, and diverges to form two parallel walls. These walls appear to mark a path. Another probable paved path was also seen in this block.

Fourteen mounds were recorded in Block 2, including one of earth only and one of earth and stone. Several have walls leading up to them. There are also 19 platforms, in two main groups, several with walls leading to them, as well as a number of smaller stone heaps, two enclosures and several complexes of walls. Remains in this block were particularly clear in 1966, and suitable for more detailed mapping.

Block 3 has at least 19 mounds and 13 platforms, again interspersed with walls and stone heaps. One star-shaped pavement or low platform was noted.

Block 5 contains a minimum of 14 mounds and 18 platforms, once again with walls associated and sometimes leading to them. One possible large oven was seen here. One star mound surrounded by a low paved area is present. Possible central pits were observed on this star mound, which is now covered in fern. These could have resulted from the taking of stones for the European settlement which was nearby. The block also contains walled enclosures, several complexes of low walls, and a low wall apparently paved on its surface.

Recording of sites in Block 5 was hampered by several areas of thick fern, which contain sites not properly recorded. In this block, too, sites are definitely clustered in three areas, with a relative absence of sites between.

Blocks 6 and 7 contain rather fewer sites, but include some which are particularly large and impressive. In this area, also, the first of the very massive stone walls occurs. Five mounds and 13 platforms were recorded in Block 6, and one star mound. One of the platforms appears to have several stone uprights on it. The star mound is built on a large low rectangular mound. Like other star mounds in the survey area, it has been partially robbed of its stones, making its identification tentative. The seaward part of Block 6 contains mainly walls and low platforms and stone heaps, the larger and more impressive sites, including the star mound, being in the south of the block. Two mounds (one of which is really a terrace mound) have lengths of about 45 m, although they are less than 2 m in height. The large wall runs diagonally through into Block 7, where it branches and disappears into thick fern. Where it is clear, in Block 6, it is 3.7 m wide and 1.2 to 1.5 m high.

Block 7 also has extensive patches of fern. Eight mounds, and a minimum of 11 platforms (including a well-preserved round example), as well as very extensive walls and low stone heaps were noted. One possible oven occurs in this block. The very large wall, coming in from Block 6, branches and curves to the north. It appears more like a path than a boundary wall. This interpretation is in accord with the route it follows and the presence of other walls which join it.

Some of the densest remains occur in Block 8, where the second of the really massive stone wall complexes is found. One large example comes in from Block 9 as a double wall and swings to the southeast, increasing in size. In the middle of Block 8 it forks, one branch continuing in a southeasterly direction to the eastern edge of the block, the other running off to the southwest corner of the block, forming an inverted "V" in plan with the apex towards the coast (fig. 81). A second arm diverges to the southeast, forming a second "V". Study of aerial photographs suggests that another part of this complex continues in a northeasterly direction between Mauga and Afia, beyond the survey area.

There are no mounds or large platforms in the northern part of the block below the large wall. However, continuous walls, with associated platforms, often linked to the walls and to each other, occur there. These platforms are mostly small. An example of 11 m x 6 m is among the largest seen. They are not evenly distributed, and in one or two areas only walls were seen. Although most linking walls are single, there is one example of high and low parallel walls, presumably marking a path.

One reason for interpreting the very large wall as a path is the number of small walls which lead off to platforms on both sides of it, particularly along the western side of the southwestern arm. It should be noted, however, that the number of platforms linked to the wall is outweighed by the number not so attached. Inside the larger "V" more than 20 platforms were counted, including one of triangular or three-pointed star shape. Many of these platforms are linked to each other or to small discontinuous walls. There are also three possible large ovens and a group of at least seven large grindstones. The categorisation of these sites as "inside the V" is merely for convenience of location. Although it was originally thought the wall might be defensive, its association with platforms on either side is against this interpretation.

Walls and platforms continue to the west of the big wall. They appear to continue uninterrupted into Block 9, which was largely obscured by fern. Clear areas were covered in walls and platforms. Many of the walls in the centre of the block run in a northeasterly - southwesterly direction, with a few at right angles to them. Walls offset from the big wall (which somewhere in Block 9 increases from a double to a triple wall) continue, until the big wall itself becomes smaller and thinner. It was not possible to trace it further, for beyond this point it appears to have been robbed or disturbed.

Above Block 8, recording became seriously impeded by vegetation. Single and double walls, heaps and platforms, however, seem to continue throughout Blocks 10 and 11, and a large square mound with corner ramps and smaller associated sites was noted in the fern in Block 12, close to the boundary with Blocks 9 and 11.

Altogether, 72 "mounds" and 155 "platforms" were recorded. There are in addition 13 areas of stone walls associated with platforms not included in the above totals, and a further 27 complexes of walls and stone heaps, some of which could also be small house sites. Even allowing that some of the larger mounds or platforms may be specialised sites, there are considerably more than 200 house sites in the survey area. Sixty-eight of the mounds and platforms were measured. Some of the largest mounds were excluded, because they were fern covered and useful measurements were impossible to obtain. The smallest mound measured is 7 x 5.5 x 1.8 m, only its height putting it in the category of mound. Several others are smaller than 15 m across, and a considerable number are about 15 m along their larger dimensions. Several are up to 30 m along their larger dimension, while a few are between 45 and 60 m. The smallest platforms are 5.5 x 3.7 m, barely sufficient to support a small house. The majority are between 7.5 and 15 m in their larger dimension, while a few are larger, with lengths between 21 and 28 m.

Because of the rough and irregular nature of the stone construction, actual house outlines could not be identified. It therefore proved impossible to distinguish residences from specialised sites on this basis. Probably only a few of the largest or highest mounds and the star-shaped sites should be considered as belonging to this category.

The star mounds exhibit some interesting features. One is associated with a particularly well formed path, consisting of a low paved wall close to the mound which turns into a curbed and sunken way. This type of path is also associated with a few of the larger mounds, although in general, walls linking platforms appear little different in construction from boundary walls. The star mound in Block 5 is surrounded by a pavement, and that in Block 6 is built on a large low mound. Similarly the three-pointed structure in Block 1 is built on a round mound. Both these latter are reminiscent of the star mound at Luatuanu'u, also built on a more ordinary terrace (I, Report 14, p. 216). The star-shaped pavement is difficult to interpret, and may have been intentional, accidental, or merely the remains of an otherwise demolished star mound.

Even if the two three-pointed structures and the star-shaped pavement are included, the total of six structures of this type is low compared with the total number of platforms and mounds. An interesting feature is the occurrence here of star mounds in the middle of such a density of presumably residential remains.

Without more extensive mapping it is difficult to discuss the fine details of site distribution. It can be seen, however, that although sites are dense and continuous, they are also clustered, and in some cases purposefully arranged. Clusters are relatively small — usually between five and ten platforms apparently associated in a complex. On the other hand, in some areas a single settlement complex is extensive — as in the case of the large walls, and the platforms linked to them.

As mentioned above, the walls appear to serve a variety of functions. Some are probably agricultural, perhaps serving a double purpose as clearance heaps and plot boundaries. In one area, in Block 6, such walls form small irregular enclosures 8 m x 6 m. Although 25 places were noted where there appear to be only low walls and no other structures, there are 40 areas of walls which have associated house platforms or possible house platforms, while almost all the larger structures are also associated with stone walls. In many cases, as noted above, at least some of these walls appear to be paths, similar to those recorded in swampy conditions at Sauniatu.

A perplexing feature is the very large walls. They are not consistent in size and tend to vary considerably along their length. Interference from plantation activities and heavy growths of fern obscure their overall pattern. The most plausible explanation does seem to be that they are paths, in which case some of their otherwise inexplicable fluctuations in size may relate to the status of people living adjacent to them.

In the upper part of the survey area alignments of walls make it evident that the principal orientation of former settlement is diagonal to the present plantation blocks. A majority of walls run parallel to the stretch of coast between Fuailolo'o and Samea, suggesting that the settlement in Blocks 8 and 9, at least, was part of a strip running inland from that part of the coast, rather than from Paepaealā.

Reconnaissance by vehicle in other parts of the plantation revealed sites in relatively weed-free areas at Afolau and Vaipapa, between Vaipapa and Sina, and between Sina and Afia, as well as in the more overgrown region closer to the coast. The modern named areas within the plantation do not seem to be associated with particular concentrations of prehistoric remains. Indeed, sites appear to be as continuous from Faleolo to Vaipapa as they are from Paepaealā to Aiga i le tai.

An important result of the site distribution data is the support they offer for Stair's assertion (1897: 57) that even in the early years of the nineteenth century the path from Falelatai to Fasito'otai was lined with dispersed settlements, reflecting a period when Samoa was more densely populated and more people lived inland than in 1840. This path probably passed close to Vanimonimo, perhaps even through Vaipapa, and at least in its northern sector must have passed through concentrations of archaeological remains similar to those in the project area.

For various reasons site surveys on Upolu have tended to concentrate on exclusively inland situations or on areas which are not particularly typical. The Mulifanua survey places results from these other surveys in their proper perspective by providing a sample of sites from the coast for some 4 km inland in an attractive part of Upolu. As at Vailele (I, Report 6, p. 100), the resulting data emphasise the continuous nature of site distribution, and the impossibility of dividing *i uta* (the inland) from *i tai* (the coast) by any meaningful distinction. There is no break in the settlement pattern 1, 2, 3 or 4 km from the coast. All the land was used for cultivation, for residence, even for specialised sites (as the distribution of star mounds in the survey area shows).

The density of remains in the project area, and by implication throughout the plantation, suggests intensive use of the land for a long time. The advantages of this part of Upolu for settlement are considerable, and include the broad rich lagoon and the relatively fertile soil, whose principal failing, a lack of potassium, is probably itself a reflection of the long history of cultivation (Wright 1963: 89; Ward 1962: 292). The principal disadvantages are the lack of water and an absence of easily fortifiable situations. The sites themselves show that neither was a deterrent to settlement.

The results of the survey gain a new dimension from the discovery of Lapita decorated potsherds in the lagoon to the north of the survey area (Report 33). If the sites revealed by the survey are seen as the end result of some 2500 years of occupation, their density and complexity can be better understood.

GENERAL COASTAL RECONNAISSANCE

At an early stage in the Western Samoan archaeological programme the search for coastal midden deposits began. This search culminated in the selection of Lotofaga as a site for excavation (I, Report 15). Coastal sections were, however, noted in a number of areas, both in 1964, and subsequently, which are worth placing on record as an indication of the extent of such remains.

The investigations at Lotofaga suggested that the low-lying coastal strip there had been occupied only during the last millenium. The carbon date obtained by Kear and Wood (Grant-Taylor and Rafter 1963) for their Tafagamanu sand deposits, which are extensive around the coast of Upolu, and our failure to find pottery in any coastal raised beach situations other than in a secondary context at Apolima, suggest that most, if not all the low sandy coastal situations around Upolu have been occupiable only during the latter half of Samoan prehistory. Nonetheless, the existence of deep and sometimes stratified deposits in several locations suggests that occupation has been considerable.

In 1964, Green recorded cultural deposits of up to 1.5 m in depth in rubbish pits at Falefa and Faleapuna, indicating that deposits in these villages are similar to those at Lotofaga. He also recorded a section up to 1 m deep at Ti'avea, confirming Golson's earlier excavation there (I, Report 1, p. 19). On the other hand, a search for midden deposits along the south coast between Lepa and Lalomanu proved fruitless. In 1966 a wash-out at Saleapaga, east of Lepa, exposed a deep stratified section there. Further east, however, along the uninhabited coast at Tuiolemu, no indication of deep midden deposits could be seen, although burning off of vegetation in 1966 exposed a few low house sites.

The search for coastal middens in 1964 led Green to the sandspit at Vaie'e, where the remains of a modern village, including cricket pitch and church, abandoned about 1950, can be seen. The generally low appearance of the sandspit, and the complete absence of midden deposits, suggested, however, that the recent historic village was not preceded by a long history of prehistoric occupation. Historical records confirm this, showing that the nineteenth century settlement was on the inland side of the estuary to which the inhabitants of Vaie'e have returned since the construction of the road.

In 1967 Green and others visited Uafato in the northeast part of Upolu. Observation here suggested that the present village rests on midden deposits of 1 to 2 m in depth. Surface inspections of other villages, such as Poutasi and Lufilufi, suggest that although sections are not exposed here, there is probably a similar depth of midden deposit.

The other area to which attention was directed in the search for midden deposits was the offshore islands. Prospecting visits to Apolima led to the small excavation there (Report 31). On several occasions in 1964 Green visited the islands off the coast of Aleipata, without, however, discovering sites suitable for excavation. Both Vini and Nu'utele beaches on Nu'utele Island were found to have shallow midden deposits, 60 to 90 cm deep in the case of Nu'utele. At Vini, Green recorded a number of low platforms, an apparently modern pig wall, a round-ended house outlined in coral limestone curbs, and a well, constructed of coral slabs. At Nu'utele, the former site of a leper colony, round-ended houses of unknown age, curbed with coral and paved with coral gravel, and a pig wall were recorded. At Namua midden deposits up to 75 cm deep were seen, and remains of modern, and possibly older houses. Fanuatapu and Nu'ulua could not be visited on either occasion because of weather conditions.

The overall results of the coastal survey suggest that many modern villages are built on sparse midden deposits between 1 and 2 m deep, which are probably of similar age to the Lotofaga deposits, and reflect a similar intensity of occupation. The exposure at Letaupe, between Matatufu and Sapo'e, shows that coastal settlement was formerly more extensive on this coast than it is at present. Otherwise, however, coastal settlements appear always to have been largely where they are today. Locations such as the Vaie'e sandspit, Tuiolemu, and the Aleipata islands, which might have been expected to reveal deposits reflecting many centuries of use by fishermen, if not permanent settlement, all proved disappointing. Fishermen's camps, of the kind which have proved so rewarding in parts of Eastern Polynesia, do not appear to exist in Samoa. This lack is undoubtedly related to the considerable differences in fishing gear and fishing methods between Eastern and Western Polynesia.

MOUND RECONNAISSANCE, 1966

To balance the steadily accumulating data from eastern Upolu and provide at least superficial information on site distribution in central and western parts of the island, a preliminary inventory of mounds visible from the main roads was compiled in conjunction with travel to and from the Mulifanua project area. This survey began in Apia itself, where some earth mounds occur, and followed the main road to Mulifanua and as far as Samatau; the road inland to Momoa; and the road to Aleisa, although difficulties of driving on the latter prevented detailed recording. In parts of the coastal road and along both inland roads, earth and stone mounds are relatively common. Only the larger sites in plantations can be readily observed from the road, while in modern villages it is difficult to distinguish ancient foundations from those recently abandoned. The survey therefore concentrated on large sites. Because of vegetation cover it was not possible to distinguish in all cases between earth and stone mounds; wherever possible, however, this was attempted.

Several earth mounds exist close to the Apia waterfront near the corners of Beach Road and the Vailima and Moto'otua Roads. There are two just on the seaward side of the radio station in Vailima Road and possibly another at Maluafou. One was noted near the Vaivase turn-off, and there is a cluster of three at the Fugalei turn-off at Vaimoso. Although these are the only mounds observed in the Apia urban area there could be others further from the roads, particularly at Taufusi.

There appears to be quite a concentration of mounds extending inland towards Moamoa, on the western side of Mt Vaea. A large cluster was observed on both sides of the road at Alamagoto, three large terrace mounds between Alamagoto and Sinamoga, and a further four earth mounds in a group between Sinamoga and Moamoa. One earth mound was seen beside the road at Lotopa. When it is remembered that these mounds are all right beside the roads, it becomes evident that mounds in this part of Upolu may be as numerous, if not as large, as those at Vailele, and may extend as far inland.

The count of mounds along the coast road began at Lepea, where one earth mound is visible beside the road. Fifty-three probable earth mounds were counted between Lepea and Samatau, the majority between Lepea and Faleula. By contrast only 11 probable stone mounds were recognised, all except one in the western part of the survey area.

The first part of the road has relatively few mounds, one at Lepea, three at Vailoa, two in the western part of Vaiusu, and three in the seaward part of the Vaitele plantation. Three others were destroyed here to obtain fill for harbour reclamation in 1964, and a number of adzes were recovered at that time (I, Report 17).

From Saina to Fale'ula there is a continuous scatter of mounds beside the road. Twenty-eight were recorded, only one of which was clearly a stone mound. West of Fale'ula visible mounds are much scarcer. Three were noted at Malie, two at Leauva'a, one at Saleimoa, two at Sapulu, and two at Vaiālua. These appeared to be earth mounds.

From Nofoali'i onwards it is more difficult to tell whether mounds are of earth or stone. Mounds here tend to be very large, and in some cases may be modified natural outcrops. Two mounds were seen close to the road at Leulumoega, and one extremely large stone mound or terrace, which is attributed to Tamālelagi. There is another very large mound at Fasito'otai to the seaward of the road, then several on the inland side, one at Vainui, two in the centre of Vailu'utai, one at Magia, and one at the beginning of the WSTEC plantation, to the east of Faleolo airport.

Both the original airport and the extensions and associated realignment of the road since 1966 have probably destroyed mounds on this part of the coast.

There are four mounds close to the coast road on the seaward edge of the Mulifanua plantations, two between Sagafili and Toloa, and two near the entrance to the plantation at Paepaealā. There is one very large stone mound at Lalovī (see below p. 202), another in the swamp at Lefatu near Cape Fatuosofia, and at least two in the small WSTEC plantation west of Samatau. It is possible that both the LMS and Catholic churches at Satuimalufilufi are built on an enormous artificial mound; it may, however, be partly or entirely natural.

It is interesting that several of the largest mounds have substantial modern buildings, usually churches, on them. Whether this is because land formerly occupied by people of high rank or by religious structures was given to the churches at the time of conversion to Christianity, or whether church buildings have just been sited on naturally prominent places, has not been ascertained, but would be worth investigating. Krämer (1902: 152) deplored the desecration by the churches of the historic precincts of Leulumoega by placing buildings on principal features; such desecration does not seem to have been restricted to Leulumoega.

The survey of the road to Aleisa was much more cursory, and merely demonstrated that mounds, usually of stone, are numerous here also. Some are very large, others similar to the medium-sized mounds seen on the coast and at Mulifanua. Several landowners with plantations between Tuaefu and Aleisa reported extensive archaeological remains, including large mounds, away from the road.

These results, taken in conjunction with the Mulifanua survey, suggest that mounds are very numerous in the northwestern part of Upolu. There is no immediately apparent explanation for the particular concentration of coastal mounds between Vaitele and Fale'ula, which may be more apparent than real because of variations in vegetation, and the distribution of present day settlements.

The Mulifanua survey showed that the two mounds visible from the road at Paepaealā are merely the most seaward of some 70 mounds extending inland. The scatter of mounds along the Moamoa road is further evidence for the existence of equal numbers of mounds running inland, as along the coast road. Further confirmation was obtained by observation from the road running inland from Fasito'outa to Lana, which is also lined with archaeological sites, including some large mounds. Other roads running inland from coastal villages in this part of Upolu would probably present similar evidence.

MISCELLANEOUS SITES

The final group of remains to be placed on record are individual sites or groups of sites, recorded in the central and western parts of Upolu.

Moamoa

A visit was made to a large fortification inland from Moamoa, reported by Bishop Pearce, who accompanied me to it. The fort, known as Luapu'ē, is situated on a ridge between the upper arms of the Papase'ea and Le'ele streams. We approached it from just below Afiamalu, walking west through bush until we reached a clearing said to have been used during the Mau movement in the 1920s. From here we turned north down the ridge to the fort. It has been designed to defend the ridge against attackers from the south, and consists of a ditch and bank, with the bank on the seaward, downslope side. The defence stretches for about 330 m from gully to gully, with a single entrance about 30 m from the eastern end. The ditch is about 1.5 m deep, and the massive bank up to 6 m high. The top of the bank is flat, with what appear to be palisade postholes still evident in some places. Palisades are said to have been still standing late last century. There were no other signs of occupation in the vicinity, and no other defences.

Some distance further down the ridge towards Moamoa is a stone terrace, and Bishop Pearce reports similar structures on other ridges in the vicinity, as well as a smaller stone wall and downslope ditch on a ridge named Olosina above Papase'ea. At about the point where we emerged from the bush into the Moamoa plantations, low stone walls and house foundations became apparent. Bishop Pearce gave the names of Faga, Malelega, Le'ele and Samoi as former settlements in the vicinity.

Samatau

In his discussion of the Faia'ai cave (I, Report 18), Green has already mentioned the adjacent *pa toga,* and paved road. In 1966 an opportunity arose to follow this wall for its entire length and inspect some other sites in the same vicinity. The wall extends in a more or less straight line for about 2.75 km, petering out quite suddenly at both ends. One end is on the southwestern slopes of Mt Olo (fig. 81) and the other close to the Vailavea road a little less than 2 km inland from Samatau. There is thus no possibility that the wall could be an effective defence. Like the big walls in the Mulifanua project area this wall fluctuated considerably in size along its length. It is therefore possible that the mound described by Green as probably later and constructed of stone robbed from the wall, is actually associated with the wall. The old path, which runs up to and through the wall, was described by an informant as a spirit path, an explanation similar to that offered for the way of the *pisaga,* and Tualemoso's way at the other end of Upolu. It is perhaps significant that the path appears to follow the boundary of the Mulifanua plantation; it may also have marked a major land boundary in the past.

Towards the Samatau end of the *pa toga* are several large mounds, some of which may take advantage of natural rocky outcrops in this predominantly rocky landscape. One site recorded is a square-topped mound measuring 18 x 12 m on top, and 3 m high. There was possibly a stairway up one end, but the rock here is collapsing. Low walls and platforms occur in the same area.

On the same occasion a detailed inspection was made of a large stone mound at Lalovī, situated on land known as Ala'iava. This is a very well made circular mound with a path or steps up the coast side. The surface is flat, with a low oval upper tier sufficient to support a substantial house. According to the present landowner, his great grandfather found the site when occupying the land. He did not know what it was, but concluded it was a *tia.* Krämer, however (1902: 157), attributes the site to Tongans. This site would repay clearing of the small weeds which cover it, and careful mapping.

The same is probably true of many of the larger mounds which appear unattractive heaps of rock when covered with creepers or fern.

Lana and Tanumalala

On several occasions sites were recorded at Lana, about 6 km inland from Fasito'outa, and further inland towards Tanumalala. At Lana there is a star-shaped mound (grid reference 994672 on topographical Sheet 18). It has seven or eight arms and measures 18 m from one extreme to the other. At least two stone terrace platforms and various low walls and stone heaps are visible in the same vicinity. A short distance below (grid reference 993675) is another *"tia"*. This is an irregular seven-sided structure with vertical stone walls and a flat surface. On the boundary between the plantation at Lana and the WSTEC cattle run further inland is a high round stone mound, 17 m in diameter (grid reference 996671). These three sites, recorded during visits to Lana, again provide an indication of the density of structures in this part of Upolu.

Abominable weather during both visits to the adjacent cattle run prevented effective recording. In the lower part of the area low stone walls and heaps are numerous, but no house sites were seen. Then there is a gap with no evidence of occupation. Several well preserved stone mounds occur further inland near the two small volcanic cones northeast of Tanumalala. The cones themselves both have structures on their rims. One has only one structure, an elongated mound set lengthwise along the rim which measures 18.9 x 12.8 m and has access ramps at both ends. On the other crater are a similar but larger mound, a rather amorphous stone structure, a transverse trench and longitudinal terrace, and a further possible stone structure.

Early in 1966 Buist also recorded several sites in this area, but closer to the cross-island road, including a circular mound 18 m in diameter and 2.4 m high with an entrance stairway on the northwest part and a surface of small pebbles; a rectangular mound 18 x 12 m; a small low rectangular stone mound; a stone-walled enclosure with a well-preserved wall in low bush; and a stone-walled roadway running inland from the coast. He was also told of a very large mound on the rim of Tafua Upolu, but was not able to investigate it.

Despite the arbitrary nature of recording in this area, it is obvious that a number of large and impressive sites exist here. The very arbitrariness of the survey suggests that this situation is not unique, or even unusual, in this part of Upolu.

CONCLUSIONS

The implications of the various kinds of sites described above and their distributions will be considered in Report 39 as part of the discussion of Samoan structural remains and settlement patterns. Certain general conclusions about Upolu, however, can appropriately be drawn here.

In all areas investigated, archaeological sites occur throughout the land presently occupied by plantations and into the bush. This is true even of areas which are now occupied by extensive Government or privately owned plantations and so are not part of customary lands. Most of these areas of archaeological sites contain a substantial proportion of sites which are clearly residential in character, but there are some remote areas, such as the *vao matua* in Aleipata, the ridges high above the Falefa Valley, and the centre of the island at Tanumalala, where most or all sites appear to be specialised, and not ordinary residences. On the other hand, types of structures which can reasonably be regarded as specialised are also found scattered among other, more domestic types of site.

The continuous distribution of archaeological sites from the coast for a considerable distance inland has been convincingly demonstrated at Mulifanua and Vailele; in the light of these results the archaeological sites far inland in the Falefa Valley and Sauniatu can be seen as the most inland sector of similar distributions. At the same time the consistent use of the coast for residence is reflected in the wide-spread if unrewarding coastal midden deposits.

The results from different parts of Upolu illustrate the differences in site type from area to area, and highlight the difficulties of comparing sites from one area to another. That the differences are tied to the underlying geological formations is clear when the similarity of structures at Sauniatu to those at Mulifanua is contrasted with the differences between Sauniatu and neighbouring Falevao. Some kinds of structures can be rendered in earth or stone, and are easily recognised wherever they occur; foremost among these is the star mound. On the other hand, house foundations vary considerably from region to region, while the extent and purpose of stone walls vary depending on the amount of stone present on the surface and in the soils.

The mound reconnaissance survey showed that earth mounds are not quite so restricted in distribution as was previously thought. Moreover, in much of Upolu earth mounds and stone mounds are in complementary distribution, resulting in an even overall occurrence of mounds. The absence of round and rectangular mounds in Aleipata remains to be explained;

possibly it is related to the extraordinary predominance of star mounds there.

Other inequalities of site distribution will be discussed below, together with a more detailed review of the functions of certain kinds of sites.

There are still areas of Upolu which are not well known, notably the southern parts of Tuamasaga and A'ana, and the northeastern part of Atua. There are undoubtedly still many forts and large mounds to be discovered and recorded. Nevertheless a substantial body of data on archaeological sites throughout Upolu has been assembled, and it can be claimed that the overall patterns of site type and site distribution on the island are now understood.

ACKNOWLEDGEMENTS

Any review of site surveys over a long period of time and by different workers must involve indebtedness to a great many people, all of whom it may not be possible to mention by name. Our thanks should first be expressed to all who assisted by reporting sites, providing transport and accommodation, and acting as guides and workmen. Particular mention should be made of the following. Atonio Maiava guided me to Malae and Utuave, and to sites at Samatau, as well as accompanying Buist to Tanumalala. His contribution to the Samoan programme has been mentioned before, and cannot be overemphasised. Mr William Hart drew our attention to the sites at Sauniatu, made arrangements for me there, and also assisted Green in the initial coastal surveys. My own work on the south coast in 1964 and at Aleipata in 1966 could not have taken place without the constant help and encouragement of Muta'aga and Toloa Enosa of Lotofaga, whose contribution throughout the programme was so tremendous. I should particularly like to mention my guides, Tui at Vaigafa, Nafatali for the *malumalu o le pisaga,* and Malio and Fotu at Lalomanu, as well as all those who assisted at Vaigafa, Sauniatu, Lepa and Lalomanu. Bishop Pearce has also been mentioned before; his continuing interest in our work has been greatly appreciated. Mr P. W. H. Kelly of WSTEC enabled me to work at Mulifanua, and drew my attention to areas of particular interest. I am also grateful to Miss Leahy and Mrs Hougaard who accompanied me to Mulifanua under trying conditions. Mr and Mrs Walter Jahnke deserve my thanks for their hospitality at Lana, and Mr P. Ripley for his assistance with the mound reconnaissance, and with recording at Lana and Tanumala. Site recording on an island like Upolu would be impossible without an adequate base to work from, and I am particularly grateful to those who provided not merely adequate but ideal bases in Apia from which to work: Mr and Mrs P. Creevey in 1964, Mr and the late Mrs C. G. Powles in 1965 and Dr and Mrs P. Heller in 1966.

SPECIALISED SITES IN THE UPPER FALEFA VALLEY

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A problem which emerged early in the course of the archaeological programme in Western Samoa was the identification and interpretation of specialised structures, particularly pigeon-snaring structures, burial places and religious sites. Previous workers had accepted the interpretation frequently offered by Samoan informants that many mounds were pigeon-snaring mounds (I, Report 1, p. 15; Kikuchi 1963: 57). From 1964 onwards, however, field archaeologists became more cautious in the interpretation of mounds of various kinds. Buist (I, Report 3) refrained from functional interpretation, and although Scott suggested the association of star mounds with pigeon snaring (I, Report 4, p. 89) he made no definite identification. The site survey in the Vailele project area revealed no sites which could not be interpreted as house mounds, and excavation of the star mound at Luatuanu'u produced no direct evidence of its function (I, Report 14).

A principal difficulty in accepting the identification of mounds in the bush as pigeon-snaring mounds, or *tia seu lupe,* is the lack of any references to mounds in the ethnographic descriptions of pigeon snaring. All nineteenth century writers agree that special places in the bush were cleared for the sport, and huts built around (Turner 1884: 127-128; Churchward 1887: 139-140; Krämer 1903: 333). Pritchard (1866: 161-162) added that stones were placed in a circle, around which chiefs sat in ambush. Buck's later compilation (1930: 321) suggests that pigeon-snaring places were usually on artificially levelled areas of steep ridges, sometimes built out at the sides and lower ends with stone. None of the above authorities describes anything which could be regarded either as a large mound or as a star mound or other irregularly shaped structure. It is interesting that the use of stone in construction is mentioned only in the later accounts, written after the sport had died out.

The term *tia* used by most writers to describe pigeon-snaring places, can now mean either a grave or a pigeon-snaring place (the latter usually qualified as *tia seu lupe)* (Milner 1966: 263). In the nineteenth century, however, only the meaning of a pigeon-snaring place seems to have been current (Pratt 1862: 203). This usage is reflected in the well-known proverb, *e pipili tia 'ae mamao ala* (Schultz 1965: 31). The literal meaning, the hunting sites are close together but it is a long way from one to another, can be readily understood by the field archaeologist scrambling from ridge to ridge to record sites in the mountainous parts of Upolu.

An additional complication in the subject of pigeon snaring and mounds is provided by the association of pigeons with religious observances in some parts of Samoa. The only nineteenth century description of what appears to be a star mound attributes a religious significance to the site (Platt MS 1935-36: entry for 3 February, 1836).

> Passed by a place most ressembling a Tahitian marae of anything we have yet seen. It does not appear that sacrifices or idolatrous worship of that kind was offered. It was sacred to the devils on which they laid the bodies of the dead. There also the chief when he had a design of conquering a district, he used to divine, by catching wild pigeons in a net on the top of it. It is an immense pile of stones of several hundred yards. We could not well estimate the extent on account of the thick bush in front. The side which we passed projected in several places like buttresses of three or four yards in extent each about 12 or 15 feet high with niches between. We did not ascend to examine the top.

The curious practice of divining by pigeon snaring on a star mound can better be comprehended when it is noted that various deities, particularly the war god Vave, were believed to appear in certain places in the form of pigeons (Krämer 1902: 23).

Ethnographic descriptions of burial places are equally equivocal. Although there is a wealth of information on burial customs, indicating that burial was commonly in shallow pits in or near houses, as well as archaeological confirmation of this practice (Report 21, p. 30), there are also sufficient references to remote mountain burial places to suggest that structures of this kind may exist. In particular, numerous accounts suggest that while interment was normally in or close to houses, skulls were often removed and placed variously in houses (Wilkes 1845 (II): 139; P. Turner MS 1835; Krämer 1903: 105), in sacred places (Buzacott MS 1836-37: entry for 14 July 1836), or in family burial places in the mountains (Stair 1897: 179). Krämer (1903: 105) also described the burial of skulls in stone vaults.

Relatively little is known of chiefly burial places other than those of historical personages. The change in the burial practices of ordinary people as a result of missionary influence is likely to have been paralleled by a less well documented change in chiefly burial practices, and it may be that burial in remote stone structures was practised in prehistoric times.

The nature of other religious sites is even more uncertain, ethnographic accounts suggesting a remarkable diversity of structures and natural features which could be so described (Davidson 1969a: 68).

During the site survey of the Upper Falefa Valley, a number of sites were recorded which did not conform to the pattern of residential sites in the valley. They are distinguished by several characteristics. Firstly, they are all in remote situations on steep and sometimes almost inaccessible ridges. Secondly, they are distinguished in most cases by a curiously irregular, although sometimes symmetrical outline. Thirdly, they are all either stone faced, or constructed entirely of stones, although the use of stone is not necessarily a deciding feature throughout Western Samoa. It does, however, seem to be relevant in the Falefa Valley.

Because they are different in shape from any Samoan sites previously reported, the sites are described here and most of them illustrated. They were found in several of the locations in the survey area already described (Report 20), and the earlier report should be consulted for details of their setting.

Maugatia

Maugatia exemplifies the remote, inaccessible and precipitous situation in which these sites occur. It is for most of its length a narrow razor-back ridge, on which construction of any kind of structure would have been exceedingly difficult. The six specialised sites recorded include examples of three different kinds, all of which are recognisable in other parts of the survey area as well. Maugatia-1 (fig. 82a) and sites 4 and 6 are small, simple trapezoidal-shaped stone platforms, built out lengthwise on sloping areas of ridge. In shape they do not qualify as abnormal sites, but their situation and precipitous surroundings make it completely impossible for them to have been residential, even as bush refuges.

Maugatia-2, which faces site 1 across a slight saddle, is also a stone terrace built out lengthwise along the ridge (fig. 82b). It has a more unusual shape, however, narrowing towards its tip with traces of buttresses and niches along its side. Similar structures recorded at Polua and Lata are described below. Sites 3 and 7 (fig. 82c, d) represent another variety of structure, also recorded elsewhere. Both are built out on the Falevao side of particularly narrow and precipitous areas of ridge, with sheer drops on either side. Both incorporate or are close to large boulders which occur naturally on this part of the ridge. Both are distinguished by two niches or bays on their northern sides. They thus resemble partial star mounds. The feature of protruding wings, arms, or buttresses, alternating with recessed bays or niches, is one of the principal identifying features of many of these sites, and is found both in star-shaped mounds, and in a variety of other structures.

Mata'itoa

The other extremely precipitous situation in which a structure was located was Mata'itoa. In this case, however, it is the access to the ridge which is difficult. The site itself is situated on an almost flat, if narrow, area of ridge. Whereas the sites at Maugatia are relatively free of vegetation, being too rocky to support any cover, Mata'itoa is covered in bush.

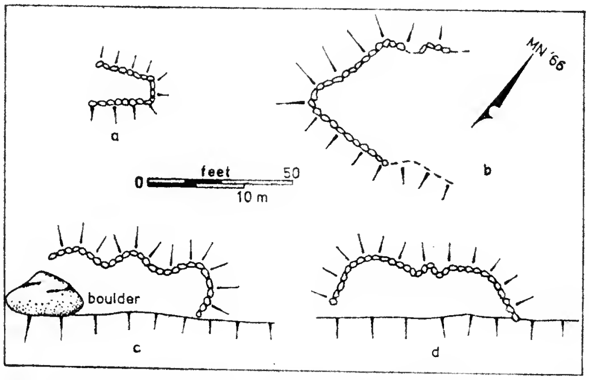

Fig. 82. Specialised structures, Maugatia. a, c, d, surveyed by tape only, b, compass and tape. a. Maugatia-1; b. Maugatia-2; c. Maugatia-3; d. Maugatia-7.

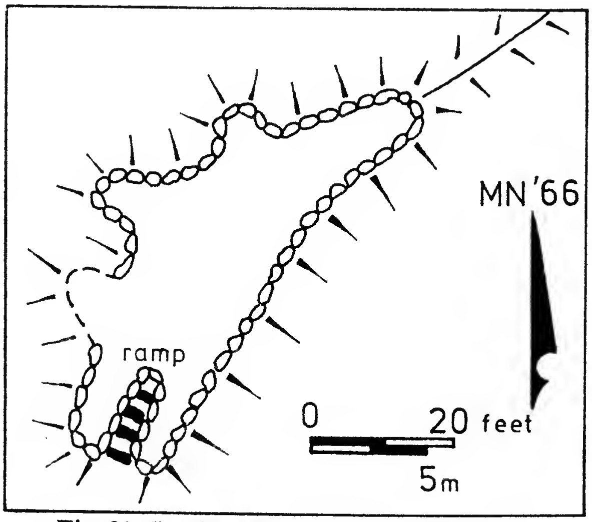

Fig. 83. Specialised structure, Mata'itoa-2.

The site, Mata'itoa-2, is so far unique in its shape, but embodies features which are found on other specialised structures, notably the alternating arms and bays, which at the southern end take the form of a long, narrow, internal access ramp (fig. 83). It was impossible to tell whether this is a stone structure, or merely stone faced, but in view of the general nature of the terrain the latter is more likely.

LATA

Whereas the majority of sites recorded at Lata appeared to be house platforms, one definitely specialised structure was recorded on the steep ridge above. Two others, in very dense bush, might have been naturally level places on the precipitous rocky ridge above. The site recorded, Lata-1, was only sketched, but it is a stone-faced, or stone platform similar to Maugatia-2 and Polua-23 (fig. 84).

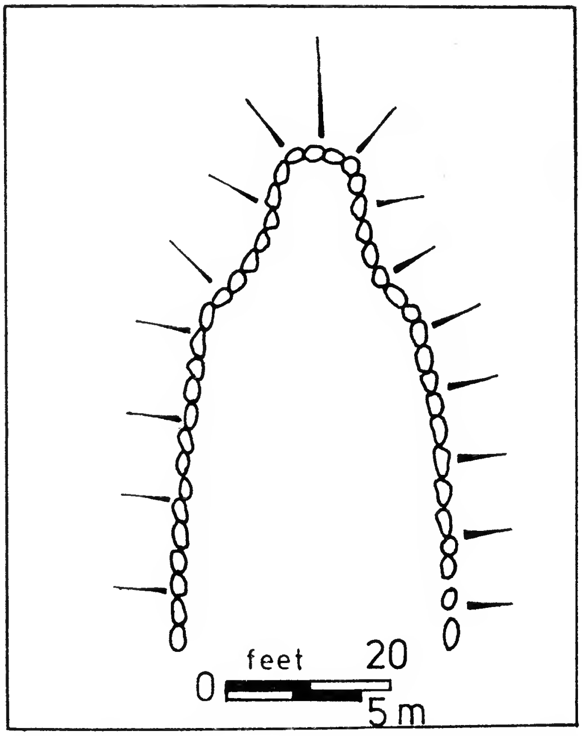

Fig. 84. Sketch plan of specialised structure, Lata-1.

SINA

Four specialised sites were recorded at Sina. Sina-26 is located in dense bush just below the Mafa Pass road on the fifth and westernmost ridge of Sina, beyond the limits of Sina proper. It exhibits two of the characteristic protruding wings, one on each side of a long structure with rounded tip. It is built on a terrace, backed by a steep scarp (fig. 85a). Sina-12 is on the second ridge of Sina, and is a more symmetrical example of a similar type of structure. It has two arms, and narrows towards the tip, which is on the edge of a very steeply descending area of ridge (fig. 85b).

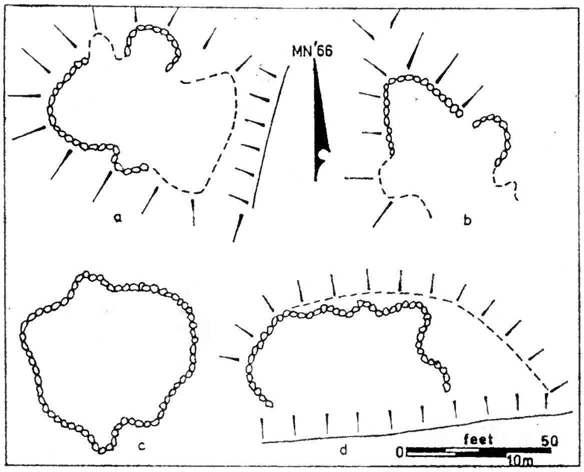

Fig. 85. Specialised structures at Sina. a. Sina-26; b. Sina-12; c. Sina-17; d. Sina-14.

The remaining two sites at Sina are on the first and easternmost ridge, also known as Fa'aleaga. Sina-14 is the highest site on this ridge and is a raised stone structure built on a larger terrace, backed by a steep scarp (fig. 85d). In plan, it is very similar to sites 3 and 7 on Maugatia. Immediately below this site is an enormous terrace measuring 20 m across and up to 60 m long, with a stone wall along its inner side, backed by a 4.5 m scarp. There is a smaller terrace below this, and then another terrace on which is Sina-17, the only complete star-shaped mound recorded in the Falefa Valley (fig. 85c). It is either of stone or stone faced, varying from a single course on the south-east to four or five courses on the downslope side. This complex of sites is only a short distance below sites Maugatia-1 and 2 on the ridge-top above.

NIULE'A

Only two definitely specialised sites were recorded in this predominantly residential complex. Sites Niu-60 and 68 are both situated on the upper part of the western half of Niule'a's ridge system. Site Niu-60 (fig. 86c) is in the middle of a series of terraces running up the ridge from the stone-walled complex B below. Site Niu-68 (fig. 86b) is the uppermost site

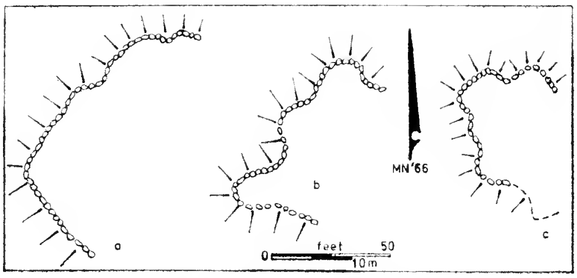

Fig. 86. Specialised structures at Niule'a. a. Niule'a-99; b. Niule'a-68; c. Niule'a-60.

recorded on the same ridge, except for an oven-like depression above it. Both sites exhibit the characteristics now recognised as typical of these structures — a series of buttresses and bays.

A less certain example is Niu-99 (fig. 86a) situated about half-way up the next ridge to the east, well above the stone-walled complex C, but considerably below a number of more orthodox terraces. Its location and the fact that the arms and bays are not pronounced, make classification of this site uncertain, and illustrate the difficulties of distinguishing between less extreme specialised sites, and more irregular residential terraces.

Two other possible specialised sites at Niule'a include a diamond-shaped platform, high up on the westernmost ridge, and another site possibly similar to Niu-68, seen on the last day of the survey but not cleared or measured. It is not far from the stone-walled complex D, low down on the easternmost of the Niule'a ridges.

Polua

A number of probable specialised structures exist on the two ridges recorded as part of Polua. Polua-1, 5 and 12 are on the northern ridge, which is arguably part of Vaimaga, whereas Polua-23 to 27 are on the southern ridge, generally agreed to be in Polua. Although some of these sites comply in all respects with the requirements of specialised structures, others are less certain, and have been included in this account because of their location, and careful use of stone, rather than their shape.

There is little doubt about Polua-1 (fig. 87a), the lowest recorded site on the northern ridge, or Polua-5 (fig. 87b), both of which exhibit arms and bays. Polua-5, particularly, is very similar to a regular star mound. Polua-12 (fig. 87c), however, is a more orthodox shape, and has been included because it is the most remote of the recorded sites on the ridge.

Polua-23 to 27 (fig. 87d-h) are the five uppermost sites on the second ridge. Sites 23, 26 and 27 have shapes which place them clearly in the category of specialised sites. Sites 24 and 25, however, are more dubious, and again, it is their situation on this steep remote bush-clad ridge, and the careful stonework, which suggest they are specialised structures. Polua-24 (fig.87e) has a particularly well constructed stone facing, up to 1.5 m high on the northern side.

Most of the remaining sites at Polua are terraces, some with traces of stonework. There is also a sunken path on the northern ridge.

Folasa-Vaimaga Divide

Two rather different structures were recorded on the bush-clad ridge between Folasa and Vaimaga. They are elongated terraces on the ridge with low and incomplete rectangular pavements (fig. 88). They are much more like the pigeon-

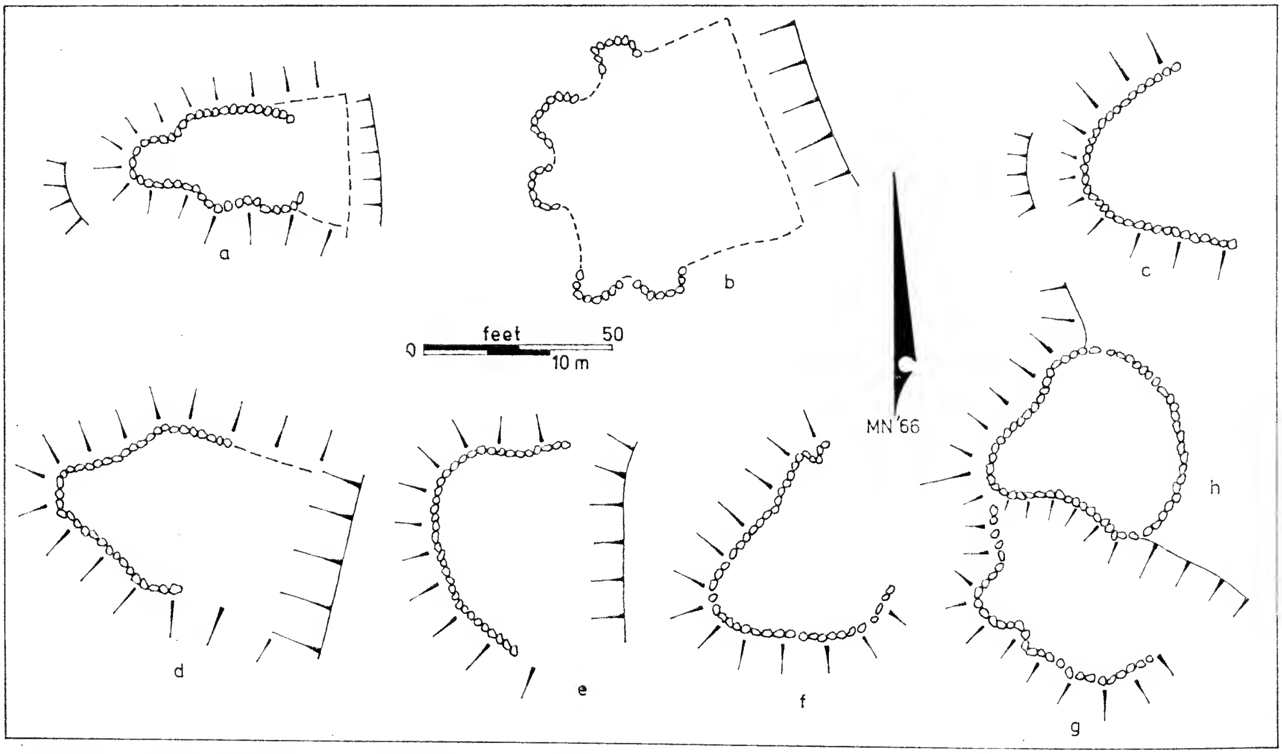

Fig. 87. Specialised structures at Polua. a, surveyed by tape only, b-h, compass and tape. a. Polua-1; b. Polua-5; c. Polua-12; d. Polua-23; e. Polua-24; f. Polua-25; g. Polua-26; h. Polua-27.

snaring platforms described by Buck. Their only claim to be included in the specialised category as defined here, is their position on a bush-clad ridge. If these two sites are to be considered as possible *tia seu lupe,* or as serving some specialised function, however, various similar sites on the upper fringes of other residential areas should also be considered. Particular examples include the partially excavated sites of Fo-1 and Te-1, which also comply with Buck's description of pigeon-snaring sites, and the sites recorded at Pago-uta. They, in turn, are not greatly different from some of the ordinary terraces without readily visible house outlines, recorded in lower parts of the survey area.

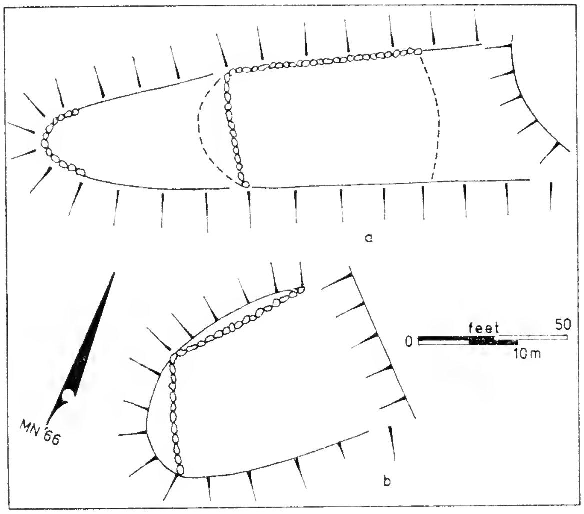

Fig. 88. Specialised structures on the ridge between Folasa and Vaimaga.

Discussion

The foregoing descriptions and illustrations demonstrate that there exist in Samoa various remote and distinctly shaped structures which are clearly not residential and must have fulfilled a specialised purpose or purposes. What these purposes were remains in doubt. The possibility that some or all of the structures are graves could be solved only by excavation of one or more; it should be noted, however, that they have distinct formal resemblances to star mounds, and that the limited excavation of a star mound at Luatuanu'u revealed no sign of its use for burial. On the other hand, the particularly restricted surface area and precipitous location of many of them precludes their use for that sort of pigeon-snaring contest described by nineteenth century writers which involved numbers of people over a considerable period of time. Such contests would be impossible at Maugatia or Mata'itoa, although they could be held at most of the other situations described, if earth terraces in the vicinity were used to accommodate the contestants.

It is possible to describe these sites as *tia* without solving the question of their function, since the term *tia* could embrace both graves and pigeon mounds. It is also possible, however, that some of them were *malumalu.* In view of this uncertainty, therefore, it seems safer to class them as specialised sites, without assigning a particular function to them.

The important formal characteristics which place a site in this category beyond doubt include a tendency to taper towards the end facing down the ridge, and the presence of protruding arms and recessed bays. Any structures exhibiting these features, where they are not merely a result of careless or erratic construction, must be considered specialised sites. The same characteristics relate these sites to the even more distinct star-shaped mounds.

There are, however, other sites in remote situations which do not exhibit these characteristics, whose interpretation is even more uncertain. Because of their position and fine stone facing, the remaining sites at Maugatia and at Polua also have a strong claim to be considered specialised. At the same time, however, they lessen the chance that specialised sites in this broader category are everywhere identifiable, since such sites in actual settlements would be indistinguishable from house sites in ordinary field survey.

The last point is reinforced by the sites on the Folasa-Vaimaga divide, which are even more like sites within the normal range found in occupation areas. There are no grounds for accepting them as specialised sites other than their location and their resemblance to *tia seu lupe* as described by Buck and other ethnographic writers.

Thus it can be seen that just as there is a great variation in size and shape of house platforms through low mounds to large mounds, so there is a range of structures from star mounds through allied forms distinguished by protruding arms and recessed bays, to sites whose specialised nature is more doubtful. The chances of correct functional identification of a majority of sites is considerably decreased by the difficulty of assigning many structures to distinct formal categories.

X. SUMMARIES AND DISCUSSION

A RADIOCARBON AND STRATIGRAPHIC SEQUENCE FOR SAMOA

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Arguments over the issue of model building in archaeology continue, some seeing the construction of a theoretically sound framework for ordering the data as a major part of any research programme, and others feeling that given some general objectives for exploration, any pattern imposed on the data must be one that is inherent, its formulation arising out of close familiarity with the materials available. There can be no doubt that most anthropologists hold certain views about the nature of culture, its component systems, and relationships among its various parts. In fact, of course, nearly all hold slightly different views. The question which arises here is how one ought to attempt the construction of a cultural sequence for Samoa. Should one employ a largely Samoan perspective and argue from close familiarity with a large corpus of materials from there? Should one analyse the material from the point of view of some framework thought appropriate to resolving current problems in Polynesian prehistory? Or should one perhaps employ methods currently advocated by students of prehistory elsewhere in the world?

It is our view that the underlying structure of the two volumes on Western Samoan archaeology which we have edited has in fact decided the issue. Although the volumes have been organised around a general statement of aims, followed by sections dealing with reconnaissance surveys of field monuments, other sections detailing the results of intensive site surveys and excavations in certain project areas, and ending with a final section summarising the entire programme, no one formal or theoretical framework has been adopted for the presentation and interpretation of the materials. This has allowed the authors of the different reports to emphasise the diversity of their materials while working within the context of related projects. In short, authors have been encouraged to concentrate on an interpretation of their own data and avoid those complications encountered when attempting to cast all results within a single framework, however elegant its theoretical foundation.

Useful though this mode of presentation may be, especially to those who will wish to integrate the data differently, any synthesis of these materials at this juncture requires some type of integrative framework designed to pull the data together without destroying their diversity or doing violence to interpretations which various authors have placed on them. For this reason we have chosen to outline a chronological sequence for Samoa based on a series of 45 radiocarbon dates and on the information from a substantial number of stratigraphic sequences, each covering a different span of time. Temporal relationships in Samoan prehistory, we feel, offer one of the few relatively independent means of integrating the diverse range of cultural data that has been gathered. We have therefore made an overall appraisal of the radiocarbon dates from Samoa, analysing their true chronological age more fully than one might when dealing with the results from a single site. On the other hand, when considering an author's interpretation of the occupational sequence at a site, we have stayed within the framework provided by his much closer analysis of the data. The resulting correlations yield a general picture of which periods of time are covered by what data. Based on this result, a separate analysis is provided in Reports 39 and 40 of the continuities, disruptions and changes over time among a variety of structural features and portable artifacts which are associated with the different occupations.

In the construction of this chronology and in the analysis of associated structural and portable artifacts, we have resisted the temptation to divide the sequence into culturally defined periods, aspects, phases or stages, although it is a common procedure in synthesising the prehistory of island groups in Oceania. There are several reasons for this. One is that the data are either inconclusive or insufficient at a number of points in the 2700 year sequence. Another is that we have not discovered in these data, nor found reason to impose on them, a particular scheme of temporal divisions. In large part this is because neither cultural peaks, abrupt changes in cultural content, nor significant clustering of distinctive materials are as yet in evidence. Rather, what we seem to have is a fairly full documentation of some features and artifacts at different points in time, and some knowledge of the associations between the various categories of material. These data can be used to demonstrate that certain structural features and classes of portable artifacts stretch over varying spans of time within the 2700 year sequence.

It is true that the historic materials could be separated out on the basis of European trade goods and made into a separate phase. It is also true that the earliest prehistoric materials are distinctive in their association with pottery. To separate them from the rest, however, leaves the large bulk of the Samoan evidence in the long interval between, for which no satisfactory division is available. Moreover, the continuity in structural features and other classes of portable artifacts is fairly strong between the early assemblages with pottery and those without. The same continuity applies at the late end of the sequence for assemblages with and without European trade goods. Thus it seems unwarranted to give the two ends of the sequence undue emphasis by recognising them as culturally separate entities in an otherwise undifferentiated sequence.

Finally, it is important at this stage in West Polynesian prehistory to assess the degree of continuity in sequences from each island group, especially those of Tonga, Samoa and Fiji. For it is not until we can assess the degree of continuity, change and cultural replacement on the basis of a full range of portable and structural artifacts, and not simply adzes or pottery, that the issues of Polynesian cultural origins and subsequent inter-island relationships can be satisfactorily stated and debated.

Interpretation of Radiocarbon Dates

A more elaborate and sophisticated interpretation of the age results reported to archaeologists by radiocarbon laboratories is required now that a better understanding of their conversion into calendrical ages has been achieved. For this reason, it is no longer sufficient simply to subtract the reported radiocarbon age from 1950 and cite the result as a calendrical age, particularly if the results fall within the last 7000 years, or if they are based on a half-life of 5568 years. Over the last four years Green has made three attempts to convert the Samoan radiocarbon results to calendrical dates, using the Suess (1970) curve, the initial MASCA conversion table (Ralph 1971), and now the most recent MASCA correction table for secular effect (Michael and Ralph 1972). As Damon, Long and Wallick (1972) comment for a rather similar table, current conversion scales represent the summation of a large number of compatible data and are not likely to change significantly in the near future. The revised MASCA table used here is the outcome of one of the papers presented by Michael and Ralph at the Eighth International Conference on Radiocarbon Dating. It should enjoy a fair measure of stability and is likely to be widely applied. It is, moreover, the table which has been used by the New Zealand radiocarbon laboratory in reporting and correcting our most recent set of eight dates. As a consequence, by using the new MASCA table, all 45 of our radiocarbon dates are now assessed according to the same method (table 23). The method consisted of converting all dates reported with the old half-life of either 5568 or 5570 to the new half-life of 5730, and then calculating an adjusted mean age in calendrical years from the New Zealand version of the MASCA table. Finally, the results have been rounded off in the process of translating the results into calendrical age ranges at 1 and 2 standard deviations from the mean. These ranges, rather than the mean, are used in the assessments which follow.

One might question the use of a northern hemisphere correction scale in the southern hemisphere (cf. Shawcross 1969: 190-192), although Samoa lies only 15° south of the Equator. Neustupny (1970: 42), however, offers considerable evidence in support of the view that there is no longitudinal variation in C14 concentration, as well as good theoretical grounds and data for viewing temporal variations in C14 as synchronous and of the same amplitude throughout the world. Also, it should be noted that the New Zealand laboratory, which earlier obtained some of the anomalous southern hemisphere results because of problems in ascertaining correct ages for annual rings in New Zealand trees, is sufficiently satisfied with the new scale to apply it to the most recent of our Samoan results. It seems, therefore, the best basis available at present for arriving at calendrical equivalents of radiocarbon dates from Samoa.

As a final caution we should affirm our awareness of the problems presented by individual radiocarbon determinations, any of which may be subject to individual errors introduced by a number of factors. Although it is no longer necessary, with the new conversion tables, to increase all errors derived from laboratory counting procedures quoted at less than ± 100

TABLE 23

ASSESSMENT OF CALENDRICAL AGE FOR RADIOCARBON DATES FROM SAMOA

Sample no.	Site no.	Location in site	Age in years B.P. (1950) for half-life of: 5568 or 5570	5730	Adjusted age in calendrical years	Calendrical age with 68% confidence	Calendrical age with 95% confidence
NZ-1427	SU-Le-12	centre post house 1, sq. E/F 6	modern	modern	—	—	before 1840 A.D.*
NZ-1431	SU-Le-12	posthole, perimeter house 1, sq. E-7	modern	modern	—	—	before 1840 A.D.*
GaK-499	SU-Vg-1	*umu ti* in Vaigafa village	< 200	< 206	<1633 A.D. (at 2 s.d.)	—	1630 - 1840 A.D.
GaK-1197	SU-Fo-2	oven in corner of square house on terrace	180±70	185±70	1702± 70 A.D.	1630 - 1770 A.D.	1560 - 1840 A.D.
NZ-1430	SU-Le-12	posthole 2, perimeter house 1, sq. G-5	184±75	190±77	1696± 47 A.D.	1550 - 1740 A.D.	1500 - 1790 A.D.
NZ-1432	SU-Le-12	posthole, perimeter house 1, sq. D-6	188±54	195±54	1691± 54 A.D.	1640 - 1750 A.D.	1580 - 1800 A.D.
GaK-1436	SU-Fo-1	oven 2, house site 1, sq. B-5	210±70	216±70	1623± 70 A.D.	1550 - 1690 A.D.	1480 - 1760 A.D.
GaK-1201	SS-01-B-16	rectangular pit on platform	210±100	216±100	1623±100 A.D.	1520 - 1720 A.D.	1420 - 1820 A.D.
GaK-501	SU-Va-1	firepit on platform layer 1b	220±70	227± 70	1613± 70 A.D.	1540 - 1680 A.D.	1470 - 1750 A.D.
GaK-498	SU-Lu-21	oven off terrace to rear	230±70	237±70	1603± 70 A.D.	1530 - 1670 A.D.	1460 - 1740 A.D.
NZ-360	SU-Se-1	charcoal from fire lens on platform	240±50	247±50	1593± 50 A.D.	1540 - 1640 A.D.	1490 - 1690 A.D.
NZ-1434	SU-Le-12	large post, layer 3, sq. F-6	286±91	295±93	$1571{+93 \atop -66}$	1510 - 1660 A.D.	1440 - 1760 A.D.
GaK-1437	SU-Lam-1	layer 1, pit or posthole Sq. B, Subsq. H-5	350±100	361±100	1520±100 A.D.	1420 - 1620 A.D.	1320 - 1720 A.D.
NZ-854	SU-Lam-1	layer II, level 3, Sq. A, Subsq. F-5	< 352	< 363	< 1518 A.D.	< 1520 A.D.	< 1170 A.D.
NZ-1428	SU-Le-12	posthole in west baulk layer 3, sq. F-6	401±104	414±117	1536±117 A.D.	1420 - 1660 A.D.	1310 - 1770 A.D.
GaK-1434	SU-Fo-1	posthole 87, house II house site 1, sq. D-5	470±180	484±180	1463±180 A.D.	1280 - 1640 A.D.	1100 - 1820 A.D.
GaK-500	SU-Va-1	oven, base layer IVb step 1 (north)	680±80	700±80	1256± 80 A.D.	1180 - 1340 A.D.	1100 - 1420 A.D.
GaK-497	SU-Lo-1	oven, layer V Sq. B-2, excavation B	735±85	757±85	1236± 85 A.D.	1150 - 1320 A.D.	1070 - 1410 A.D.

GaK-1196	SU-Fo-2	*umu ti* at rear of terrace	740±100	762±100	1231±100 A.D.	1130 - 1330 A.D.	1030 - 1430 A.D.
GaK-1202	SS-Sp-15	*umu ti* in association with house platform	750±80	773±80	1221± 80 A.D.	1140 - 1300 A.D.	1060 - 1380 A.D.
GaK-1195	SU-Vam-3	oven, associated with house site	760±100	782±100	1211±100 A.D.	1110 - 1310 A.D.	1010 - 1410 A.D.
GaK-502	SU-Va-2	lens on surface of layer 2, Sq. B-6	850± 70	876±70	1126± 70 A.D.	1060 - 1200 A.D.	990 - 1270 A.D.
GaK-503	SU-Va-3	firepit at base of layer 5a, Sq. C-5	865±70	891±70	1111± 70 A.D.	1040 - 1180 A.D.	970 - 1250 A.D.
NZ-1429	SU-Le-12	charcoal on interface layer 4 and natural sq. C-3	881±120	907±124	1088±124 A.D.	960 - 1210 A.D.	840 - 1340 A.D.
GaK-1200	SS-01-C-1	firepit in house platform	890±70	917±70	1079± 70 A.D.	1010 - 1150 A.D.	960 - 1220 A.D.
GaK-1442	SU-Le-12	layer 1, sq. F-5	890±80	917±80	1079± 80 A.D.	1000 - 1160 A.D.	920 - 1240 A.D.
NZ-855	SU-Va-4	fire hearth sealed under clay band on top of layer F-1a	927±241	955±241	1041±241 A.D.	800 - 1280 A.D.	560 - 1520 A.D.
GaK-1438	SU-Lam-1	layer II, level 3 sq. C, subsq. G-3	1050±80	1082±80	930± 80 A.D.	850 - 1010 A.D.	770 - 1090 A.D.
GaK-1443	SU-Le-12	surface of layer 7, sq. F-6	1410±80	1452± 80	586± 80 A.D.	510 - 670 A.D.	430 - 750 A.D.
GaK-1435	SU-Fo-1	brown layer under terrace sq. D-11, house site 2	1410±110	1452±110	586±110 A.D.	480 - 700 A.D.	370 - 810 A.D.
GaK-799	SU-Lu-41	layer 4, cutting VIII	1500±80	1545±80	499± 80 A.D.	420 - 580 A.D.	340 - 660 A.D.
GaK-1439	SU-Va-38	firepit under mound layer 14	1550±80	1597±80	444± 80 A.D.	360 - 520 A.D.	280 - 600 A.D.
GaK-1693	SU-Va-4	oven toward base layer E, sq. A-1	1600±350	1648±350	371±350 A.D.	20 - 720 A.D.	B.C. 330 - 1070 A.D.
GaK-1198	SU-Va-4	lens at base of layer F-1	1660±80	1710±80	314± 80 A.D.	230 - 390 A.D.	150 - 470 A.D.
GaK-1340	SU-Lu-53	agricultural activity layer 2, rectangle A-2	1660±80	1710±80	314± 80 A.D.	230 - 390 A.D.	150 - 470 A.D.
GaK-1199	SU-Va-4	cooking pit, Hearth Horizon	1680±80	1730±80	294± 80 A.D.	210 - 370 A.D.	130 - 450 A.D.
GaK-1341	SU-Sa-3	layer 4, level 2, sq. F-6	1800±80	1854±80	163± 80 A.D.	80 - 240 A.D.	0 - 320 A.D.
GaK-1441	SU-Sa-3	layer 5, sq. I-6	1840±100	1895±100	123±100 A.D.	20 - 220 A.D.	B.C. 80 - 320 A.D.
NZ-362	SU-Va-1	bottom part of layer V	1850±50	1906±50	122± 50 A.D.	70 - 170 A.D.	20 - 220 A.D.
NZ-361	SU-Va-1	top part of layer V	1880±60	1936±60	92± 60 A.D.	30 - 150 A.D.	B.C. 70 - 210 A.D.
NZ-363	SU-Va-1	pit sealed by layer V	1950±120	2009±120	2±120 A.D.	B.C. 120 - 120 A.D.	B.C. 240 - 240 A.D.
GaK-1194	SU-Va-4	Hearth Horizon, sq. N-2	2150±100	2215±100	B.C. 258±100	B.C. 360 - 160 B.C.	B.C. 460 - 60 B.C.
GaK-1339	SU-Lu-53	firepit on surface layer 1, under terrace	2170±100	2235±100	B.C. 278±100	B.C. 380 - 180 B.C.	B.C. 480 - 80 B.C.
GaK-1444	SU-Le-12	pit, layer 5b, sq. F-7	2210±100	2276±100	B.C. 310±100	B.C. 410 - 210 B.C.	B.C. 510 - 110 B.C.
GaK-1342	SU-Sa-3	oven, base layer 2, sq. H-2	very recent contaminated by addition of more than 20% modern carbon of unknown source				

* upper limit set by fact site is not historic, i.e. after 1840 A.D.

years to that figure at a minimum, as recommended by Polach and Golson (1966: 22), it is still worth accepting their recommendation that final results should be expressed in rounded-off age ranges that are twice, as well as once, the standard deviation (Polach and Golson 1966: 23). We also recognise the possibility of the inclusion of older charcoal in more recent stratigraphic contexts, the problem of firmly associating an event dated by the burning of the sample with the feature, structure, or layer for which an age is required, and the possibility that some species of tropical trees or the use of heartwood from particularly slow-growing species may yield results older than the context in which the sample is found. Just how many and complicated are the possible sources of error from such factors is indicated by the discussions in site reports in these two volumes and in a general discussion by Shutler (1971: 23-27) of problems encountered in the Pacific. At this point, confidence in the results is only restored by numbers of independent dates all supporting the same general conclusion, and by assessing the stratigraphic and cultural contexts in which they occur to confirm the reasonableness of the results.

Radiocarbon-Dated Sites and Stratigraphic Sequences

Useful stratigraphic sequences in association with radiocarbon dates are principally from the project areas of Vailele, the Upper Falefa Valley, Luatuanu'u, and Lotofaga. Among these, the sites from Vailele and the Upper Falefa Valley provide the most satisfactory data for a general sequence. Elsewhere, isolated dates for particular sites and features are available, which although they may be related on the basis of chronological age to the general sequence, are not as easy to evaluate on the basis of their content and position within a local context. For this reason, the discussion of age proceeds from dates for sites in the Vailele and Falefa areas to single dates from a sole site or feature in a locality.

Age of Pottery-Bearing Deposits

A useful starting point is the age of layer V at Va-1 in Vailele, which in its cultural content is almost the same as layer 4 of Sa-3 in the Upper Falefa Valley. A best estimate for layer V at Va-1, based on the pooled mean of three dates (NZ-361 to 363) is A.D. 100 ± 34. It is admirably supported by a date for layer 4 of Sa-3, which with 95 percent certainty is not before A.D. 1 and very probably lies between A.D. 80-240 (GaK-1341). On this basis A.D. 100 ± 100 is given as a best estimate of its age in table 25.

If the other pottery-producing layers at Sa-3 and that from Va-4 are ordered according to

Table 24

Varietal Change in Samoan Pottery

Site	No. of thick ware sherds	Percentage	No. of thin ware sherds	Percentage
SU-Va-1, layer V	719	99.7	2	0.3
SU-Sa-3, layer 4	1171	79.1	309	20.9
SU-Va-4, layer F-1b	31	13.5	198	86.5
SU-Sa-3, layer 5	385	8.7	4062	91.3
SU-Sa-3, Occup. A	48	3.2	1447	96.8

Table 25

Calendrical Ages from Radiocarbon Dates

Site	Calendrical Age Range: At one standard deviation	Calendrical Age Range: At two standard deviations	Best estimate of age
SU-Va-1, layer V	70 - 170 A.D.	20 - 220 A.D.	
layer V	30 - 150 A.D.	B.C. 70 - 210 A.D.	100 ± 34 A.D.
under layer V	B.C. 120 - 120 A.D.	B.C. 240 - 240 A.D.	
SU-Sa-3, layer 4	80 - 240 A.D.	0 - 320 A.D.	100 ± 100 A.D.
SU-Va-4, layer F-1b	—	—	before 100 A.D.
SU-Sa-3, layer 5	20 - 220 A.D.	B.C. 80 - 320 A.D.	50 ± 100 A.D.
SU-Sa-3, occup. A	—	—	before 1 A.D.

TABLE 26

AGE ASSESSMENT OF RADIOCARBON DATES FOR SU-VA-4

Stratigraphic sequence	*Calendrical Ages A.D.* with confidence of: Upper Limits 68%	95%	Lower limits 68%	95%	Best estimate of age
Layer E — oven within layer	720	1070	not applicable		800 - 1070 A.D.
Layer E/F-1 interface — firepit	not applicable		800	560	560 - 800 A.D.
Hearth Horizon — stone-lined oven sealed by Layer E, subsequent to F	370	450	210	130	210 - 450 A.D.
Layer F-1, probably F-1a	390	470	230	150	150 - 390 A.D.
Layer F-1b, with pottery	no clearly associated samples				prior to 150 A.D.

their percentages of thick coarse and thin fine ware sherds (table 24), then the two A.D. 100 layers with predominantly thick ware sherds discussed above, are preceded by three layers with largely thin fine ware sherds. Only one of them, layer 5 at Sa-3, is radiocarbon-dated. Its age is almost certainly not earlier than 80 B.C. and it probably dates towards the lower end of the one standard deviation age range of A.D. 20-220 (Gak-1441), since ceramically it should be earlier than the two A.D. 100 layers above, and stratigraphically it is in fact earlier than one of them. Within these constraints, an age range of A.D. 50 $\pm$ 100 seems a reasonable estimate for layer 5 at Sa-3. It implies that of the other two deposits with thin fine ware, the stratigraphically earlier occupation A at Sa-3 is older than A.D. 1 (table 25). It also indicates that layer F-1b at Va-4, which is ceramically equivalent to layer 5 at Sa-3, is certainly earlier than A.D. 150 and probably has an age before A.D. 100 (see below).

DATED DEPOSITS AT VA-4

The assessment of the age of layer F-1b at Va-4 forms a useful basis for discussion of all deposits at Va-4 which have been radiocarbon dated. There can be no argument that the series of dates for this mound is not entirely satisfactory, partly because of the small size of some samples, resulting in large standard deviations, and partly as the result of the difficulties experienced in distinguishing, designating, and equating its deposits, which were excavated at four different times by four different archaeologists. Still, the results can be made to yield a more consistent picture than might at first be apparent from inspection of the dates in table 23.

The age of the oven within layer E, giving a maximum age for the prehistoric mound occupations, B and D, must lie towards the upper limits of the 700 to 1400 year time span allowed by the radiocarbon results (GaK-1693), if the remaining results, which are all stratigraphically earlier, are to be accepted. This can be seen in table 26. An only slightly better radiocarbon result, with a 480 to 960 year time span, is from a sample (NZ-855) in a fire pit sealed by a clay lens at the base of layer E (I, Report 10, fig. 68), which is cut into layer F-1a. It indicates that layer E was almost certainly laid down after A.D. 800, and that the fire pit, made before that date, is not earlier than A.D. 560. Such an assessment is consistent with one of two ages for the Hearth Horizon, a deposit which lies above layer F-1a and below layer E, in a stratigraphic position which is approximately equivalent to the fire pit and clay lens.

The compatible Hearth Horizon result, GaK-1199, is from a stone-lined oven at the northeast end of the bulldozer cutting. Because the deposit is lacking in pottery, an age earlier than the 68 percent limit of A.D. 210 is unlikely, given the age estimates for pottery from nearby Va-1 discussed above; an age up to the 95 percent limit of A.D. 450, however, is quite acceptable, both stratigraphically and in relation to the other radiocarbon results. Unfortunately, this determination is in conflict with another for the Hearth Horizon in square N-2 (GaK-1194) indicating a date between 460 and 60 B.C., because more than three standard deviations separate the two results. Unlike Terrell (I, Report 10, p. 166), we are inclined to reject the second result as a useful indication of the age of this deposit in view of its lack of associated pottery and its conflict with all other age results for this mound. The anomalous result may be explained by older charcoal incorporated in a more recent context, a wrong interpretation of the event (in this case the Hearth Horizon) which this charcoal was thought to date, or an incorrect radiometric assessment of its age.

The final radiocarbon result from Va-4 bears on the age assessment of the pottery from layer

F-1b, discussed above, as before A.D. 150 and probably before A.D. 100. As Terrell has indicated (I, Report 10, p. 164), no carbon samples were obtained from a context clearly associated with the pottery. A sample (GaK-1198) has been dated, however, from a thin concentrated lens of carbon and fire-burned pebbles within and near the base of layer F-1, at a point where that deposit was not differentiated into layer F-1a and F-1b. Its age is the same as that for the sample from the Hearth Horizon which we have accepted as correct, and its stratigraphic position, which ties it closely in time to that of the Hearth Horizon, is only slightly earlier. It strongly suggests that the lower limit for the age of layer F-1a is about A.D. 150, an assessment which fits well with that based on the ceramic position of layer F-1b, evaluated above as before A.D. 100.

The Vailele Sequence

The cultural sequence at Vailele, which began with the radiocarbon-dated pottery deposits of Va-1 and Va-4, is continued by the occupation deposits from the Hearth Horizon at Va-4, dated to the third to fifth centuries A.D. At approximately the same time, almost certainly between A.D. 280 and A.D. 600, and probably during the fourth century, another wholly prehistoric succession of occupation floors began at Va-38. It lasted for a long but unknown period without evident interruption (I, Report 11, p. 181). Features denoting the continuation of occupation at Va-4 after the Hearth Horizon are a fire pit and some associated stone alignments on the surface of layer F-1a in square A-1. Using the best estimates that can be made from some rather unsatisfactory radiocarbon results, the features are dated to between A.D. 560 and A.D. 800. They are almost certainly not later than the eleventh century A.D. mean age of the sample from the fire pit. Therefore, the break in the sequence of deposition initially encountered at Va-1 between the second century A.D. and the renewal of occupation in the thirteenth century has now been filled by materials from other sites in the vicinity, indicating that the gap is local to the site of Va-1 and does not represent a break in occupation of the Vailele area.

The next major event in the area was the appearance of earthen mounds (Report 39, p. 226). Exactly when mound construction began in the Vailele area is difficult, if not impossible to document. What is apparent is that at several sites where activities not involving mounds had been in evidence, substantial mounds suddenly appeared. For example, at Va-2 the sequence starts with some scattered hearths, postholes, food storage pits, and a possible oven, in association with some agricultural activity which probably dates to the twelfth century A.D. and before (I, Report 8, p. 144). These activities, almost certainly lasting no later than the thirteenth century, were followed by the construction first of a low mound for some special purpose and then of a large house mound over the smaller mound. At Va-3, a low-lying living pavement replaced the long use of the locality for gardening and the making of fire pits and ovens, one of which yielded a sample (GaK-503) dating to the twelfth century A.D. or before. Shortly after construction of that pavement a large mound was built, on the surface of which successive residential occupations took place.

The adjacent locations of these two sites, the similar activities which took place on them, and the nearly identical dates for some of these, suggest one general use for this part of Vailele up to the twelfth century A.D.

It should be noted here that in the individual reports on Va-2 and Va-3, Green (I, Report 9, pp. 154, 157) appears to imply that human activity in this portion of Vailele did not begin until the tenth or eleventh centuries A.D. This is obviously not the case. More correct is the interpretation (I, Report 8, pp. 145, 151) that stated that evidence for intensive use of the locality before the twelfth century A.D. is slight and confined to features indicating clearing, horticultural activity, and cooking fires, rather than occupation levels indicating domestic residence. Such recurring activities probably took place in the Vailele area for many years. However, bush-fallow gardening cycles leave little trace of any but the latest activities, and then only when they are sealed off from subsequent disturbance by a platform or mound. Thus, where localities are known on the evidence of adjacent sites to have been occupied at an earlier period, it is unwise to conclude either that features in agricultural soils at the base of a site necessarily date the first human activity there, or that all such features will be of one age. Vailele is a good example of the first situation, where the evidence from Va-1 and Va-4 indicates use of the locality for many years before the twelfth century materials recovered from the bases of Va-2 and Va-3. The second situation is well exemplified by the deposits from Lu-53 and Lam-1, discussed below, where dated samples from separate areas and layers at the base of the same site exhibit different ages.

At Va-1, evidence of renewed activity is provided by an oven at the base of the deposits under a series of house platforms. A sample (GaK-500) from this oven places this activity perhaps a century later in time than similar activities recorded not far away at the base of Va-2 and Va-3. Successive occupations on low raised platforms with river gravel house pavements followed shortly thereafter, probably in the thirteenth century A.D., and lasted for an interval estimated to span not more than 200 years. In this interval there were at least three major renewals of the platform surface, indicating that for some time there was a return to residential use of Va-1, before its conversion into a mound.

The occurrence of deep earth fills at approximately the same point in the stratigraphic sequences of the four excavated mounds is worth noting, although the resulting mounds were not necessarily all contemporary in their construction, nor alike in their function, at least initially. The earliest mound, on present evidence, was probably that of Va-4, although the rather unsatisfactory radiocarbon results, including one from a sample closely associated with mound construction (GaK-1693), allow no great precision. As argued above, a best estimate of the maximum age of the layer E mound fill is A.D. 800. An eleventh century age seems even more acceptable. This estimate would place the mound's main residential occupations, D and B, in the twelfth century A.D. or after. The possibility that they are earlier, however, must not be totally rejected.

The layer 3 fill which formed the mound at Va-3 appears to have a thirteenth century A.D. or later age. There were several periods of residential occupation on its surface. At Va-2, by incorporating a smaller specialised mound, a mound of substantially increased size was created and used for residence some time after the thirteenth century A.D. This estimate, based on the twelfth century age of the basal layer, assumes that the specialised sub-mound functioned as a structure for perhaps a century.

The deep earth fill which converted the low raised house platform at Va-1 into a large earth mound with a hollow depression in its centre is dated by a charcoal sample from a fireplace on the surface of a stone platform in the depression. This platform, the last of a series in the depression, belongs to the final stage in the use of the mound as a specialised structure (I, Report 7, p. 126). The sample (GaK-501) indicates that this stage could have an age as late as the first part of the eighteenth century, or as early as the first part of the sixteenth century. A seventeenth century date seems the most appropriate, with the stratigraphically earlier stone platforms in the central depression dating from the sixteenth century. Before the early nineteenth century, this mound also had been converted to residential use.

The Vailele sequence is terminated by nineteenth century use of the mounds for burial or to carry structures related to plantation activities, all of which date to the 1870s and after. Concrete remains from plantation structures existed on the surfaces of Va-3 and Va-4. In the case of Va-4, a substantial number of portable artifacts belonging to the late nineteenth and early twentieth centuries were also recovered from layer A (I, Report 10, p. 166). Burials subsequent to the last residential use of Va-1 and Va-2, probably of plantation labourers (I, Report 7, p. 127; Report 8, p. 149), provide a dating for the final use of those two mounds.

In summary, residential use of large mounds at Vailele from perhaps as early as the eleventh century to well into the eighteenth century A.D. is reasonably well attested by the evidence from four sites. During this period, raised house platforms were sometimes contemporary with mounds, particularly mounds of specialised function, and specialised mounds were contemporary with large mounds used for habitation.

The Falefa Valley Sequence

A summary of the general chronological sequence for the Upper Falefa Valley has already been presented by Davidson (Report 30, pp. 155-156).

The case for a first century A.D. dating of layers 4 and 5 at Sa-3, which were associated with pottery, has been discussed above in relation to the pottery-bearing layers from Vailele. In that discussion it was concluded that the age of occupation A at Sa-3 may be estimated as before A.D. 1, despite the lack of a dated sample in direct association. The only earlier date from the Upper Falefa Valley is on a sample (GaK-1444) from a pit fill at Le-12, which also contained potsherds and other early artifacts. When the radiocarbon result is corrected to a calendrical age, it strongly implies that occupation on the flat expanse of fertile soil at the back of the Falefa Valley had begun before 60 B.C. — provided, of course, one accepts the interpretation of the debris in the pit as a fill from an earlier deposit nearby which was used to level the surface of the platform. The possibility that this material derives from a nearby occupation level as early as the third century B.C. is considerably strengthened now that it is possible to demonstrate from other evidence that 300 B.C. does not mark the lower limit of an acceptable age for the settlement of Samoa (Report 33, p. 174). After some 500 years, occupation as far inland as this might well be expected.

Between occupations B and C at Sa-3, dated to the first century A.D., and occupation E, dated to the 1830s, is occupation D. On stratigraphic grounds (Report 29, p. 117), the interval between occupations C and D has been assessed as more than 700 years. The relevant charcoal sample (GaK-1342), however, proved to be one of two which were contaminated by the addition of more than 20 percent of modern carbon. Contamination of unknown origin after collection and before counting is the probable cause. A satisfactory determination for the other contaminated sample was subsequently obtained by using additional charcoal from the original sample. Unfortunately, the charcoal remaining in the original sample from which GaK-1342 was drawn proved to be of insufficient size, and only a general assessment of less than 10,000 years could be given (Kigoshi, pers. comm.). Hence the age of occupation D is still defined only within the broad limits indicated above.

In the 700 year interval following the pottery-bearing layers at Sa-3 there are few dated deposits from excavated sites in the valley. A reasonably secure sample (GaK-1443) from a well dated sequence at Le-12 provides an age estimate of before A.D. 750, probably in the sixth or seventh centuries A.D., for occupation A at the base of that site. The other age determinations in this interval are more difficult to interpret. One, GaK-1435, from a sample under the terrace at Fo-1, may reflect an early stage in bush clearance and agricultural development of the lower slopes of the valley by the sixth or seventh centuries A.D. There is little evidence of earlier use of this locality, apart from some very weathered adze fragments from later contexts at Fo-1 itself. The other determination, GaK-1438, is a sample from one of a number of charcoal lenses just above the undisturbed ground surface underlying the mound at Lam-1. Its context, like those of similar samples from the mounds at Vailele, appears to reflect agricultural activities of the eighth or ninth centuries A.D. In this locality, however, there is good evidence of earlier activities than those dated, in the form of potsherds in the mound fill. As is not unusual, there is also a second date of different age from beneath the mound at Lam-1. Since this second result is later in time and probably dates the last stage of gardening activities in the locality before the construction of the mound, it is discussed below.

The two dates in the 700 year interval under discussion — one from the fertile valley flat, the other from the lower slopes — are probably the best directly dated evidence of agricultural activity in the Upper Falefa Valley before A.D. 1000. They are strongly, though indirectly, supported by the firm evidence of occupation in the upper valley from the first century B.C. onwards, and perhaps from the third century B.C.

Dated habitation levels in the valley flat after A.D. 1000 and before A.D. 1400 are known only from occupation C at Le-12. Here, one sample (NZ-1429) from under an extension to the house terrace provides a reasonably good indication that an existing feature was enlarged in the eleventh or twelfth centuries. Another sample of this age, GaK-1442, from the most recent occupation at Le-12, may be rejected as an accurate estimate of the layer in which it was found, because it is in conflict with all other radiocarbon determinations for that layer, and with other archaeological and traditional evidence supporting an eighteenth to early nineteenth century age for the final occupation. However, as Davidson and Fagan (Report 24, p. 83) suggest, the charcoal could well derive from an earlier period, probably that of occupation C, as indicated by its eleventh to twelfth century date.

It is difficult to say exactly when actual occupation began on the lower slopes along the side of the valley, although some point after production and use of pottery had ceased seems very probable and is consistent with the one date for the beginning of bush clearance at Folasa in the sixth to seventh centuries A.D. The first dated signs of habitation, and not simply human activity, on the lower slopes are recorded for the period between A.D. 1100 and A.D. 1400, at a time when dated occupation levels on the valley floor are known only at Le-12. An oven at Vam-3 provided a sample (GaK-1195) with a twelfth to thirteenth century age. It has an upper limit in the fourteenth century. Stratigraphic evidence indicates that before then at least two residential occupations, one associated with the dated oven, the other earlier, had taken place. Underlying both habitation levels was a zone suggesting bush clearance, which may well have been associated with gardening activity. It suggests use of the locality by perhaps the tenth or eleventh centuries A.D. The raised rim oven used for cooking *ti* at Fo-2 on a terrace above Fo-1 has also yielded a sample (GaK-1196) with a result that is likely to be of twelfth or thirteenth century age. Construction of the terrace, either for habitation or as a specialised site, was almost certainly earlier than the construction and use of the oven.

Further evidence from Folasa of a terrace constructed for habitation at this period is furnished by Fo-1 immediately below Fo-2. The age of construction may be estimated on the basis of two dates from the surface of the terrace, as well as the sample from beneath the terrace. The sample (GaK-1434) from a post of house II has a large standard deviation which would permit the construction of the house to be as early as the thirteenth century or as late as A.D. 1800. A sample from an oven associated with the end of the house sequence sets an upper limit on the sequence as mid-eighteenth century, with a date in the late sixteenth or seventeenth centuries more likely. As at least six houses preceded house II on the terrace, a point in the thirteenth or fourteenth centuries seems to offer the best estimate for the beginning of the series of houses (see below). The construction of the terrace, therefore, would be reasonably bracketed between the A.D. 800 upper limit for the sample underlying the terrace, and the thirteenth to fourteenth century estimate for the beginning of the house sequence.

After A.D. 1400 a number of dated occupation levels are known from both the floor and the lower slopes of the Upper Falefa Valley. At Fo-1, the possibility of a long series of residences beginning in the thirteenth or fourteenth centuries and extending into this period has been raised. From the age of the materials trapped under the terrace, the evidence of several major river gravel fills reflecting restorations of the paved surface, each with several associated houses, and the knowledge that the life of a single house structure need not be more than a decade (Report 39, p. 236), it would appear that an interrupted sequence of recurring habitation is involved. This would be consistent with a better dated sequence of the same type, involving the same depth of deposits and spanning the same period, on the raised terrace platform of Le-12. At Fo-1, only the late end of the series is reasonably well fixed, with house II, discussed above, probably dating to the seventeenth century or before, and followed by house I of the same or slightly later age. The oven associated with this end of the occupation sequence provides a sample supporting this interpretation, as does the wholly prehistoric content of the associated artifacts. The series of houses could well begin before A.D. 1400 and represent several recurring occupations in the period under discussion.

A final residential use of nearby Vam-3 in the period after A.D. 1400 is indicated by the twelfth to thirteenth century age of the underlying oven sample discussed above, by the fine state of preservation of the final occupation features on the site, and by the traditional evidence for habitation of this locality in the immediately pre-European period.

Out on the valley floor, securely dated habitation levels after A.D. 1400 are recorded for Le-12 and Lam-1. At Le-3, two periods of residential use, comparable in age to those at Le-12, are in evidence (Report 25, p. 97). At Le-12, the date of occupation E and house 1 of layer 1 has been determined on the basis of a sample from a wooden centre post (NZ-1427) and three tree-fern perimeter posts (NZ-1430 to 1432). On the basis of eighteenth to early nineteenth century or modern results, and the absence of early European artifacts, occupation E is fairly securely assigned to the period between A.D. 1770 and 1820. This is supported by the traditional evidence that the last settlement of Leuluasi was just before European contact. An earlier residential occupation, D, at Le-12 is reasonably well dated by two samples (NZ-1428 and 1434) to the sixteenth century A.D.

A broadly similar age for the residential use of Lam-1 is suggested by two samples. The first, NZ-854, indicating mound construction probably in the sixteenth century, and certainly not earlier than the twelfth century A.D., is consistent with a second, GaK-1437, for habitation on the surface of the mound, probably in the fifteenth or sixteenth centuries A.D., and almost certainly before the seventeenth century. As there was a series of occupations on the mound, it is reasonable to infer that habitation began in the sixteenth century with the construction of the mound, and continued into the seventeenth and perhaps the eighteenth centuries.

The final radiocarbon result from the Upper Falefa Valley is on a sample from a small oven in the corner of a square house at Fo-2, the only one recorded in our Samoan survey. It was thought by local Samoans to be a plantation house of recent age, an assessment supported by the radiocarbon result. Although the result could be interpreted as prehistoric, in this instance the possibility of a more modern interpretation is favoured. This sample illustrates the difficulties involved in using radiocarbon results alone to separate nineteenth and twentieth century events from those of the seventeenth and eighteenth centuries. The same difficulty is demonstrated by the four samples for one event at Le-12, two of which give modern and two seventeenth to eighteenth century readings.

The Luatuanu'u Sequence

It is not possible to present for the Luatuanu'u area (the other project area on Upolu explored in some detail) a radiocarbon-dated sequence of the same quality as those presented for Vailele and the Upper Falefa Valley. Yet enough information has been obtained to make it worthwhile to assess the four dates available within a single framework.

As on the lower slopes of the upper Falefa Valley, one would expect the first signs of human activity to reflect bush clearance, and perhaps gardening, which was then followed by habitation. It would seem that the failure to find pottery in or on any of the inland sites is, in this instance, an indication that only minimal use of this part of Upolu for activities other than gardening took place up to the fourth or fifth centuries A.D., by which time pottery production had ceased (Report 40, p. 248). This is supported by the adze forms in an extensive collection from the inland sites thought to date from the middle to late part of the sequence (I, Report 12, p. 198). The hilly terrain and the low fertility of its soils would have made the inland area of Luatuanu'u relatively unattractive, and it would not have been occupied until growth of population, and perhaps reduction of fertility of coastal soils through long use, required expansion into such areas.

It is also possible that, just as the traditional account records, the narrow coastal strip of raised sand beach was not available for settlement some 1500 years ago (see below). This is supported by the presence of only later adze types in the coastal collection (I, Report 12, p. 198).

The few available radiocarbon dates fit well with such an outline. Two dates are now available for the base of Lu-53. One, GaK-1339, from one of several small fire pits on the former ground surface underlying the terrace fill (I, Report 14, p. 216 and fig. 95) provided a third or fourth century B.C. result. The second date, GaK-1340, has become available since Report 14 was published. It is from layer 2 of square A-2 (I, Report 14, fig. 91) and was stratigraphically sealed under the first (layer 5) of a series of extensive habitation floors extending out on to the terrace fill. The sample, from one of several pockets of charcoal found in depressions of an uneven former ground surface (layer 1), is associated with the base of a loose grey soil (layer 2), best interpreted, along with other similarly composed lenses (layers 3 and 4), as evidence of former use of the locality for agriculture after clearance of the bush. The result suggests a date in the third or fourth centuries A.D.

The possibility that dates of differing ages will be obtained from similar contexts beneath a structure has already been mentioned. The two dates from Lu-53 considered together provide a strong indication of several centuries of agricultural activity in the locality before it was used for habitation. The change to residential use, on stratigraphic evidence, would have followed shortly after the third to fourth centuries A.D. Habitation at this site then ceased for an extended period, during which activity reverted to gardening. The cycle was repeated when the site was again used for habitation, then for a specialised non-domestic structure (the star mound), and finally for modern gardening. Unfortunately, only the last of these events is dated.

The results of a 2000 year sequence of alternating use of land for agriculture and habitation are evident in another phenomenon encountered in the Luatuanu'u area. Long agricultural use, to the point of exhausting some soils in the area, has given rise to many open fern-covered ridges (I, Report 12, p. 186). Presumably these zones were still favoured for settlement after they were abandoned for agriculture. Dispersed settlements along the ridges had the advantages of steep natural slopes and clear views of the surrounding area, and were close to easily fortifiable positions. One such traditional settlement on the Tula-i-Matafale is dated by a sample (GaK-498) from an oven thought to be associated with one of its house sites, Lu-21, to the sixteenth or seventeenth century A.D. — an age consistent with its traditional dating.

A defensive location further inland, Lu-41, is strongly fortified. It appears that the fort in its present form, including the terraced residential area on the inland end (Report 39, p. 228) and the large breadfruit storage pits, is protohistoric in age and is to be associated with the more recent stage of construction which formed the high inner bank on the downhill end. A radiocarbon sample (GaK-799) of material associated with an earlier stage of bank construction, at a time when the fort may have extended only to the narrow neck at its centre (I, Report 13, fig. 86), strongly implies human activity there before the seventh century A.D. It may well date the first construction of a fort at this point on the ridge. From the context of the sample it is difficult to be sure, but fortification of the ridge in the fifth to sixth centuries A.D. would not be inconsistent either with the pattern of later occupation or with the evidence of habitation at Lu-53 by that time.

Other Radiocarbon Dates

The five remaining radiocarbon dates from Western Samoa are more difficult to interpret in relationship to each other, other dates, or the general sequence.

A single determination (GaK-497) from a sample taken from an oven at the base of the deep sandy coastal deposits along the beach front at Lotofaga indicates when occupation may have begun on the then low-lying and probably newly emerged sandspit there (I, Report 15, p. 230). These deposits are probably equivalent to the Tafagamanu Sands around the coasts of Upolu and Savai'i, which Kear and Wood (1959: 29-30, 47) interpreted as raised beaches or raised beach ridges.

Evidence of recent uplift relative to sea-level along this and other coasts of Samoa is fairly common. Whenever we have examined deposits mapped as Tafagamanu Sand, however, we have found, as at Lotofaga, that the so-called raised beaches, at least in their upper levels, consist of cultural deposits. We believe the suggested correlation of a 5 ft (1.5 m) change in sea-level with these raised beaches (Kear and Wood 1959: 30-31) is geologically no longer acceptable (Butzer 1972: 225), especially since a radiocarbon date for these sand deposits gave a younger result than the predicted 2300 years B.P. On Upolu the actual result was 1180 ± 55 B.P. based on the old half-life of C14 (Grant-Taylor and

Rafter 1963: 147). The true age in this case is the same as the radiocarbon age. Thus a probable date between A.D. 715 and 825 is indicated, with an age before the ninth century and after the first half of the sixth century A.D. being highly likely. On Savai'i, a date of 1850 ± 80 B.P. was obtained for these deposits (Grant-Taylor and Rafter 1963: 160). The calendrical age in this case would be A.D. 122 ± 80. Here the beach sand was sealed under the Puapua basalt. A raised wave-cut bench in this basalt, now raised 15 ft (4.6 m) above sea-level, had trapped coral sand, two samples of which provided corrected dates of A.D. 1211 ± 50 and A.D. 1245 ± 50, placing upper limits on the age of the Puapua basalt and giving an estimate of the rate of deformation by uplift along the central Savai'i axis (Grant-Taylor and Rafter 1963: 160).

On all the evidence available to us, therefore, these Tafagamanu Sands are geologically very recent. A likely explanation for them is that varying degrees of uplift of the land in the first millenium A.D. have provided new coastal surfaces in the form of low-lying beach ridges on which more recent cultural deposits have accumulated, and on which some coastal settlements have been situated ever since.

A sample (GaK-499) from a deep pit with a raised rim at Vaigafa has been dated to before A.D. 1840 and after A.D. 1633. The pit has been interpreted as an oven of specialised form used in cooking the root of the *ti* plant. There is no reason to question the result, for Vaigafa is traditionally held to have been inhabited close to the time of European contact. However, although ovens without rims are intimately associated with residential occupations, it is questionable whether a raised rim oven should be used to date an adjacent settlement (Report 39, p. 225). This problem is raised by the sample (GaK-1202) of probable twelfth or thirteenth century age from a smaller raised rim oven at Village A, approximately two miles (3.3 km) inland of Sapapali'i on Savai'i (I, Report 3, pp. 42, 51). The well-defined, narrow track to the weed-covered platforms of Village A suggests a prehistoric settlement of no great antiquity, an assessment which is consistent with local tradition. The oven may therefore belong to an earlier period of activity in the area.

There are two dates for the series of inland settlements at Ologogo on Savai'i. One of some antiquity, GaK-1200, is on a sample from a fireplace on a house platform of Village C. It implies habitation in the inland part of Savai'i before the thirteenth century A.D. and probably by the eleventh or twelfth centuries, as does the dated oven from Sapapali'i discussed above. Such results are not unexpected in view of the much greater age of inland settlement on Upolu.

The other radiocarbon date for Ologogo is from Village B. Buist (I, Report 3, p. 49) interpreted this settlement as historic on the basis of a wide road leading to it, although he considered that its occupation could have extended back into the prehistoric period. As Davidson (Report 39, p. 240) demonstrates, such wide roadways need not all be considered historic, and this example could just as well have been a prehistoric feature. Such an interpretation would accord better with the age of a sample (GaK-1210) from a rectangular pit on one of the stone house platforms in Village A, which is before A.D. 1760, with a 95 percent probability, and quite possibly of sixteenth or seventeenth century age.

The two results from Ologogo are not sufficient for a proper assessment of the ages of the many and complex features recorded in the area.

The last date to be discussed is one obtained by Golson from the cave of Seuao, famous in tradition. The original result of 240 ± 50 B.P. appeared somewhat young even at the 95 percent level of confidence (I, Report I, p. 19) in comparison with the traditional estimate of occupation in the last half of the fifteenth century. Correction for secular effect brings this result more into line with tradition, an age between A.D. 1490 and 1690 being very likely, and a sixteenth century date probable.

Conclusion

This review of the Samoan sequence, based largely on a combination of site stratigraphy and radiocarbon dates, will hardly satisfy those who wish for a series of chronologically and culturally defined periods or phases by which the data are sequentially ordered. It does provide, however, a useful framework within which the data we have recovered can be placed in temporal perspective and reviewed in the two reports which follow.

In view of the difficulty sometimes experienced with radiocarbon dates, it is worth noting that of 45 radiocarbon determinations, 13 by the New Zealand Institute of Nuclear Sciences Laboratory, and 32 by the Gakushuin Laboratory of Japan, only 2 have had to be totally rejected, one for what is probably laboratory error, and the other on archaeological grounds. Several dates may be questioned as possibly not dating events associated with the layers in which the samples were found. They need not be interpreted as inaccurate radiometric measurements of sample age, however, as they can be explained as deriving from some other context in the site or from some nearby context, earlier deposits of which were incorporated in the site. It is also significant that where the two laboratories have provided age estimates for deposits with the same cultural materials, as at Va-1, Sa-3 and Va-4, or dates for deposits belonging to the same sequence, as at Le-12, Lam-1 and Va-4, the results are to a very large degree not only compatible, but mutually supporting. Thus there seems good reason to place considerable confidence in the radiocarbon dates, particularly those from the Upper Falefa Valley and Vailele, which occur in the context of multiple results.

The Samoan sequence begins around or before 800 B.C. This estimate is based on a collection of inferentially dated Eastern Lapita style ceramics belonging to the earlier part of a little known interval covering the first 600 to 800 years of Samoan prehistory. Excavated and reasonably securely dated habitation layers, however, are not known until the first century A.D. They may be combined with a range of less securely dated deposits associated with less easily interpreted cultural contexts to indicate the occupation and/or use of some of the more fertile inland portions of Upolu, as well as the coastal zone, by this time. There is also some evidence to suggest that this situation obtained as early as the third century B.C. For this part of the sequence and perhaps to the third century A.D., the use of pottery made locally in Samoa, first in the Lapita and then in a Plain Ware style (Report 40, pp. 247-249), is well attested by evidence from a number of sites.

Expansion of inland occupation and maintenance of that on the coast continued thereafter without apparent interruption. Local sequences in both zones frequently reflect alternation in the use of a locality between agriculture and habitation. Convincing evidence is available for clearing and use of the lower slopes on the side of the Upper Falefa Valley and the hilly ridges behind Luatuanu'u by the third to sixth centuries A.D. It is followed by evidence of continuity of residence in these areas, and by implication in other similar areas of Upolu, for the remainder of the prehistoric part of the Samoan sequence.

At some point after the tenth or eleventh centuries A.D., mounds serving as house platforms for the residences of ordinary and higher-ranking individuals in the society appeared. Mounds with specialised functions other than human residence also appeared at this time. Mounds for either purpose occurred inland as well as on the coast. However, there is no evidence to suggest that they completely displaced the low-lying stone house platform on the flat, or its equivalent on terraces cut into the slopes of the more rolling or hilly localities. Rather, there is dated evidence for most forms of occupation in all zones from the eleventh or twelfth centuries A.D. until the 1830s. It is supported by the widespread occurrence in all parts of Samoa, especially evident in the survey data, of structures of this general age. In the 1830s, under the impact of European contact, nearly all occupation returned to the coast, where it has been documented historically in the 1840s (Watters 1958).

Major periods of marked cultural significance in the Samoan sequence are not easy to identify. The major functional and formal change in the ceramic assemblage occurred before the disappearance of pottery, and its loss was really more in the nature of a change from clay to wood, than a change in vessel function (Report 40, p. 253). The major changes in the adze kit were also early, after which there were only changes in the relative frequencies with which various forms occurred at different times (Report 40, p. 262). The appearance of mounds in some areas was in fact the addition of a larger and higher type of raised platform to the already existing structural complex, while the appearance of European artifacts in the early contact period was an extension of the portable artifact inventory. Change there was, and it would be wrong to deny it, as is demonstrated in the papers that follow. Still, it can be documented without recourse to a period or stage model. Without such a model, the principal feature of the Samoan sequence is its continuity. Now that the Tongan pottery sequence has been shown to span only the first 1000 years, with only a few excavated sites to document the following two millenia, it is in reality the Samoan sequence that provides the one good case in Western Polynesia for continuity between the ancestral Lapita horizon and the Polynesian cultural complex which developed from it in the course of the next 2000 years.

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SAMOAN STRUCTURAL REMAINS AND SETTLEMENT PATTERNS

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In this report the evidence now assembled on the nature, distribution, and time depth of archaeological sites and structural features in Western Samoa is reviewed, and limited comparisons with adjacent island groups made. Results of site surveys in both Upolu and Savai'i and excavations on Upolu provide the material for discussion. Reference is also made to a review of relevant historical evidence published elsewhere (Davidson 1969a).

There has been general agreement among field archaeologists about the broad categories of archaeological site recorded in Samoa. Golson (I, Report 1), Buist (I, Report 3), Scott (I, Report 4) and myself (Reports 20, 36, 37) have all recorded mounds and platforms, terraces, walls, ditches, circular raised rim pits, and fortifications. Functional identifications have included residence, agriculture, defence and specialised activities. Sites on both main islands have been shown to be distributed over coastal and inland areas, areas not now inhabited and even beyond the limits of modern plantations into the bush. As the archaeological programme has advanced, the range of variation within each formal category has become better appreciated, and fuller details on the distribution of various kinds of structures have been assembled. Some problems in the functional interpretation of certain kinds of sites remain.

Excavations, the main indicators of time depth, have provided considerable data on some kinds of structures and little or none on others. One important result has been the discovery that Samoa was well populated 2000 years ago, and settlement extended well inland in some areas. This means that the surface remains studied by field archaeologists in many parts of Samoa are the composite result of centuries of repeated occupation, and that two closely adjacent sites need not have been contemporary. Only if they are obviously combined in a recognisable pattern (for example two house platforms connected to one path) can they be regarded as probably contemporary. On the other hand, a raised rim oven need not have been used by the inhabitants of a settlement in which it apparently occurs; a specialised structure such as a star mound may or may not have been part of the settlement with which it is apparently associated. These points are worth stressing, for although nobody would seriously argue that Tamālelagi (who lived in the sixteenth or seventeenth century) was a Christian because his former house mound in Leulumoega is adjacent to the Catholic church, it is more tempting to assume that a carbon date for a raised rim oven also dates adjacent house sites.

RAISED STRUCTURES

The most numerous archaeological remains in Western Samoa are those variously described as mounds and platforms. Field archaeologists have classified these according to whether they are constructed of earth or stone, and according to their size and shape as large mounds, small mounds, platforms and star mounds. The irregular but not fully star-shaped structures described in Report 37 should now be added. As many structures are built on sloping ground, they vary considerably in height according to whether they are measured on the upslope or downslope side. They also overlap with a category of site recognised in the field as terraces.

MOUNDS

Although successive archaeologists have found it convenient to divide mounds into the categories of large and small, such division is essentially arbitrary, as is the distinction between mounds and platforms. Buist based his distinction on horizontal dimensions, large mounds having a greatest dimension of 100 ft (30.5 m) or more. Despite this definition, however, he describes as "large mounds" sites with horizontal dimensions considerably less than 100 ft. Scott emphasised particularly the height of large mounds and their greater height in relation to their supporting base. At Mulifanua height was also used to separate "mounds" from "platforms". It can be said, however, that both height and breadth combine to give an impression that a raised structure is large. Moreover large mounds, however defined, are merely the largest in a structural category which includes small and low, small and high, broad and low, and broad and high raised structures.

Buist recorded 11 mounds on Savai'i whose maximum dimension is more than 100 ft. Eight others whose dimensions were not obtained may also belong to this group. Several of Buist's mounds under 100 ft in breadth, however, are more than 10 ft (3.05 m) high. Apart from the complex associated with and including Pulemelei, Scott recorded only three other mounds in the large size range on Savai'i. Several large mounds were recorded at Mulifanua, none as high as most Savai'i examples. Many of the mounds noted in the mound reconnaissance survey of Upolu are likely to belong to this size group, and it should be noted that all the excavated mounds at Vailele and some others there have at least one dimension of 100 ft or more.

The two largest mounds yet recorded are Pulemelei at Letolo on Savai'i and Laupule at Vailele on Upolu. Both have been described in some detail (I, Reports 4, 6; Freeman 1944).

On Savai'i the great majority of mounds are constructed in stone. Buist recorded only one indisputable example of an earth mound, although a few other examples have been reported (D. E. Yen, pers. comm.). In contrast, earth mounds are numerous in parts of Upolu, and on that island appear to be in complementary distribution to stone mounds, depending on whether stone was abundant in the locality.

Most mounds, both large and small, are rectangular. Round and oval mounds occur as a recognisable and rare form, even more restricted in occurrence than star mounds. Scott and Buist each recorded one round mound on Savai'i. To these may be added four examples at Mulifanua, one recorded by Buist at Tanumalala, and one definite earth example at Vailele recorded by Green and Freeman. There are also smaller versions which have been recorded as platforms. These, too, are less common than their rectangular counterparts in the same size range.

Some mounds have one or more definite access routes, in the form of internal or external ramps, which may occur on two opposite sides, on one side only, or, in the case of rectangular mounds, at one or more corners. Good examples of such ramps are seen at Pulemelei (I, Report 4, figs. 39, 41). Not all high mounds have such access ramps, however, and in some well-preserved examples it is certain that they never existed.

In a few cases, stone mounds appear to be composite, or to have been constructed in tiers. Pulemelei is a good example of a two-tiered structure, where the tiers are probably part of a single construction phase. Other composite mounds suggest a situation where a second and different structure has been superimposed on an earlier one. The later structure is often specialised. Examples are star mounds superimposed on rectangular mounds at Salelologa on Savai'i and at Mulifanua; triangular or three-pointed structures superimposed on rectangular and round mounds at Vaito'omuli on Savai'i and at Mulifanua respectively; and small low rectangular or oval platforms superimposed on large mounds, which occur in small numbers on both islands. Such evidence is not surprising, since results of excavations in earth mounds have shown that they have complex histories.

It has been variously claimed that large mounds occur singly and in groups. Scott has reported at least one large isolated mound on Savai'i, and examples at Tanumalala on Upolu are relatively isolated. It is clear, however, that most large mounds occur in apparent association with other large mounds and with smaller mounds, platforms and stone walls. Scott's plan of the community pattern of stone mounds at Letolo (I, Report 4, fig. 42), and Green's map of earth mound distribution at Vailele (I, Report 6, fig. 47), are representative examples. My account of sites at Mulifanua, and descriptions by both Buist and Scott of other complexes on Savai'i, show such patterns to be recurrent and not unique to the surroundings of the two largest known mounds.

No excavations have been conducted in stone mounds, other than the small excavation by Hougaard in the remains of Mo-1 at Moamoa (I, Report 16). There is therefore no evidence on their age or internal structure. Results of excavations at Vailele and Puna, however, have provided a considerable body of data on the age and formation of earth mounds. It is apparent that some are the result of a single construction period, while others grew by a series of additions. In the former category are Lam-1, Va-3 and Va-4, all of which revealed a single major construction period followed by multiple occupations on the surface. Va-38 at inland Vailele, by contrast, revealed a long sequence of gradual accumulation and addition, with at least five separate construction periods. The excavations at this site were too restricted to allow discussion of the extent of the mound at any of its earlier periods. Both Va-1 and Va-2 also had complex construction histories. At Va-1, a series of pre-mound occupations was followed by the construction of a mound similar in size and shape to the final mound, but with a large central depression in which several successive stone platforms were constructed. The pit was then filled and the surface of the mound used for habitation. At Va-2, a non-residential sub-mound was built, possibly in two stages. It was then enlarged, first to its present height and then to its present breadth, and used in both instances as a house platform.

It can be seen, therefore, that except at Va-38 where the limited evidence available suggests steady development from a low platform to a high mound, the excavated earth mounds were built either during a single period of construction for use as house mounds, or built first as apparently specialised mounds and subsequently altered or enlarged by one or more additions for use as house mounds. The relevant radiocarbon dates from Va-1, Va-2, Va-3, Va-4 and Lam-1 (Report 38, pp. 218-221) suggest that mound construction may not have begun in Samoa until about the eleventh century A.D., although low house platforms paved with river gravel, such as occurred at Va-1 and at various sites in the Falefa Valley, were present long before that time. The last use of all Vailele mounds was residential; it is therefore particularly interesting that the first stage of mound building at both Va-1 and Va-2 was apparently undertaken with some other purpose in view.

House Platforms

Despite Golson's impression that most house platforms in any given prehistoric settlement were uniform in size and shape (I, Report 1, p. 15), later investigators have found that there is considerable diversity within single areas, as well as from one area to another. This is true even if the category of house platforms is confined to those sites on which house outlines can be identified by the presence of curbstones or river gravel pavements of appropriate size and extent. If the abundant platforms in areas such as Mulifanua or Lalomanu where house outlines are not normally identifiable during reconnaissance survey are included, the range is even greater. Like so many aspects of Samoan archaeology, the variation is partly but not wholly due to variations in terrain and local construction materials available.

House platforms recorded by Buist on Savai'i ranged from small rectangular platforms to large low pavements and large high mounds, and included some round and oval structures. Scott also recorded both rectangular and round examples. Platforms at Mulifanua included rectangular and circular examples of various sizes and heights, as well as some which could only be described as irregular or amorphous. The structures at Lalomanu (fig. 80), all of which were probably house platforms, provide a further indication of the variation in size and shape.

When chronological variations in house platforms are better documented, it may be found that most house platforms in one area at one time were similar. On surface evidence, however, this is unlikely, even in relatively stone-free parts of Eastern Upolu, where there is less diversity than at Mulifanua, for example. At Leuluasi there are several kinds of house foundation, including the plain curbstone outline without visible paving of any kind (Le-4b), the curbstone outline set in the centre of both rectangular and oval pavements (Le-3 and Le-4a), the curbstone outline set in an irregular pavement (Le-16), the type of foundation in which the house outline is slightly raised and surrounded by a relatively narrow sloping pavement (Le-9), and the house outline and pavement set on an earth mound (Le-28). At Vaigafa a greater range is present, including raised rectangular and oval platforms, as well as the sloping oval pavement, and house outlines surrounded by larger pavements.

Such diversity among prehistoric house platforms may be compared with the modern diversity. The latter is easily appreciated by trying to record and classify modern house foundations between Apia and Faleolo in the northwest of Upolu. Examination of platforms in the Mulifanua survey area suggests a similar variety of size and shape in the prehistoric period.

On present evidence it appears that round or oval foundations are rare on Savai'i. They are less common than rectangular foundations on Upolu, but oval or round foundations, in the form of raised platforms, circular pavements, and sloping pavements, are all documented for the late prehistoric period.

Star Mounds and Related Structures

Thirty-six star mounds have now been recorded in Western Samoa, comprising 8 on Savai'i, 1 on Manono and 27 on Upolu. All but four have been recorded by one or more participants in the Samoan programme. Most have been described elsewhere in these volumes. The contexts of the previously unreported examples is as follows. The star mound on Manono was evidently seen by Golson (Calkins 1963: 165), and was subsequently recorded by Boroman in 1964. It is a large structure almost 100 ft (30.5 m) by 75 ft (22.9 m), and has eleven arms. An example at Lafulemu between Lotofaga and Vaigafa was also seen by Golson. It has six arms (Calkins 1963: 165). I recorded a structure at Folasa-a-luga during a brief visit to the area in 1967. It is situated on the edge of a steep slope to the northwest of Lam-1 at Puna. Two star mounds were reported by Mr W. Hart in the same area as a large fortification in the centre of Upolu between Apia and Siumu. It is possible that these are the mounds mentioned by Wilkes (1845 (II): 95). If so, it is surprising that earlier accounts do not indicate their unusual shape. Finally, one example near Vaie'e was reported to Green in 1964 by a Samoan authority.

Calkins' statement that the Manono example was known as the "star house" (a description which enabled Boroman to locate it without difficulty), led to the adoption of the term star mound for this kind of structure. It is interesting to note that the analogy was also used by the informant who reported the Vaie'e example to Green. The term has been borrowed by archaeologists from Samoans, rather than invented by them. However, the modern Samoan analogy need not reflect former beliefs concerning these sites.

There is little to be added to previous descriptions of star mounds. The Aleipata examples, together with those described by Buist and Scott, provide a good indication of the variations in size, shape and material. The structures have from five to eleven arms, range up to about 30 m in maximum breadth, and vary considerably in height. Some are constructed in stone, a few entirely in earth, and many are of earth with stone facing. Sometimes the arms and indentations are pronounced and in other examples much less so.

The feature of a central pit or depression is definitely present only in one example on Savai'i, with a possible unconfirmed example at Mulifanua. The same site on Savai'i is also the only known example with cairns on each of the projections. This latter feature suggests a possible relationship between star mounds and some very large mounds of more orthodox shape, since it is shared by this star mound and Pulemelei.

A range of irregular structures with characteristics relating them to star mounds has been described in Report 37. To these may be added two structures on crater rims at Lalomanu (Lal-8 and Lal-12) and at least one of the structures on Mauga Ali'ī, all of which exhibit the distinctive arms and bays on one or more sides. The third "star mound" reported by Scott on Savai'i should also be included here, since he describes it as having only two arms (one of which has a cairn on it). This indicates that these structures are not confined to the Falefa Valley. Their apparent concentration there is probably misleading, since this was the only part of Samoa explored in sufficient detail for such remote and inaccessible structures to be located.

The excavation of a star mound at Luatuanu'u showed it to be a late feature. Construction and use of the mound was the last event in a long sequence of occupation and use of the site. Earlier phases reflect domestic occupation and agricultural use. The excavations provided no positive evidence on the function of the star mound. They showed, however, that it was not used for residence nor, at least in the excavated portion, for burial.

Terraces

Terraces have been described in detail at Luatuanu'u, Vailele, and some areas of the Falefa Valley, notably Folasa and Vaimaga. In more stony parts of the islands, terraces are normally stone faced, or constructed entirely of stone. In the uneven rocky terrain on the young volcanic series it is not always easy to distinguish between terraces and mounds, or mounds which have at least partly natural bases.

It has been suggested that terraces were used both for residence and for agriculture. A terrace is essentially a levelled area of sloping ground which has been constructed to permit activities which could not comfortably be carried out on the unmodified slope. Samoan agriculture today is practiced on very steep slopes; it therefore seems unlikely that terracing was constructed primarily for agriculture. On the other hand, unoccupied terraces would have been used for agriculture, as they are today, as part of the rotation cycle which moves over any available cultivable land within reasonable reach of settlements. Terraces, however, have been constructed in the first instance as a base for activities other than agriculture.

The question of the function of terraces raises many of the same problems which arise in considering the function of other raised structures, discussed in more detail below. The presence of house outlines and pavements on terraces at Luatuanu'u, Folasa and Vaimaga, shows that many were residential. The terraces at inland Vailele lack such remains, but are otherwise very similar to the Luatuanu'u examples, even to the probable sunken paths which are present on ridges in both areas. The absence of surface house remains correlates with a similar absence on many of the mounds in the same area. Surface evidence of houses was also lacking on the terraces in the upper part of the large fortified site at Lu-41 (I, Report 13, p. 206). This is probably because habitation in a fort of this kind was in "temporary coconut leaf houses" (Williams MS 1832: Observations . . .). Such houses would require a level ground surface, but not the paving associated with more permanent residence.

On high ridges in remote situations, terrace formation is a necessary preliminary to the construction of specialised structures such as those described in Report 37. Again, the construction of the terrace makes possible the activity which takes place on it. The interpretation of the terrace site is dependent on its location and the nature of the structure, if any, which is present.

In a few instances terraces appear to be part of a defensive system. The best example is Lu-44, the high peak between Luatuanu'u and Solosolo. It is unlikely, however, that any of the terraced peaks recorded by Buist in Savai'i is a fortified site.

The results of excavations at Luatuanu'u, Folasa and Leuluasi indicate that terrace construction has a long history in Samoa. The terrace at Lu-53, on which the star mound was eventually built, was probably constructed about the fourth or fifth century A.D. Although it is difficult to argue convincingly that the sixth or seventh century date from beneath the terrace at Fo-1 reflects an event immediately preceding the construction of the terrace, the possibility has to be considered. On the other hand the initial terrace construction at Le-12 was probably considerably earlier than the period dated by the sample from under the terrace extension, and may not have been long after occupation A, dated to the sixth or seventh century A.D. It is thus probable that terrace construction, together with low house platforms, was present in Samoa before the appearance of substantial mounds. Terraces are, of course, a natural response to a sloping terrain, and so are widespread in Polynesia.

Function of Raised Structures

Several lines of evidence show that some raised structures, including large ones, were foundations for ordinary dwelling houses. There is good traditional evidence to show that the largest known earth mound, Laupule, was the house site of Tupuivao, a tyrannical chief who flourished in the first half of the seventeenth century. There is abundant archaeological evidence to show that all the excavated earth mounds were house sites in their final form. It is important to note that all the excavated Vailele mounds reach 30 m in their largest dimension and are thus in the upper part of the size range of mounds. It is also worth noting that they are rectangular rather than circular in plan. In view of the demonstrated occurrence of earth mounds in less stony parts of Samoa, and of stone mounds in stony areas, it seems entirely reasonable to conclude that most rectangular stone mounds up to 30 m and more in breadth are also house foundations. Just as Laupule was the foundation of a very high chief of the Tui A'ana line (who was, however, cut off from the succession because of his behaviour), so other very large mounds, whether of earth or stone, are likely to have been house sites of people of very high status. The attribution of a very large stone mound on Upolu to Tamālelagi supports this hypothesis. There are, however, sufficient medium-sized mounds (up to about 30 m) to suggest that a number of people of lesser status lived on such mounds at some time.

The apparent absence of smooth paved surfaces on many large mounds is not, I believe, a good indication that they were not house sites. The same apparent absence of paving is evident on many smaller platforms at Mulifanua, which are otherwise most easily interpreted as house sites. More convincing support, however, can be obtained from the present state of many recently abandoned rock foundations in modern villages. The fact that they were house sites can be verified by reliable informants; their present condition would cause problems of interpretation if they were encountered in archaeological contexts.

On the other hand, a pebble pavement cannot be universally accepted as good evidence of a house foundation, since at least one star mound has been found with such a surface and star mounds are probably one of the few types of raised structures which did not support houses. There are other instances, too, where pebble pavements suggest specialised sites rather than dwellings. A notable example is Lu-60 on the Tula-i-A'ana (I, Report 12, p. 190).

Even if most mounds of orthodox shape were house foundations, it is still possible that some of them were specialised structures, rather than dwellings. Stair (1897: 111-112) reported that very large foundations, sometimes also very high, were erected both for the house sites of important chiefs and for some god houses. His account of foundations 50 to 70 ft (15 to 21 m) wide and sometimes many feet high describes the category of medium-sized mounds. His reference to exceptional examples, which were extremely massive, could embrace the largest known mounds. Turner provides supporting evidence with his description of a "temple", which could in fact be Pulemelei itself (Turner 1884: 23). It can be concluded, therefore, that very large foundations may have supported either chiefs' houses or religious houses. Without good traditional evidence it may not be possible to decide which function was served by individual examples.

It cannot be concluded, however, that all raised structures were house foundations. Green interpreted the first sub-mound at Va-2, with its puddled surface and absence of postholes, paving or other signs of occupations, as some kind of specialised site. He drew a similar conclusion for the first stage of mound use at Va-1, which was distinguished by a large central depression with one or more stone platforms.

The best examples of specialised structures yet known are star mounds and allied forms. The nineteenth century description cited in Report 37 is sufficient to show that the form is prehistoric and to imply a religious function which also embraced pigeon snaring. Both star mounds, and a small proportion of more orthodox mounds, therefore, were probably specialised.

Another approach to the problem of specialised structures is to review historical evidence for their existence, and then attempt to identify them among the archaeological sites recorded. In Report 37 it is suggested that the likely categories of specialised site are religious sites, pigeon-snaring sites, and burial places.

Part of the rationale for the siting of pigeon-snaring places is that at certain times of year pigeons flocked in large numbers past particular places. It was at such places that pigeon-snaring grounds were prepared. The situation on the edge of a steep slope was suitable because there it was relatively easy to snare the birds as they flew up out of the gully below, swooping low over the edge of the cliff. They also flocked past other places, however, or could be readily attracted to them by decoys, and in such places, also, pigeon-snaring grounds were established. Although most accounts imply that such grounds were in the remote bush, one states specifically that at a particular time of year pigeons came to the coast to eat certain berries (Churchward 1887: 139). Pigeon-snaring sites, therefore, can be expected to have a wide distribution, perhaps a perplexing one in the modern landscape. Star mounds certainly have such a distribution. Any correlation of star mounds with the sport of pigeon snaring, however, is complicated by the apparently religious function of the only ethnographically described example. It is easier to say that star mounds were specialised than to say in exactly what way they were specialised.

It is almost certain that other sites, too, were used for pigeon snaring. The most likely examples are paved terraces without visible house outlines, found particularly but not exclusively on high and remote ridges. In addition to the sites on the ridge between Folasa and Vaimaga, described in Report 37, such sites exist on upper ridges at Folasa, Vaimaga and Te'auailoti in the Falefa Valley, on Mauga Ali'ī, at Area C at Vaigafa, at Sau-5 on the little peak at Solaua, and probably in numerous similar situations. One example was excavated and its non-residential use verified (Report 26, p. 101).

Evidence for burial practices and burial mounds has been reviewed above (Reports 30, 37). It seems quite clear that ordinary people were buried in shallow graves in or near houses, and not in separate burial mounds. Some historic and recent graves of important people are in or under raised structures, and Krämer reported burial mounds at Faleolo with vaults containing the remains of important late prehistoric and early historic chiefs. In recent times, tiered structures have been erected over the alleged burial places of traditionally important people who lived at a more remote period. An example is the stone structure marking the supposed burial place of Salamasina at Mulifusi, Lotofaga. This in itself is a good indication that important people of Salamasina's period were not buried in mounds. It seems, therefore, that burial of chiefs in special mounds was rare to non-existent in the prehistoric period, coming into favour in early historic times.

Both archaeologists and informants have sometimes identified small cairns and heaps of stones as marking graves. The only indication that this may have been a prehistoric practice is provided by Wilkes (1845 (II): 76). Other nineteenth century accounts indicate that such cairns are probably a post-European development. Scott's test excavations of possible graves of this type at Pulemelei gave negative results. There is therefore no evidence to support the identification of cairns and stone heaps as graves in prehistoric contexts.

Ethnographic accounts of skull reburial do not clearly imply specific burial structures. The only archaeological evidence for this practice is at the *malumalu o le pisaga*. There is nothing in the accounts of disinterment and reburial of skulls to preclude interment in a religious structure rather than one specifically constructed for skulls.

It may be concluded, therefore, that although burials might be expected in house platforms, there is no strong evidence for the existence of burial mounds, or other raised structures marking prehistoric graves.

A review of nineteenth century accounts and reconstructions of pre-European religion suggests that there was a great variety in the form in which supernatural beings were believed to manifest themselves, and in the religious sites devoted to them. A number of *aitu* were believed to reside in trees, stones and other natural features; others were thought to appear in the form of living creatures such as pigeons, octopuses or eels. Houses were set aside as god houses in most settlements. The god houses actually seen by Europeans in the 1830s seem to have been small, and indistinguishable from ordinary dwelling houses.

Most religious sites in Samoa will be impossible to identify from their archaeological remains. The presence of a god house in a settlement can be suspected but not demonstrated unless strong local tradition, as in the case of the *malumalu o le pisaga*, identifies a particular structure. Some unusual sites such as the low circular structure SU-Le-24 (Report 28) can be tentatively identified as religious, but this may be quite wrong and can never be confirmed. In some instances the isolated position of a large mound (as for instance SS-Pp-1 at Satupa'itea) or its appearance with other specialised sites (SS-Sl-8, a round mound near Salelologa associated with two star mounds) suggests that it is specialised, but a religious function cannot be certainly specified in preference to its use for pigeon snaring as a sport.

A major point which emerges from consideration of structures and their functions is the probability that the largest mounds represent supra-local authority of both sacred and secular varieties. The largest dwelling houses belonged to politically important figures; the largest god houses appear to have been dedicated to the war gods. Some of these war gods, such as Siule'o and Nafanua, are traditionally credited with extensive influence in political matters, notably accession to high titles. It is very likely that their power and influence were given visual expression in the massive foundations of god houses erected for them.

External Relationships

The most detailed description of mounds in Tonga remains that of McKern (1929). His work has recently been supplemented by surveys in Vava'u (Davidson 1971b) and Niuatoputapu (Rogers MS). A useful summary of Fijian raised structures is provided by Frost (1970).

Frost cites Capell and Lester's definition of the Fijian *yavu* as "the foundation of stones and earth on which a house is built, and in which the owner was in olden times buried" (Capell and Lester 1941: 314, cited in Frost 1970: 21). He summarises a number of sources which suggest that structures were used for cooking, for sleeping, for village social functions, for chiefs, for burial and for temples, in increasing order of importance. The more important a structure was, the larger the size of its foundation (Frost 1970: 22).

Tippett (1968: 167-172) discussed Fijian god houses, and was able to show how, as pre-European religion gave way to Christianity, the god houses were replaced by Christian churches. It seems likely that a similar process took place in Samoa earlier in the nineteenth century and was not well documented.

Burial practices in Fiji took a variety of forms, but there is evidence for burial under houses and temples, in open platforms, and occasionally in massive mounds (Frost 1970: 23-24).

It is unclear from Frost's discussion whether cook houses in Fiji were built on raised structures, which was not the case in Samoa. In both island groups, however, dwelling houses, community houses, chief's houses and god houses were built on platforms or mounds, and in both areas rectangular mounds were preferred.

McKern's account of Tongan structures concentrated on ceremonial mounds and burial mounds. There is also, however, in Tonga a large category of undistinguished earth mounds with no surface evidence of burial and no traditional evidence to suggest a specialised function. These are probably the Tongan equivalent of the Samoan and Fijian house mounds, but until they are investigated archaeologically this must remain uncertain.

Many raised structures in Tonga are burial places. Foremost among these are the *langi*, or burial places of members of the Tui Tonga family, which are usually elaborate rectangular structures, often faced with large coral limestone slabs. They appear to have no prehistoric equivalent in Samoa. There are a great many round earthen mounds of various sizes which were burial places of ordinary people (Davidson 1969b). These, too, are apparently not present in Samoa. The elaboration of burial mounds appears to be a peculiarly Tongan development, although the fundamental idea of burial in a raised structure was apparently also present in Fiji. It is least developed in Samoa.

Other Tongan mounds include *esi* or chiefly resting places and *sia heu lupe* or pigeon-snaring mounds. A majority of *esi* described by McKern were rectangular; he suggested the possibility that the circular form might be older. In some instances there were no formal differences between structures described as *esi* and those regarded as pigeon mounds. Most pigeon mounds were circular, sometimes with one or two external ramps, and often, but not always, with a central depression. Although mounds with central pits occur in Vava'u, none has been reported on Niuatoputapu.

The *esi* also seems to be a peculiarly Tongan invention. There is no cognate term in Samoan. The idea and the name of the pigeon-snaring structure, however, are common to both Tonga and Samoa. In both groups the terms could apparently include both natural situations and artificial structures. The pigeon mounds identified by McKern (which were concentrated in Ha'apai) were all circular. The circular mound with or without access ramps is also present in Samoa, although none has yet been found with a central pit, and there is no particular reason to identify round mounds in Samoa as pigeon mounds. Star mounds and allied forms are at present known only in Samoa. The presence of a central pit on one star mound and possibly a second, provides a tenuous link between the two types of structure. However, McKern was unable to obtain a satisfactory account of the function of the central pit, and it may be that his information was incorrect, and that central pits are a feature of religious structures rather than pigeon mounds in both groups. If Green's identification of a central pit at Va-1 is correct, the feature has some antiquity.

The problems of functional interpretation in each island group make comparisons particularly difficult. It seems, however, that the basic idea of a platform or mound, usually rectangular, as a foundation for various kinds of houses, was certainly present in Fiji and Samoa and probably also in Tonga. Only in Tonga was the idea of burial in such structures fully developed, whereas it seems to have been least developed in Samoa. Tonga, also, was apparently the only place where the *esi* was present. Tonga and Samoa share the sport of pigeon snaring, and evidently also the idea of an associated structure. In Tonga, however, they seem to have been circular, and in Samoa, at least in late prehistoric times, star shaped. The lack of a satisfactory explanation for the central depression, or indeed for the need of a mound at all, suggests that in both groups the concept of pigeon-snaring mounds needs reappraisal, particularly in view of the known religious associations of at least one star mound in Samoa.

Existing evidence on the age of mounds in Samoa suggests that large mounds may have been present only during the last millenium, the period within which burial mounds are known to have been present in Tonga (Davidson 1969b: 274). Mounds are certainly confined to the last two millenia in both groups, since none is associated with Lapita pottery use, nor was the idea transferred to East Polynesia. At the other end of the time scale there is no evidence that large mounds were in use in Samoa as foundations of either dwelling houses or god houses in the 1830s. Some of the latter had probably only recently been abandoned, since missionaries such as Turner and Stair were able to obtain detailed accounts of their use; large mounds may already have been abandoned as dwellings some time earlier. The peak period in the occupation of mounds in Samoa seems to have been that for which both archaeological and traditional evidence exists, namely the sixteenth and seventeenth centuries.

Houses

All our information on complete houses comes from the eastern part of Upolu where, as already explained, conditions are most suitable for the identification of actual house outlines during surveying. McKinlay (Report 21) has discussed in some detail the construction and dimensions of houses at the early historic village of Sasoa'a, using data on excavated prehistoric houses at Folasa for comparison. The excavations at other sites in the Falefa Valley, particularly Le-12 and Te-5, provide additional data on house construction, confirming for this part of Samoa the absence of the Tongan type of house, now common in Samoa and known as the *fale afolau*. It seems clear that late prehistoric Samoan houses were, as Williams (MS 1832) described the houses of the 1830s, oval with a short central ridge pole supported by one to three posts, or in the case of smaller houses, lacked ridge poles altogether.

The only known rectangular house is that at Fo-2, apparently associated with an oven, and possibly, therefore, a cooking shelter. The lack of any other dwelling house outline at Fo-2 suggests that the site was possibly a specialised one and the house itself perhaps a recent addition. The workmen believed that the square house outline was recent, and the late carbon date for the oven supports this interpretation.

Our complete house plans belong to the late prehistoric or early historic periods. Most earlier contexts reveal a bewildering range of postholes, often associated with river gravel paving and sometimes with fragmentary curbing, but with no identifiable patterns. Two structures suggest the antiquity of round or oval structures, however. One is the posthole alignment indicating a small round-ended structure at Sa-3 dating to the first century A.D. (Report 29, fig. 55). The other is an arrangement of postholes surrounding an earth oven, which suggests a round or oval structure of approximately 5 m in diameter, associated with the third to fifth century A.D. Hearth Horizon at Va-4. The structure here appears to be a cook house rather than a dwelling house. Its rounded form is clearly indicated by six postholes outlining between one-quarter and one-third of the estimated perimeter.

Despite the shortage of house plans from earlier periods, some features of houses can be traced throughout the sequence. Foremost of these is the use of river gravel paving in house floors, present at Sa-3 and Va-1 in early contexts, and at numerous points thereafter throughout the sequence. The use of curbstones is also attested at earlier contexts than those for which complete house plans are available, especially at Vailele between the thirteenth and fifteenth centuries A.D. (I, Report 7, p. 122).

A feature frequently found in late sites, but poorly documented in earlier contexts, is the stone-edged hearth, used to provide light rather than heat in dwelling houses and community houses. The feature is common at Sasoa'a and according to documentary evidence continued in use at least until the 1880s (Churchwood 1887: 167), after which it presumably gave way to introduced forms of lighting. The occurrence of hearths at Folasa and Leuluasi shows that they were present in the late prehistoric period. Buist obtained a carbon date of eleventh or twelfth century A.D. for a hearth at Ologogo. Although single dates from restricted excavations of this kind should be viewed with caution, the determination does suggest a respectable antiquity for this type of hearth in Samoa. Its antiquity is supported by a partially stone-edged hearth, several centuries later in age, from layer IIIa at Va-1 (I, Report 7, p. 124).

In addition to the measurements of houses at Sasoa'a and the excavated houses at Folasa, summarised by McKinlay (Report 21, table 1 and fig. 18), measurements of houses were obtained in the following areas: Folasa (five surface houses other than those at Fo-1 and the square house at Fo-2), Vaimaga (six), Faga (three), Te'auailoti B (Te-5 and one other), Olovalu and Palapi'i (three), Polua (one), Leuluasi (fourteen including one each at Le-3 and Le-12, later excavated). In addition, measurements are available for eight houses at Vaigafa, ten at Luatuanu'u (including three consecutive houses at Lu-21), one at Malae, two at SU-Sau-2, and one each at Sau-3 and Sau-4. This provides a total of 57 houses in addition to those listed by McKinlay.

These 57 houses have a size range similar to that of the Sasoa'a houses, except that whereas some are smaller than any at Sasoa'a, none is as large as the only Sasoa'a house which fell within the size range given by Williams (MS 1832) as appropriate for the *fale tele* or community house. They are divided fairly evenly between McKinlay's categories of "round" and "oval", so that the suggestion on the basis of the Folasa excavated houses, that prehistoric houses tended to be "oval" rather than "round", is shown to be incorrect, and the situation at Fo-1 probably the result of a continuing preference by that site's occupants for the oval form.

The similarity in size range and shape between prehistoric and early historic period houses is evident when the 14 Leuluasi houses are plotted against the 19 Sasoa'a houses (fig. 89). It has already been shown (Reports 20, 24, 30) that Leuluasi, in its final form, is a late prehistoric settlement. Nothing could better indicate the continuity between prehistoric and early historic house construction than the very similar range in size and shape recorded in these two settlements.

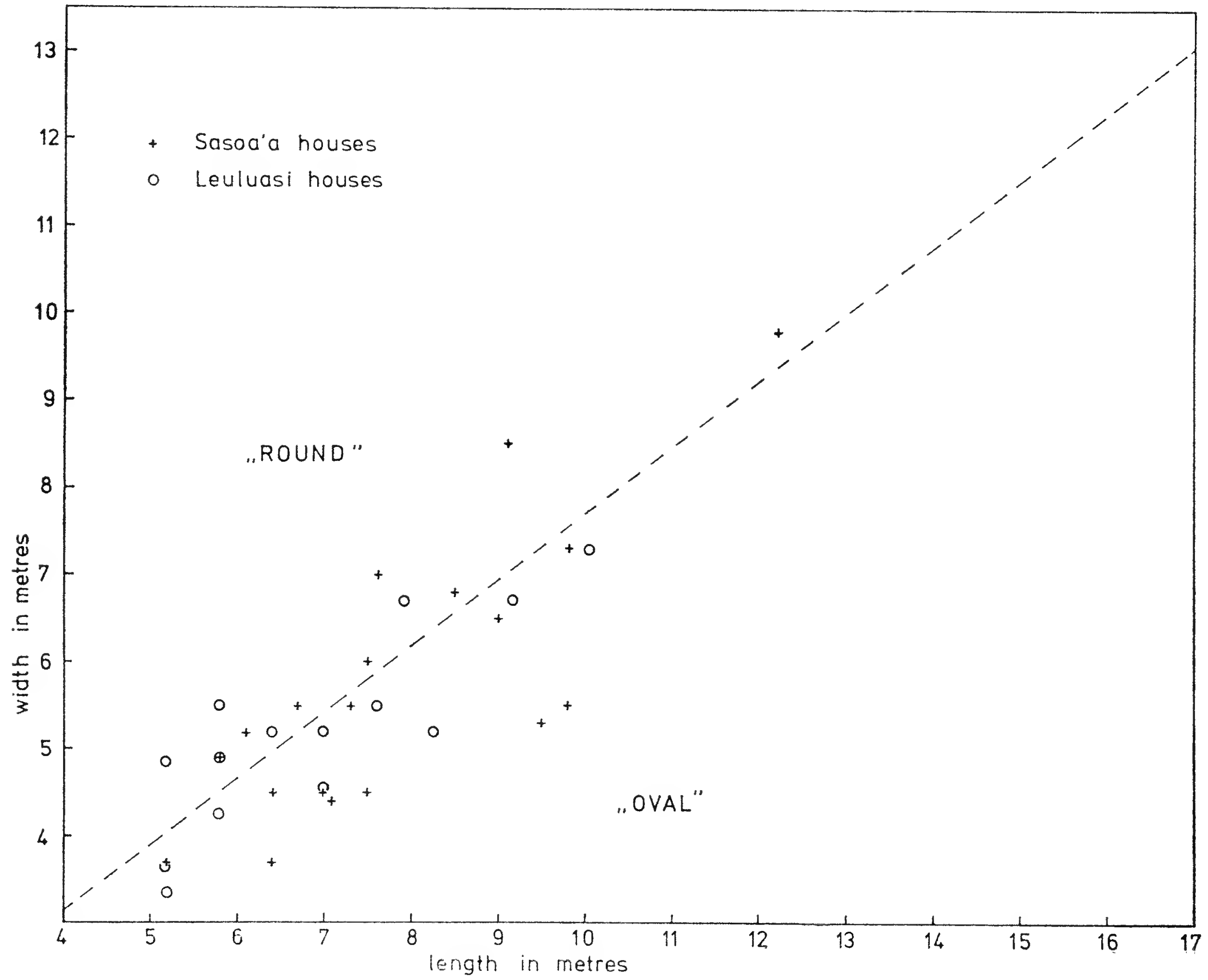

Fig. 89. Dimensions of houses at Sasoa'a and Leuluasi.

Several other interesting points emerge from a consideration of the house dimensions. The houses at Vaigafa tend to be among the largest recorded, as do those at Sauniatu and Malae, whose prehistoric nature is not certain. There is no doubt about the prehistoric age of the Vaigafa houses, however, since test excavations in the floor of Vai-2, one of the larger houses, revealed no sign of European material.

On the other hand, houses at Luatuanu'u tended to be small, and when these are compared with the Vaigafa houses, six of the latter are seen to be bigger than any of the former and four of the former smaller than any of the latter, although there is some overlap between the largest Luatuanu'u and the smallest Vaigafa houses. This difference may reflect the higher status of the people of Vaigafa, than of those who lived on the Tula ridges behind Luatuanu'u.

Not surprisingly, the smallest houses are those at Te'auailoti and Faga, although the smallest at Leuluasi and Folasa, as well as the four smallest at Luatuanu'u, cluster at this end of the scale. The interpretation, on excavation, of the smallest house recorded (Te-5) as a bush refuge, rather than an ordinary residence, is entirely consistent with its size (Report 27).

A useful measure of house size appears to be floor area, which has been roughly calculated for all complete houses. The normal error inherent in plane table surveying at the scale used in the field, the uncertainty in defining the actual roofed floor area because of the varying positions of posts in relation to curbs in Samoan houses, and the difficulty of calculating the area of an irregular oval, mean that these figures are only approximate. Nonetheless they give a reliable general indication of the approximate areas involved.

Table 27 gives the mean floor areas of houses in each of the places where six or more houses were recorded as part of the same settlement. In each case, all houses, surface and sub-surface where these latter could be measured, are included.

It can be seen that each settlement except Vaimaga has a considerable range in house area. However, there are relatively few houses with floor areas greater than 50 m^2. One house at Sasoa'a is far larger than all other recorded houses. If this house is excluded from the Sasoa'a houses, the average floor area at Sasoa'a is even more comparable with the prehistoric settlements in the vicinity.

Although the *fale tele* ought to be an important and easily recognisable marker (Davidson 1969a: 62-65), the only one which has been identified is the early historic example at Sasoa'a. This house has an area of approximately 95 m^2, compared with the largest of the other houses, one at Vaigafa, which has an area of 68 m^2. Probably an area of 90 m^2 or more is required before a *fale tele* can be identified with confidence. Two possible reasons for our failure to find prehistoric examples can be suggested. The first is that they had already become enlarged beyond their prehistoric size in the early 1830s with the acquisition of metal tools. The second is that our samples of houses were simply not comprehensive enough, and that further work would reveal *fale tele,* at least in more important settlements. I prefer the latter alternative.

Although there is little or no indication in the literature that chiefs' houses were any larger than other houses, the large size of the houses at Vaigafa suggests that a high status settlement, such as Vaigafa traditionally was, would have larger houses than ordinary settlements. Four of the houses measured at Vaigafa (all of which are adjacent to the raised path Vai-18) have areas greater than 50 m^2, the largest having an area of 68 m^2. None of these houses is built on a high foundation, although they vary considerably in the sort of paving or platform with which they are associated.

In addition to showing house size in a form useful in comparisons from one settlement to

TABLE 27

MEAN HOUSE FLOOR AREA IN SIX SAMOAN SETTLEMENTS

	Settlement	No. of houses	Mean floor area (m^2)	Standard deviation
A.	*Historic*			
	Sasoa'a	19	37	18.6
B.	*Prehistoric*			
	Vaigafa	9	45.5	12.99
	Folasa	10	33	16.68
	Leuluasi	14	30	12.56
	Luatuanu'u	10	26.5	9.14
	Vaimaga	6	23	3.7

another within Samoa, house areas can be used in other ways, providing a starting point for discussion of community size and also a possible indication of social organisation.

Naroll (1962: 588) suggested that the population of a prehistoric settlement can be roughly estimated as about one-tenth of the floor area in square metres (in other words that an individual requires approximately 10 m^2 of floor space). Recently LeBlanc (1971: 210-211) suggested that this figure should be applied with caution, citing among other examples data from two modern Samoan villages which indicated an average roofed dwelling floor space per person of 11.0 and 8.7 m^2, and an average total roofed area per person of 13.2 and 9.8 m^2. He warned that cook houses and communal buildings occupy a substantial proportion of roofed floor space in both villages.

There are difficulties in applying such calculations to archaeological survey data. In the first place, Samoan houses are larger now than they were in the late prehistoric and early historic periods; the population of Samoa is much larger than it was in the first half of the nineteenth century, and the proportion of individuals under 15 years of age in the population is probably also much higher now. It is not known whether the average floor space requirement per individual has remained constant in spite of these changes.

Although the archaeological survey data are particularly good, there are still areas of uncertainty in interpreting them. Cook houses can reasonably be excluded from the calculations, since all the evidence suggests that they were not curbed and paved, and only archaeologically recognisable houses with these features are included in the survey material. We can expect, however, that communal buildings such as *fale tele* (community houses) and *fale aitu* (god houses) are included among them. Secondly, it is by no means easy to decide which houses were contemporary, even at a settlement like Sasoa'a.

Among the 19 houses at Sasoa'a are two revealed by excavation at Sa-1 and Sa-2, which can be excluded from this discussion on the grounds that they are earlier than the visible surface houses at the same sites, and three cases where two superimposed houses are visible on the surface (fig. 2). House 2 at Sa-11 is the largest house recorded archaeologically in Samoa and the only one which falls within the size range described for *fale tele* in the 1830s. Obviously this house should be included, and for reasons of consistency the larger of the two superimposed houses at Sa-18 is also included. Of the two concentric curbstone outlines at Sa-12, only the smaller is definitely a house outline, and is included in preference to the larger outer line. If, then, the two earlier houses at Sa-1 and Sa-2, the two smaller houses at Sa-11 and Sa-18, and the outer alignment at Sa-12 are excluded, 14 houses are left of which one is almost certainly a community house. Since Sasoa'a is documented as a Christian settlement with a mission school, it is unlikely to have had a god house. One of the houses could have served as a chapel. There is no archaeological evidence of this, however.

The total floor area of the 14 houses is 555 m^2 and the total dwelling floor space of 13 houses is 460 m^2, with an average of 35 m^2. At 10 m^2 per person this means a population of 46 divided amongst the 13 dwellings, or about 3.5 people per dwelling. At 8.7 m^2 (the smaller figure recorded by LeBlanc for a modern Samoan village), a population of 53 is implied or 4.1 people to a dwelling. Such estimates for Sasoa'a, which we have identified as a village section of the late 1830s, seem not unreasonable.

The other settlement for which similar calculations can be made is Leuluasi, where 14 houses can be assumed to be contemporary. There is no house at Leuluasi which falls into the size range regarded as necessary for a *fale tele,* although it is possible that such a house may exist in the long grass north of the survey area, close to the traditionally remembered *malae* of Lolomea. The only possible candidates within the survey area appear to be Le-4b, which does not seem suitable in any respect other than size, and Le-12, which has some of the attributes such as setting and the possession of two hearths and an encircling wall, but lacks the necessary size (fig. 5). It is impossible to identify a *fale aitu* with certainty, although one possibility is the non-residential Le-24 (Report 28). Another candidate is the second to smallest house, Le-28, which has an area of 15 m^2 but is built on the only real earth mound at Leuluasi, thus attaining an importance not warranted by its size.

If for the purpose of discussion Le-12 is assumed to be a *fale tele* and Le-28 a *fale aitu,* the remaining dwelling floor area is 349 m^2 with an average of 29 m^2. At 10 m^2 per person this implies only 35 people divided among 12 houses or about 3 people per dwelling. The figure of 8.7 m^2 gives a population estimate of 40, or 3.33 people per dwelling.

Although LeBlanc's figures do not include house size, or number of individuals per house, other data on modern Samoan villages can be consulted. Lockwood (1970) has published figures on numbers of individuals per family and numbers of buildings owned by the same families in four villages in 1966. It can be seen by comparing his tables 2a-d and tables 14a-d that families which own only traditional buildings average between four and six individuals per house in the four villages studied. Since the modern houses are probably larger than those of Leuluasi and

Sasoa'a, it seems likely that calculations implying an average of just under four individuals per dwelling at Sasoa'a and Leuluasi are of the right order. This is confirmed by Wilkes' report that approximately 75 people occupied 20 houses on Apolima in the late 1830s (Wilkes 1845 (II): 108). It appears the average floor space requirement per individual at Leuluasi and Sasoa'a may have been nearer 8 m^2 than 10 m^2. On this basis the population estimates for Sasoa'a and Leuluasi are probably as good as any other means of estimating population size from archaeological data.

House area can also be used in quite different predictions. Ember (1973) has correlated house area with patrilocal and matrilocal residence, although it is not clear whether he thinks it is also possible to correlate house area with multilocal residence. On the figures he presents it is clear that according to his criteria the Samoans must be regarded as patrilocal and patrilineal in both the late prehistoric and early historic periods (average living floor area less than 484 ft^2 (45 m^2) in all settlements). In another paper (Ember and Ember 1972: fn. 4), it is claimed that depopulation in the early years of European contact may have led to a change in descent and residence in Samoa from patrilineal and patrilocal to ambilineal and multilocal. There is no evidence of any change in house size during the relevant period. Not only are houses at Leuluasi and Sasoa'a in the same size range, but successive houses at Sa-1 and Sa-2 are almost identical in size. Consequently there is no archaeological evidence to support any change in patterns of descent or residence. In so far as archaeological evidence can be used at all to make inferences of this kind, the evidence supports Freeman's (1964) claim that the Samoans were patrilineal and patrilocal. The archaeological evidence applies both to the late prehistoric and early post-contact periods. It could be argued that the change from dispersed settlement (as at Leuluasi) to nucleated settlement (as at Sasoa'a) *was* a response to depopulation. This, however, is a quite different matter from a change from patrilocal to multilocal residence as suggested by Ember.

A final point to be considered is the duration of houses. Lockwood (1970: tables 14c-d) gives the average useful life of a present day guest house of traditional style as 40 years, of a large *fale* as 30 years, and of a small *fale* as 8 years. It is probable that the life of prehistoric houses was closer to that of the modern small *fale* than to those of the modern guest houses and large *fale*, many of which are constructed in the *fale afolau* style. An average life of eight to ten years for each house would imply that the successive houses associated with European artifacts at Sasoa'a could be accommodated within a period of less than 30 years, giving the settlement a life span from approximately 1837 to not later than the 1860s. This is in accord with the absence from the site of more numerous and varied European artifacts to be expected if the settlement had a longer life.

The implications for prehistoric settlements are also interesting. A life of only eight to ten years means that all houses at Fo-1 could have been constructed within 100 years, although they need not have been and it is doubtful that they were. The positive forest of postholes on the surface of most mounds excavated is also understandable if individual houses had a life span as short as eight years.

Lack of evidence precludes discussion of the external relationships of Samoan houses. It seems reasonably clear that the *fale afolau* diffused from Tonga to both Samoa and Fiji (where it is known as *vale vakatoga)* in the nineteenth century (Davidson 1969a: 70; Tippett 1968; 155-157). The prehistory of Tongan houses is unknown, however, since this aspect of Tongan archaeology has until now been neglected. Fijian traditional houses are of several kinds, although a rectangular plan predominates except in those areas where the Tongan structure has been introduced (Tippett 1968). It is possible that oval or round-ended houses have been present in Tonga and Samoa for a long time and that Tonga had in prehistoric times a simpler construction as well as the *afolau* form. If the rectangular houses are old in Fiji, this may be a point of difference between Fiji and Samoa, contrasting with their obvious similarities in house foundations.

Ovens and Pits

One of the more successful functional identifications made by Samoan informants was that of large circular raised rim pits as large ovens, for all such pits excavated have proved to be ovens. Several informants separately stated that they were used for cooking the root of the *ti (Cordyline fruticosa* L.). *Umu ti,* as ovens used for this purpose are called, have been made within the last 25 years in parts of Samoa, and some informants had participated in their construction and use. It was frequently stated that *umu ti* were always made in the bush, never in settlements, a statement which is supported by Krämer (1903: 155). The cooking of the *ti* root requires a high initial temperature, and an oven which will maintain its heat for a long period of time, up to several days. Some informants claimed that whereas the size of the archaeological examples was correct for *umu ti,* the latter were normally shallower than examples recorded in the field. Only one really shallow example was seen, inland from Lepa, which almost appeared to consist of a raised rim without an associated central pit. In contrast to informants' claims, the only excavated oven which contained preserved remnants of *ti* was the particularly deep example at Folasa. Krämer's account (1903: 155) also implies that a deep oven was required. In view of the fact that one excavated example did contain traces of *ti*, and that all those investigated have proved at least to be ovens, the use of the Samoan term for this particular category of field monument in Samoa is not perhaps as misleading as may at first appear.

The distribution of the ovens is perplexing. In Savai'i they are widely distributed in association with old settlements. In Upolu their distribution is very uneven, and although they usually appear to be associated with other archaeological remains, this may be fortuitous. No definite *umu ti* were recognised at Mulifanua or Lalomanu, although several possible examples were recorded at the former. Nor were they present at Luatuanu'u, Malae, or any of the recorded areas at Sauniatu, except for one example at SU-Sau-2. Most other places recorded in Upolu revealed at least one, with an extraordinary concentration of at least 17 at Vaigafa. *Cordyline* is apparently found in a variety of habitats in Samoa, including coastal and inland situations, and both bush and cleared areas. The Samoans recognised a number of varieties, some of which they cultivated, and some of which produced roots which were used (Christopherson 1935: 49; Krämer 1903: 384). It is possible that only cultivated varieties were used in *umu ti*, which would explain the normal occurrence of *umu ti* with other settlement remains, although modern statements about *umu ti* are against this. It is perhaps more probable that the varieties used in *umu ti* were often found in old clearings, and on abandoned occupation sites. This would explain their association with other archaeological sites without running contrary to informants' assertions that they were never made in settlements. It should be noted that no *umu ti* have been found in the remote bush; none was seen, for example, in the *vao matua* in Aleipata.

The remarkable concentration of *umu ti* at Vaigafa is unique. A possible explanation for the continuing importance of this settlement may have been its production of this kind of food, although neither this alone, nor in combination with the traditional inland activity of net production (Stair 1897: 142-143) seems sufficient to explain the high status of Vaigafa.

The first excavation of an *umu ti*, at Vaigafa, yielded a relatively recent date. Subsequent investigations on both Upolu and Savai'i have produced older dates, indicating an antiquity of at least 600 to 800 years for the distinctive raised rim ovens. All excavated examples are characterised by a lining of very large stones, and by a very thick dense deposit of charcoal, tending to confirm informants' statements about the necessity for such ovens to retain heat for a long period.

Some other circular pits without raised rims are also ovens. Examples confirmed by excavation are those at Vaimaga and Luatuanu'u. The results from these two sites make it more likely that other circular pits are ovens; some, however, like the recent pits at Folasa are not, and it is inadvisable to identify rimless pits as ovens without excavation.

The excavated ovens without raised rims are dated to the same general period of time (the last millenium) as the *umu ti*. The raised rim of the *umu ti* is such a regular feature, that it seems likely that rimless ovens were constructed for a different purpose. Since both excavated examples appear to be associated with house sites, it is possible that they are simply very large examples of the ordinary oven, constructed, perhaps, to cook food for a large gathering.

The ovens associated with most dwelling houses are too small and shallow to be identified in field survey. The excavations at Fo-1 showed that they exist. Every family in a modern Samoan village has at least one cooking house — a rough shelter over one or more earth ovens — and the excavations at Folasa indicated that a similar pattern probably prevailed in the past. The earth oven itself is documented throughout the known Samoan sequence, with examples in the earliest contexts at Sasoa'a dating to before 1 A.D.

The earth oven is, of course, ubiquitous in Polynesia, even in islands where stone is lacking and coral rubble must be used. The *umu ti*, however, has not yet been reported from Tonga, where site survey data are poorer than in Samoa. It is questionable whether a large oven, retaining heat for such a long time, could be made without stone. Krämer notes the occurrence of *umu ti* in eastern Polynesia and in Fiji (1903: 155, fn. 1).

Pits other than ovens are relatively rare in Samoa. Excavations have revealed a variety of small pits, at all periods, but particularly in early levels. These are presumed to be for the storage and fermentation of crops. The use of pits to ripen bananas, and for fermentation of breadfruit, is well documented in Samoa (Pritchard 1866: 395; Turner 1884: 107). Their presence among the earliest features at Va-1 and Sa-3 suggests that the agricultural base of the economy was already established at the beginning of the known sequence. These small pits, revealed only by excavation, do not seem to be directly associated with houses at later points in the sequence. Their occurrence in numbers at Va-1, for instance, may reflect a use of the site, or part of it, for agriculture and storage rather than residence.

Small pits, assumed to be for storage or fermentation of food, have been revealed by excavation throughout Polynesia. They are well recorded ethnographically and historically. As archaeological evidence accumulates, it may be possible to identify recurring types of pits, and to document more fully the types of situations in which they occur. For example, both rectangular and bell-shaped pits have been excavated in Tonga in a context where they are apparently not associated with residential occupation (Davidson 1969b: 275-279). These pits, however, are much larger than most Samoan examples, and probably belong to a much later context than those at Va-1. Similar pits were also found at the Mangaia mound in Tonga. These may be considerably earlier than Va-1 (Suggs 1961b: 102; Groube 1971: 302). Poulsen (1967) also found numerous pits.

Large pits, recognisable in field survey, are rare in Samoa. The large pits in the fort at Luatuanu'u were tentatively identified as for communal storage of fermented breadfruit. An ethnohistoric account has since been discovered which adds considerable support to this identification (Crocombe and Crocombe 1968: 142). Such large pits, however, are rare, and may only occur in late contexts in fortifications such as that at Luatuanu'u.

Among the small numbers of pits recorded during site surveys are deep circular pits, 2.5 to 3 m in diameter with straight sides, isolated examples of which were recorded in several parts of eastern Upolu; large amorphous pits of unknown use, one example of which was seen near Ti'avea; and the pits described by Buist at Ologogo. It is possible that some of the circular examples were for water storage. Excavations at Lu-53 revealed a complex system of shallow drains, possibly associated with a well in the vicinity. It is likely that considerable effort was devoted to trapping and storing surface water in some parts of Samoa.

Buist's interpretation of the pits at Ologogo as collapsed subterranean rectangular pits is open to question. It seems much more likely that the Ologogo pits are relatively regular examples of a wide category of shallow amorphous pits which appear, for the most part, to be borrow pits of some kind. In this category would fall some irregular pits at Mulifanua, and possibly the large pits at Ti'avea, which may be borrow pits for clay or red earth.

In a landscape so full of mounds, it is perhaps surprising that borrow pits for spoil for mounds are not more in evidence. Peters has documented the use of borrow pits in connection with mound construction at Luatuanu'u. The ditch features at Puna and Vailele, now largely filled in, and the partial ditches still visible around some star mounds, provide part of the explanation for the general absence of such pits.

In concluding this discussion of pits, it can be said that the only relatively numerous and regular pit feature which can be confidently identified in Samoa is the *umu ti*. Some other circular pits are ovens, but not all can be assumed to be. Excavations reveal a range of small pits presumed to be for food storage, as well as small domestic ovens; neither of these is recognisable as surface features in site surveys. Other pits include large circular pits of unknown use, and large rectangular pits which are presumed to be for food storage. Both categories are very rare. The remaining features which can be described as pits are amorphous and irregular and are presumably mostly borrow pits. They are more likely to be borrow pits for gravel or clay, than for construction material for mounds, although the latter have also been identified.

Problems of pit interpretation are similar in Tonga. Excavations have revealed pits similar to the excavated Samoan examples, as well as bigger ones. There is no information on surface pits in Tongatapu, but a survey in Vava'u revealed various regular and irregular surface pits, some of which may be ovens, but many of which are probably borrow pits (Davidson 1961b: 37). In Niuatoputapu large conical pits are found, variously identified by informants as food fermentation pits and disused wells (Rogers MS).

Walls, Ditches and Paths

Walls and ditches (other than defensive ditches) have been recorded throughout Samoa in situations where they appear to have served a variety of purposes. In some instances both walls and ditches seem to have formed paths, which are accordingly included in the discussion in this section. In other instances both walls and ditches may form enclosures.

Stone walls are a common feature of the archaeological landscape. Wright (1963: 92) considered them possible evidence of former agricultural activity; the larger examples are sometimes interpreted as defensive. Stone walls seem to have performed many functions, however. Some are boundaries of agricultural plots, house site land, the land of a *nu'u* (parish), or the land of a district. Some have served as paths, sometimes as single walls, and sometimes as parallel walls on either side of a level or sunken track.

The meandering nature of many boundary walls can be seen in illustrated examples in the Falefa Valley survey area (figs. 4 and 5). A similar irregular appearance characterises walls elsewhere in the survey area and in other parts of Upolu. An interesting feature of the stone wall systems in the Falefa Valley occurs at Niule'a, where a double stone wall marks a path which passes diagonally through a settlement area characterised by meandering single stone walls. A combination of single and double stone walls apparently marking paths and boundaries was mapped by Scott at Letolo (I, Report 4, fig. 42).

The use of stone walls as causeways connecting one house platform to another is common in areas where stone is abundant. Notable examples occur at Sauniatu and Mulifanua on Upolu, where linked mounds exist. Scott has recorded several complexes on Savai'i where stone walls connect mounds or platforms. The three earth mounds linked by earth causeways at Puna (Report 23) are an interesting example of this feature repeated in earth, in an area where stone is not abundant.

Examples of stone walls and heaps presumably resulting from agricultural clearance, since they were not associated with any other sites, were found at Mulifanua, Tanumalala and Aleisa on Upolu. However, similar heaps were also found associated with platforms and mounds in many places. Both Buist and Golson excavated stone heaps. Golson concluded that the heaps at Aleisa were the result of agricultural clearance. Buist made the interesting point that heaps at Ologogo on Savai'i had been deliberately sorted and small stones deliberately stockpiled. Stone heaps are easily recognised only in well grazed areas, with the result that their known distribution is largely confined to cattle runs on both Upolu and Savai'i.

The majority of stone walls on both islands reported as fortifications are probably not defensive. No certain examples of defensive walls have been identified on Upolu, although a fortification with a ditch and stone wall was reported but not seen at Olosiga above Papase'ea. Scott regarded the stone wall running from stream to stream across the ridge above Pulemelei at Letolo on Savai'i as probably defensive; he also described a presumably post-European fortification at Uliamoa which has a stone-faced wall. Stone walls were extensively used in middle and late nineteenth century fortifications (*Samoan Reporter* 15: 2; Churchward 1887: 42; St. Johnston 1883: 155). There is some evidence to indicate that they had a prehistoric precedent, particularly in the Manu'a group where early historic descriptions imply that walls then existing were of some antiquity (Wilkes 1845 (II): 66).

None of the very large stone walls investigated at Mulifanua could be said to be defensive; most have been interpreted as paths. Only their greater height and fluctuations in height distinguish them from Scott's "causeways", which are also broad raised stone walls.

Two principal types of ditches other than defensive ditches have been recorded. These are single ditches, usually running up ridges, which have been interpreted as sunken paths, and the enclosures at Vaigafa and complexes of meandering ditches in the central part of the Falefa Valley and at Folasa. Accounts of the earth platforms at Manase on Savai'i suggest that ditches there may be not unlike those at Folasa (I, Reports 3, 4; Buck 1930: 66).

At first glance it may seem improbable that a stone wall and a ditch are functionally the same. The remarkable variation in field monuments from area to area in Western Samoa, however, which is largely due to variations in topography and the amount of stone in the soil, means that this unlikely situation can arise. If walls and ditches are considered in the light of their probable function, this becomes clearer.

Agricultural plots are not easily recognised in Samoa, and customary landholdings today are seldom marked by boundaries that can be recognised by the stranger, since most boundaries are drawn from one tree or stone or natural feature to another. The two situations where plots may have artificial boundaries are where such boundaries can conveniently be formed with stones cleared from the soil, or where frequent flooding necessitates attempts at drainage.

Paths also take a variety of forms. In eastern Upolu, a ditch running up a ridge is often the only evidence of a former path. Such paths include wide cart tracks, such as the old roads to Lalomauga, Fagaloa and Lotofaga in the Falefa Valley, and narrower foot tracks, such as those at Luatuanu'u, Solosolo, on many of the ridges of the inner Falefa Valley (where they lead only to specialised sites) and at Lalomanu. Sometimes, these paths are marked by stone walls on either side. This may occur either when they pass through a former settlement (as at Niule'a in the Falefa Valley or Sosaiete at Lalomanu) or less certainly when they lead to a particularly important site or site complex. Some instances of the latter were noted at Mulifanua, where sunken paths bordered by stone walls appear to lead to large or distinctively shaped mounds.

As shown above, raised walls of both earth and stone may also be paths. The simplest form is simply a raised earth wall. This can be emphasised by being bounded by a ditch on either side, as on the ridge between Folasa and Vaimaga. Sometimes, as at Vaigafa, a raised earth path is paved with stones on its surface. Raised stone paths vary in size from small low walls to broad low walls (Scott's causeways) to broad high walls, as at Mulifanua.

Another kind of path, not documented for Upolu, is formed of "stepping stones" over a recent lava flow. Although the only such path recorded by Buist on Savai'i is recent, since it crosses the 1905 lava flow, historical records document the existence of similar paths over prehistoric lava flows (Platt MS 1835-1836: entry for 25 March).

The last category of path to be described is the path which is level with the ground surface, neither sunken nor raised, but marked either by paving, or by curbs or walls along its edges, or by both. A good example of a small paved path is seen at Leuluasi (Le-6, fig. 5). The path which breaches the *pa toga* at Mulifanua near the Faia'ai lava cave is a broader example. Level unpaved paths, bounded by walls, are better documented on Savai'i than on Upolu, but probably also exist in the rockier parts of Upolu in places where they have not been replaced by roads modified to take vehicular traffic. Buist has suggested that paths of this kind, wide enough to take a horse and cart, are probably historic, and has assigned tentative ages to inland settlements on Savai'i according to this criterion. However, Scott's description of the walled road at Letolo, which is associated with Pulemelei and is in places stepped in a way more suitable for foot traffic than for carts or horses, shows that this is one prehistoric road as wide as, or wider than, any of the examples described by Buist. Secondly, Buist's own evidence shows that the roads at Ologogo antedate the 1905 lava flow, and the bulk of our evidence suggests that the other sites at Ologogo B, some of which are certainly associated with the road, are more likely to be prehistoric than historic. It is probable, therefore, that at least some wide walled or curbed roads are prehistoric. They are likely to be associated with high status settlements, just as the large raised causeways are. At the same time it is possible that many roads have been progressively widened to suit first horse traffic and more recently motor vehicles. This situation is likely to be particularly acute in northwestern Upolu, where many vehicular tracks probably do follow earlier, narrower, paths.

A few references to roads and paths in the 1830s give some indications of their nature. Buzacott described the difficulty of walking from Saleaula to Tufu on Savai'i on a road consisting of heaps of large loose stones and long grass (Buzacott MS 1836-1837: entry for 5 August). He had noted earlier (entry for 2 August) that the inland road between Neiafu and Falelima was newly constructed and very good. The roads between Falelatai and Lefaga on Upolu, however, were found to be very bad. These limited descriptions suggest some of the more substantial categories of path described above. Evidently at this time there were clearly marked paths around both major islands, although their condition varied considerably from district to district.

No absolute dates have been obtained for paths or walls, although some walls can be inferred to be contemporary with excavated sites. Earth or stone causeways connecting mounds should be contemporary with their mounds, as was inferred at Puna and Vailele; the sunken path on the Tula-i-Matafale at Luatuanu'u is less certainly contemporary with the oven adjacent to Lu-21. The same may be said of the stone walls associated with this and other excavated sites.

Sunken roads are also a feature of the Tongan landscape. Although McKern mentioned only two (1929: 89), they are common in Vava'u (Davidson 1971b: 36), and Rogers (MS) has reported possible examples on Niuatoputapu. In Vava'u they are often particularly noticeable in proximity to mounds, where it appears that the distinction in height between people walking on the path and those occupying the surface of the mounds required emphasis. It would seem, therefore, that paths are intimately related to considerations of status in both Tonga and Samoa. Stone or coral walls, on the other hand, are very rare, and probably modern, in most of Tonga. Even the famous wall Kilikilitefua in Vava'u, according to one account, is a modern construction using stones from a dismantled mound (Davidson 1971b: 33). Stone for walls is simply not available in sufficient quantity in much of Tonga. Stone walls occur, however, on Niuatoputapu, and are common on Tafahi (Rogers MS).

Ceremonial roads are present in parts of East Polynesia, the *ara metua* of Rarotonga being a notable example. These genuinely pre-European roads are additional supporting evidence that some of the wider roads in Samoa are probably prehistoric.

Fortifications

Among the more dramatic field monuments in Western Samoa are the fortifications, which on present evidence, at least, are concentrated on Upolu. The most common form is the ditch and bank, or combination of several ditches and banks, extending across a ridge from gully to gully. Such forts are numerous inland from the stretch of coast between Solosolo and Apia, where examples have been reported at Malae, at Lu-41 (Report 13), on the Tula-i-Pu'e (Report 12), at Vailele (Report 6), at Magiagi (reported to us by Mr W. Hart and earlier described by Stair (1894: 241)), on the track between Apia and Siumu (also reported to us by Mr W. Hart), and behind Moamoa. All these fortifications make use of the ditch and bank, and most are constructed primarily to prevent access from the coast, although some are also defended on the inland side, and at least one, Luapu'ē above Moamoa, is designed to prevent access from the centre of the island rather than from the coast. On the other hand, three examples recorded in the southern part of Atua district guard against attack from the centre of the island, although the ditch and bank at Afulilo is built to prevent attack from the west and cuts off the inland approach to Aleipata.

Less common forms of fortification include large and small hilltop forts at Luatuanu'u and Solaua, small ditches and scarps on several of the ridges in the Falefa Valley, and transverse ditches and scarps on the rims of small volcanic cones. The remarkable fortification at Uliamoa on Savai'i is as yet unmatched by anything similar on Upolu, although the description by Atonio and Kasini of the fort at Pito Ti above Leusoali'i suggests the possibility of a similar fort there.

The lack of recorded forts in the rest of Upolu, apart from Mafafa fort between Lefaga and Falelatai, need not imply an absence of forts. Nineteenth century accounts confirm the existence of one or more large inland fortifications in the vicinity of Tanumalala, including one on the large volcanic cone Tafua Upolu (Heath MS 1838). Forts are also said to exist in the vicinity of Fagaloa and Uafato. On the other hand, the lack of recorded forts on Savai'i does seem to imply that they were much rarer on that island, for both Buist and Scott enquired systematically for forts throughout Savai'i, as did Atonio, the only results being Uliamoa, the similar stone wall at Fogatia, and three more traditional examples, including one ring-ditched hill fort.

A major war was ending in Samoa when John Williams arrived in 1830. The first two decades of missionary influence were relatively peaceful, marred only by minor wars on Savai'i in 1844, in which no one was killed, and 1846. In 1848 more serious civil war erupted on Upolu and Manono, and continued sporadically until the late nineteenth century. Most eyewitness accounts centre on the notable coastal fortifications at Lufilufi, Mulinu'u and Fale'ula, and the stone walls on Manono. It is clear, however, that many mountain fortresses on Upolu were also in use. Unfortunately, European observers seldom visited them, and the missionaries who did provide few useful details (e.g. Stair 1897: 99). It is accordingly difficult to say which of the recorded fortifications were last used in the historic period. However, accounts written before 1845 show that several of the more impressive fortifications including the example at Magiagi (Stair 1894), and probably Mafafa, were already in existence. (Wilkes' (1845 (II): 151) account of a fort on a large ridge *west* of Falelatai is likely to be Mafafa (I, Report 1, p. 17), since there is no large ridge west of Falelatai, and Wilkes in other contexts also confused east and west.) It is unlikely that the pattern of Samoan fort building had changed drastically by 1830, and indeed accounts of these forts imply that they had been used many times up to and perhaps including 1830.

In view of the number and variety of Samoan forts, and the repeated accounts in records written before the outbreak of war in the 1840s, of numerous wars, and frequent resort to mountain fortifications, there is every reason to suppose that earthwork fortifications have a long history in Samoa. Indeed, the interpretation of the carbon date for Lu-41 as dating an earlier stage of the fortification there (Report 38, p. 222), seems quite acceptable.

A problem in the interpretation of Samoan warfare is the importance given today to stories about Tongan invasions. Many forts and other field monuments are attributed to Tongans, and one of the most famous of all Samoan traditions recounts the expulsion of Tongans by Tuna and Fata and the creation of the Malietoa title, some 19 generations before 1900. In Tonga, earthwork fortifications are most numerous in Tongatapu, where most if not all, in their present form, date to the historic period. Only the ditch at Mu'a, which is exceptional, since it defended the ceremonial centre of all Tonga, can safely be regarded as prehistoric. In Vava'u, which offers far more suitable natural situations for fortifications, only five forts have been recorded, three of which are certainly historic, while the remaining two, although more similar to Samoan forts, appear more large than effective (Davidson 1971b: 35). It is doubtful whether the Tongans would have been able to teach the Samoans anything about fortification, particularly on the Samoans' home ground. On the other hand, the greater variety of fortifications in Fiji, including both ring ditch and ridge and hill forts, suggests that Fiji is a more likely source, if Samoan forts require a source.

It has been customary to derive Samoan forts from Tonga, and Tongan fortifications in turn from Fiji (e.g. McKern 1929: 81). The sources cited by McKern, however, refer to the adoption by Samoans in the mid-nineteenth century of certain Tongan refinements in the matter of loopholes, rather than basic principles of fortification. The archaeological evidence in Samoa is sufficient to show that earthwork fortifications have been present in Samoa for far longer than was previously thought. Indeed, it is possible that ridge forts were already in use in Samoa when East Polynesia was first settled, and that the ridge forts in the Marquesas are derived from an ancient Polynesian model.

Frost (1970: 261) believes that fortifications in Polynesia and Fiji are historically related and should be treated as one complex, which spread from Fiji to various Polynesian island groups by infrequent chance contacts involving small numbers of voyagers. His dating of the earliest Fijian examples at A.D. 1100 is too late if our Samoan results are correct. To sustain his hypothesis, Fijian fortifications should have a greater antiquity, which they may prove to have when more sites are excavated and dated. Fiji certainly seems a more likely source than Tonga for Samoan fortifications, if an outside source is required.

Initial missionary reports of Tongan involvement in Samoan wars suggest that instead of the total domination of Samoa by Tongans in the remote past, and their glorious expulsion, the reality may have been a series of Tongan invasions, and occasions when Tongans sided with one or other party in Samoan internal wars. Stair stated that Tongans had frequently invaded Samoa unsuccessfully (Stair 1897: 241). Wilkes reported that warriors from Vava'u had attacked Samoa at a period the missionaries inferred to be some 70 or 80 years before 1839 (1845 (II): 95). The missionary Harbutt reported from Lepa that Atua district had been ravaged shortly before 1830 by all the rest of the Leeward Islands and a fleet of Tongan canoes which happened to be in Samoa at the time (Harbutt MS 1842). Tongan trading canoes were regular visitors to Samoa in the 1830s (Davidson 1969a: 48, fn. 37). It seems only too likely that on numerous similar occasions in the past Tongans were unable to refrain from meddling in conflicts in which the Samoans were engaged. Whatever the case, however, the available evidence on fortifications in the two groups does not support the view that Samoan fortifications were built by Tongans or derived from Tongan models.

Distribution of Settlement

There is a Samoan proverb, *a ua sala uta, ia tonu tai,* which means when a mistake has been made inland it should be rectified at the seaside (Schultz 1965: 82). This expresses the close relationship between those living on the coast and those dwelling inland in the same part of an island. Evidence now assembled on the distribution of settlement shows that where surveys have been directed towards the investigation of a continuous strip of land extending inland from the coast, archaeological remains are found to be continuous. The best examples of this are at Mulifanua and Vailele on Upolu, with less detailed supporting data from other parts of Upolu, and the Letolo plantation at Palauli. In this respect, the views of Wright (1963: 91, 94) quoted by Buist (I, Report 3, p. 35) were perhaps misleading, as was Golson's initial impression that coastal settlement was largely recent, perhaps coincident with the time of European contact (I, Report 1, p. 16).

Wright appears to have noticed particularly evidence relating to bush refuges, and to have been less aware of the very extensive domestic occupations which are also to be found inland. His contention that sites of inland settlement were selected primarily for defence is in conflict with the results of both the Mulifanua and Falevao surveys. Similarly, his belief that inland settlement was influenced by the availability of good water supply is only partially supported. Certainly there are good permanent streams in the Falefa Valley and at adjacent Solaua, at Vaigafa and at Palauli, as well as in the part of Upolu which embraces the Vailele, Luatuanu'u and Solosolo survey areas. Neither the Mulifanua nor the Lalomanu project areas, however, has good water supplies, yet the former has probably the greatest density of archaeological sites of any survey area. In coastal areas, however, there does seem to be a concentration of settlements around water supplies, particularly on Savai'i.

Our evidence tends to support Wright's opinion that soils were not an important consideration controlling settlement. The comparable density of sites at Solaua and Leuluasi, on soils of very different fertility, is an illustration of this.

Broad fringing reefs, fertile lagoons, and convenient passes in the reef probably had some influence on the location of settlements. Indeed it seems likely that the most attractive areas for settlement were those with gently sloping terrain adjacent to broad lagoons, and that soil fertility and water supply were secondary considerations. The northwestern part of Upolu would, by this reckoning, attract the greatest density of settlement, a hypothesis which is supported both by the results of the Mulifanua survey and by the present high concentration of population. Whereas the present day population is located largely on the coast, however, the archaeological evidence strongly suggests that it was more widely dispersed over both coastal and inland situations in the past.

This is not to imply that other parts of the islands were not also well populated. Evidence from Vailele, Luatuanu'u, Solosolo, the Falefa Valley, Lalomanu, the road to Moamoa, and the reconnaissance surveys at Lotofaga and Lepa, all suggest extensive settlement on Upolu; the reconnaissance surveys of Savai'i also revealed extensive evidence of occupation both on the coast, and in inland areas not now inhabited. Nonetheless, there are apparently some areas of Savai'i that were never attractive for settlement. No such areas have been found on Upolu.

Observers in the 1830s remarked that the population was concentrated on the coast while most of the land lay waste (P. Turner MS 1835; Williams MS 1832: Observations; Pickering 1848: 75). The archaeological evidence, however, indicates that this was not always so. The same deduction was made by the more observant of the nineteenth century writers (Davidson 1969a: 54). In the late prehistoric period, and at least in the most attractive parts of the islands for some 2000 years previously, settlement had been spread over both coastal and inland areas. It seems likely that for much of Samoan prehistory, Samoans lived dispersed over their lands, taking advantage of both inland and coastal situations. I have argued elsewhere that the earlier settlement pattern need not have required a different form of local organisation; that a *nu'u* could function in essentially the same way whether its members all lived in a nucleated settlement on the coast, or whether they lived in a more dispersed pattern (Davidson 1969a: 55-56).

For nearly 150 years the great majority of Samoans have been living on the coast, and cultivating the nearest available land. The result is that much of the land adjacent to villages is exhausted, and gardens are now being made further and further inland (Wright 1963: 96-97). It could be argued that history is repeating itself. The first Samoans would certainly have occupied the coast, and as the population increased, the lands nearest the coast would have become exhausted, so that land had to be cleared further inland. Gradually the pattern of dispersed settlement may have evolved, with not only cultivations but settlements as well, moving over the land as part of the cycle of land use. Some degree of depopulation and the attractions of the coast for contact with Europeans inspired the move toward nucleation and a greater concentration on the coast. The attractions of roads and bus services are sufficient to maintain coastal residence still, but cultivations are again being forced further inland.

Almost all the archaeological remains recorded in inland situations can be interpreted either as the result of a dispersed settlement pattern, or as the special response to war and the temporary change in settlement pattern it necessitated. There are a few exceptional settlements, however, which seem to require a special explanation. Vaigafa is an example. It is a planned settlement distinguished by the largest prehistoric houses yet recorded. It is situated as far inland as it is possible to go in Upolu, in an area of infertile soils. Its principal attraction is a good water supply. Traditions about Vaigafa are numerous, yet none indicates the reason for a high status settlement in this particular location. Specialisation in net making (Stair 1897: 143) or the cooking of *ti* roots might be sufficient to explain the existence of a settlement, but hardly seems to warrant a high status settlement. I have argued elsewhere that inland settlements of this kind depended on a particularly valuable resource for their existence (Davidson 1969a: 57). No further evidence has been obtained to explain the existence of Vaigafa, although the proximity of a desirable resource still seems most likely.

Conclusion

The results of our investigations suggest that certain types of structure, arranged in a particular kind of settlement pattern, have been present in Samoa for a long time. Other kinds of structure are more recent. In some respects, an underlying similarity between Samoa, Tonga and Fiji can be observed. In others, unique Samoan developments are evident.

Throughout the known Samoan sequence, Samoan houses have been oval in shape, with river gravel floors and associated stone pavements. Earth ovens have been in use. Settlements have been variably located in both coastal and inland situations, and have probably formed part of a dispersed settlement pattern similar to that suggested for the late prehistoric period.

Warfare, accompanied by fortifications, seems to have been present in Samoa for at least 1500 years, and earthwork fortifications in suitable parts of Upolu have probably been used and re-used throughout that period.

Although houses have been built on low platforms and on terraces through most or all of the known sequence, the larger raised structures, including both earth and stone mounds, have on present evidence been used only in the last millenium. Their use in Samoa may be paralleled by the appearance of burial mounds, ceremonial mounds, and perhaps also house mounds in Tonga. The star-shaped mound, unique to Samoa, is an even more recent development, which probably appeared in Samoa within the last few centuries.

Associated with the large mounds are large ceremonial roads and massive stone walls. These reached their peak of development at the same time as the mounds, although their antecedents probably go back to an early point in the sequence.

The presence or absence of certain kinds of structures in East Polynesia may help to indicate their antiquity in West Polynesia, although some features, such as stone walls and terraces, are likely to be found wherever the terrain is favourable to their occurrence. Earth ovens, small storage pits, stone roads, and fortifications, are all certainly or probably old, because they are found in both East and West Polynesia. The absence of mounds from East Polynesia, however, is strong evidence to support the claim that they are relatively recent in Samoa.

Comparative data from Tonga and Fiji are not sufficient for precise comparisons. It appears, however, that there is relatively little evidence on which to base a claim for Tongan influence in Samoa. The basic idea of mound construction could have travelled in any direction between Samoa, Tonga and Fiji. Tonga and Samoa, however, elaborated the idea differently. In fortifications, too, there is no evidence at present to suggest Tongan influence in Samoa. Thus despite the traditional and historical evidence for frequent contact between the two groups, the archaeological evidence suggests a measure of cultural distinctness, paralleling the linguistic divergence.

It is difficult to generalise about Samoan political organisation or religion on the basis of archaeological evidence. The structural remains, however, suggest the existence of social stratification and supra-local authority, either immediately preceding European contact, or in the two or three centuries before A.D. 1800. A consideration of the distribution of large mounds, and the available nineteenth century descriptions and reconstructions of Samoan religion, suggest that prehistoric Samoan religion embraced not only personal observances and deities associated with particular settlements for whom small god houses were built, but on occasion included the construction of very large god houses, on massive foundations, in honour of gods whose influence extended over entire districts. In the existence of large house mounds and large god houses, convincing evidence of supra-local authority can be seen.

It should not be forgotten, however, that as Krämer so correctly pointed out, the period of occupation of Samoa is considerably longer than the 500 to 700 years covered by oral tradition. The careful study of Samoan tradition still permits only the most tentative inferences about recent Samoan social and political organisation on the basis of archaeological evidence. There is little prospect that such inferences can be made about more remote periods.

A REVIEW OF PORTABLE ARTIFACTS FROM WESTERN SAMOA

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The frequency of portable artifacts in the sites of Western Samoa proved to be rather varied, and seldom were occupation levels productive of objects in any number. The one type of site containing portable artifacts for which we searched, a coastal midden with numerous specimens of fishing gear, we failed to find. Only two early sites, with pottery, in fact yielded a substantial number of portable artifacts. It is not surprising, therefore, that we have found little reason to divide the Samoan sequence into periods or stages based on differences in their portable artifact content. Any attempt to summarise the data must of necessity deal with it by category. One productive approach appears to be an examination of the position in the Samoan sequence of such reasonably well represented categories as pottery and adzes, followed by sections relating them to similar materials from comparable contexts elsewhere in Polynesia. For the rest, summaries of materials distinctive of early contexts, of materials from other contexts, and of European artifacts in late contexts, would seem to suffice. Finally, an inquiry into the question of the type of fishing lures in use at the time of contact throws some light on why we failed to recover the expected "Samoan type" lures archaeologically.

POTTERY

Of the various classes of portable artifacts recovered from Samoan excavations, pottery is perhaps the most striking in its distribution, position in time, and typological implications. Although potsherds are the most numerous items in the collection, it is significant that none was recovered by surface survey — in contrast, for example, to those islands in the Tongan group where pottery has been recovered in quantity and on the surface. Its presence in quantity in Tongan and Samoan excavations, moreover, in conjunction with a handful of sherds from the Marquesas, is sufficient evidence to refute statements by a host of earlier writers on Oceania, reviewed by Urban (1964), that Polynesians never practised the art of pottery manufacture. Also to be rejected is the simple explanation that the abandonment of pottery manufacture in Polynesia was occasioned solely by the lack of suitable raw material on its principal high islands (Urban 1964: 430, 439). Several important issues raised by the Samoan results deserve further comment. These include: (1) the implications of the frequent recovery of potsherds from secondary contexts, where their occurrence is an unreliable guide to their age, especially if this leads to the deduction that pottery was in use at the time the deposit was formed; (2) the problem of identifying the correct temporal position of Samoan pottery, in particular, the times when it first appeared and disappeared; (3) the relationship between various pottery collections which make up the 800-1000 year Samoan ceramic tradition and the identity of the changes which characterise the development from a typical Lapita assemblage to one unique to Tonga, Samoa, the Marquesas, and perhaps other Polynesian islands; (4) the relationship of the Samoan ceramic tradition to the Lapita ceramic horizon; and (5) the reasons for the disappearance of pottery manufacture in the context of its more general disappearance in Polynesia and parts of Melanesia.

POTTERY IN SECONDARY CONTEXTS

Had the line of argument advanced for the Marquesan or Tongan sequences been adopted, the use of pottery in Samoa might well have been interpreted as spanning the entire sequence during which its manufacture slowly died out. We have preferred instead to argue for derivation from older contexts, whenever the numbers of sherds have been minimal and the nature of the deposit containing them supported such an interpretation. For example, the two sherds in the sub-mound fills and the one in layer 2 at Va-2 dating to the twelfth century A.D. or after (I, Report 8, p. 150), and the ten sherds in layer 2 and one in layer 3 of Va-3, also dating to well after the eleventh century A.D. (I, Report 9, p. 157), are obviously derived from earlier deposits and are not in primary association with the activities which formed these layers. Similarly, 2 sherds found in layers A and E of Va-4, dating to the period of early European contact, and somewhere after the ninth century A.D. respectively, were interpreted as intrusive, while the 229 sherds excavated from layer F-1 were interpreted as in primary association with other evidence of occupation some 1900 years ago (I, Report 10, p. 171). Finally, at Va-1 some 26 sherds in layer IVb, 5 in IVa, 2 in IIIa and 1 in layer I might well have been used to argue for a long-declining pottery tradition from the 735 sherds in secure layer V and VI contexts (I, Report 7, pp. 113, 128-130). Given the evidence for a 1000 year break between layer V and layer IV, however, the later sherds have more reasonably been interpreted as derived from features excavated into the pottery layer, and moved successively upwards in declining numbers by subsequent disturbances. In short, despite small numbers of sherds in later contexts at Vailele up to the European period, the stratigraphic sequences of five mounds at Vailele all militate against an interpretation which sees pottery as lasting later than the third to sixth centuries A.D. (see below).

Although the few sherds from Apolima (Report 31, p. 166) are important in relation to the question of pottery distribution and the early exploitation of various areas in Samoa, they cannot be interpreted as reflecting later, though much diminished, pottery use on that island. A similar comment could well be applied to the possibility (unproven) of a potsherd in the mound in Moamoa (I, Report 16, p. 256).

The pottery evidence from sites in the upper Falefa Valley parallels to a remarkable degree that from Vailele. Again, Te-1 with three sherds (Report 26, p. 101) and Le-3 with two sherds (Report 25, p. 96) typify sites with a few sherds testifying not to the use of pottery at the time the layers were deposited, but to the incorporation of the odd potsherd in such contexts from elsewhere. Other examples, such as the 31 sherds at Le-12 (Report 24, p. 85) and the 63 at Lam-1 (Report 23, p. 68), are even more indicative of a situation where nearby sites with older deposits containing pottery have been a source for materials used as a fill in the site in question. This would appear to explain quite adequately the 10 sherds in the layer 5 pit fill at Le-12, which are associated with other typologically early artifacts and charcoal yielding a date in the third century B.C. (Report 24, p. 84). It would also appear to hold for the 63 sherds incorporated in a fill which forms the mound of Lam-1, because none occurs in the sixteenth century occupation deposits on the mound's surface (Report 23, p. 64). In both cases, the inference that there are nearby deposits containing pottery in primary association with an early occupation layer is strongly suggested. Finally, the pottery in layers 3 and 1 at Sa-3 could, like that at Va-1, have been interpreted as evidence of a much diminished pottery tradition after the second century A.D. (Report 29, p. 152). Again, however, the more probable explanation adopted is that sherds from layers 4 and 5 were incorporated in layer 3 and 1 contexts through the digging of features into the earlier deposits.

The implications of the Samoan data are important in an examination of the argument that has developed around Poulsen's (1967, 1968) and Golson's (1971) interpretation of the Tongan archaeological sequence. On archaeological grounds they advanced the claim that the local tradition of pottery manufacture survived in Tonga until the time of European contact, when some pieces of pottery were seen in use, rather than the alternative view that the few pots seen in use were probably imports from Fiji. Their claim was supported by some late fifteenth to sixteenth century A.D. radiocarbon dates insecurely associated with pottery (Golson 1971: 74). It is my view, however, that their claims might have been advanced with more caution had they taken into account the difference between the presence of an often substantially smaller number of small sherds in secondary contexts and the occurrence of larger sherds in frequencies characteristic of primary contexts. As Groube (1971) and I (Green 1972b) have attempted to demonstrate, the recovery of sherds derived from earlier deposits in stratigraphically later contexts has been common to numbers of sites excavated in Tonga from the time of McKern (1929) and the Birks (Suggs 1961b: 101-102) to that of Poulsen (1967), Davidson (1969b) and Groube (1971). The failure of Poulsen or Golson to compensate for this phenomenon prevented their recognition of a long aceramic period in the Tongan sequence, despite a reasonable body of excavation evidence supporting it (Green 1972b: 81-84).

Once the likelihood of some potsherds occurring in secondary contexts in Tonga and Samoa is recognised, the same perspective can be applied to a total of 12 sherds from several sites in the Marquesas. This viewpoint casts considerable doubt on the chronological positions which Suggs (1961a: 97-98) and Sinoto (1970: 106-110) have assigned to pottery in the Marquesas. In Suggs' case, the five sherds from site NHaa-1 and the one from NHo-3 on Nuku Hiva are not really a sufficient basis on which to assign pottery production a temporal span from 150 B.C. to somewhere after A.D. 1100, especially as the NHaa-1 sherds come from site contexts which are improperly dated and interpreted (Sinoto 1970: 105-106). Sinoto's statement (1966: 300) that "Pottery seems to have existed in the Marquesas over a long period, but in very restricted quantities", rests on Suggs' evidence and two sherds from layer VII of the MUH-1 site (Sinoto and Kellum 1965: 26) which he (1970: 106) assigns to his Phase I, a period of initial settlement, culturally earlier than the majority of materials from NHaa-1 recovered by Suggs. The interpretation that pottery survived into Phase II only in the northern part of the Marquesas is based on the five sherds from Location A of NHaa-1 recovered by Suggs and four more found by Sinoto in another site labelled Location M (Sinoto 1970: 113).

The petrographic evidence that some of these potsherds were manufactured in the Marquesas rather than brought from Tonga or Fiji (Suggs 1961a: 97) is now available (Sinoto 1970: 113), but their interpretation as indicators of the manufacture and use of pottery at the time of the deposits in which they were found may be questioned. It is my view that the two sherds from MUH-1 and the one from NHo-3 are almost certainly in secondary contexts and were derived from elsewhere. More important, the two from MUH-1 testify both to the manufacture and use of pottery in a phase before Sinoto's Phase I and to its abandonment by A.D. 300, the date of that phase. If this is correct, then the nine sherds from the two locations on Ha'atuatua Bay are either testimony to richer pottery-bearing sites somewhere on Ha'atuatua Bay and ones which may well be associated with Suggs' (1961a: Table 1) early dates of first century A.D. or before, or they are perhaps but a small selection of sherds from primary site contexts which have not yet been adequately sampled. In either case, the implication is that secure assemblages from the Settlement Phase of Marquesan prehistory associated with the use and manufacture of pottery are present and await excavation.

Besides these deductions from the Marquesan data alone, there is the general argument that pottery has never been found in either primary or secondary contexts, despite much excavation and searching, in Easter Island, Hawaii, the Society Islands, or New Zealand. As these were probably all settled between the fourth and eighth centuries A.D., it seems evident that the manufacture and use of pottery in East Polynesia was a cultural trait which disappeared before A.D. 300. If this is the case, then an inference drawn from the earlier interpretation of the Marquesan data suggesting that pottery should have been present in East Polynesia at the time of settlement of New Zealand, whether this was in A.D. 750, 950 or 1150, no longer applies (Groube 1968: 145). One could now accept Groube's second alternative, that the immediate homeland of New Zealand culture may already have abandoned pottery before A.D. 750, in lieu of his first, which states that when the earliest sites in New Zealand are found stray potsherds may turn up. Nor can the Marquesas any longer be ruled out as one of the immediate sources of New Zealand East Polynesian culture simply because they once possessed pottery (Groube 1968: 145).

The Age of the Samoan Ceramic Complex

What is probably the earliest pottery collection from Samoa lacks a secure date or provenance. The evidence is sufficient, however, to infer that the typical Lapita decorated pottery from the Mulifanua Lagoon was made locally and precedes in date the Plain Ware assemblages (Report 33, p. 174). The question of how much earlier in time it should be placed is one to which the present Samoan evidence allows no precise answer, although data from Tonga and Fiji provide an indication. By 500 B.C., ceramic assemblages of Fijian Lapita pottery carried little or no decoration and Groube (1971: 306) has made it clear that unless new evidence is forthcoming, former claims for the persistence of decorated pottery in Tonga cannot be sustained. Thus, unless an assemblage in Tonga or Fiji prior to 500 B.C. is nominated as a likely source for the decorated Lapita pottery of Samoa, it is difficult to see from where the Samoan collection could derive. One would have to postulate a late survival of decorated Lapita on some other nearby island in Western Polynesia as the immediate source of the Samoan material. Even then, an upper limit of about 300 B.C. is implied by the first century A.D. assemblages of almost entirely Plain Ware pottery which follow in Samoa, for such assemblages probably appeared well before the first century A.D. Given the range of vessel forms implied by the Samoan Lapita collection and the fact that something like 8 percent of the decorated sherds use typical Tongan motifs, I would nominate a date of circa 700 to 800 B.C. as most likely, and consistent with Groube's revision of the Tongan sequence. I would also think it more probable that the Samoan material is related to that found by Rogers (MS) at the northern end of the Tongan chain a short 260 km away, than it is to that of Tongatapu.

Evidence from five sites bears on the age of the Plain Ware ceramic complex in Samoa. The assemblages of predominantly thick, coarse ware from layer 4 at Sa-3 and layer V at Va-1 are virtually identical and securely dated to the first to second centuries A.D. Although the deposit may in the former case be a fill composed of refuse derived from nearby, it is underlain by one of the same age associated with the same pottery, and there is no reason to deny that these two assemblages reflect pottery manufacture and use at a time contemporary with the associated dates. Stratigraphically earlier, but not as satisfactorily dated, are the deposit of layer VI at Va-1 with its thick, coarse potsherds, and the pavement and house portion of the base of layer

5 and occupation A below it at Sa-3, associated with predominantly thin, fine ware sherds.

That they are more than a century older than the dated materials appears on the stratigraphic evidence unlikely, although some time, perhaps the first century B.C. to the first century A.D., should be assigned to the slow change from a predominance of thin, fine ware to one of thick, coarse ware (table 25). A dated deposit of broadly similar age with a largely thin fine ware, but marking the transition to thick, coarse ware, is the assemblage from layer F at Va-4. Here the problem lies with interpretation of the radiocarbon results (Report 38, p. 217). Finally, there is the material from Le-12, where 31 sherds occur in various secondary contexts. There are no sherds in occupation A, dating on the available evidence to the fifth to seventh centuries A.D., and the 7 in layer 7 are in the same kind of fill deposit as occurs in the layer 5 pit fill, where there are 11 thin, fine ware sherds associated with other items characteristic of the early end of the Samoan sequence. A radiocarbon date associated with the layer 5 materials suggests an age in the third century B.C. The acceptance of this date depends on its interpretation as part of a derived fill which also contained the charcoal dated, and therefore must be treated with some caution. The interpretation does seem sufficiently well based, however, to serve as a probable indication of the age of the thin, fine ware pottery in Samoa.

My own assessment of the data reviewed above is that the evidence is sufficient to sustain a claim for a Plain Ware ceramic style in Samoa from 300 B.C. to A.D. 200 or 300, a time span of 500 to 600 years. During this interval there was only a minor amount of change within a unified ceramic complex. This leaves open the question of whether after the first century A.D. the amount of pottery manufactured was diminishsing in concert with the declining quality of pottery produced.

Some evidence exists that pottery manufacture had entirely ceased in Samoa by A.D. 500 to 600. Such evidence becomes progressively stronger after the eighth century A.D. as increasing numbers of sites are encountered with deposits in which potsherds are entirely absent. There is also some evidence to suggest that after the first century A.D. the amount of pottery being manufactured was diminishing (Report 29, p. 131). It is, however, ambiguous and the decline in numbers of sherds could perhaps be explained by the layer 4 context of Sa-3 in which those sherds appear.

In the absence of the necessary archaeological controls, the question of whether pottery production ceased gradually or at once cannot be resolved at present. Therefore, only the deposits which bear on the assertion that production of pottery had ceased by A.D. 500 to 600 will be reviewed. They include the basal deposits reflecting human activity in the long sequence from Lu-53, where layer 1 is dated to the third century B.C. and layer 2 to the third century A.D. These deposits, together with layers 3 and 4 of the same age, appear to reflect gardening activity. This is a context in which data on the presence or absence of pottery are not really to be expected, and none occurs. However, these deposits were soon sealed in by layers 5-8, which represent extensive occupation on the terrace, also without signs of pottery either *in situ* or in secondary contexts. Deposits of a roughly similar age have fifth century A.D. charcoal incorporated in the earthen bank of the fortification at Lu-41. These deposits are also lacking in pottery. In fact, despite ideal conditions for searching, no pottery was ever found in the intensive surface survey of the Luatuanu'u area, and none was encountered there in the few occupation contexts investigated, although some of these appear to go back to the fifth or sixth centuries A.D. In the Vailele area, the aceramic hearth horizon overlying the pottery-bearing layer F at Va-4 is unlikely on any grounds, despite some difficulties in precisely interpreting the radiocarbon ages of the layers above and below (Report 38, p. 217), to be later in time than the fifth century A.D. This age for occupation deposits at Vailele without pottery is supported by the lowest occupation levels of Va-38, which began in the sixth century A.D. and continued thereafter without trace of it. Finally, occupation A at Le-12 in the Upper Falefa Valley has an approximate sixth to seventh century A.D. age, yet yields none of the numerous potsherds that might have been expected of a primary context in this locality, were pottery still being manufactured. On the other hand, in the fill of layer 5 above occupation A, sherds whose probable age is 300 B.C. occur in secondary context. A handful of sherds also occurs in secondary context in layer 7 underneath occupation A.

Evidence from three areas of Upolu in Samoa reviewed above bears on the issue of when pottery production ceased. The Vailele and the Upper Falefa Valley examples are from areas where sherds might be expected, because these fertile zones were occupied while pottery was still manufactured and extensively used. The evidence from Luatuanu'u occurs in an area where sustained settlement was probably later, although some inland gardening activity may have taken place when pottery was still in use. It would appear, therefore, that the extent and quality of the evidence is sufficient to suggest that pottery production ceased between the third and sixth century A.D. in Upolu. That this probably occurred toward the earlier, rather than the later end of that interval, may be inferred from the fact that evidence of occupation deposits without pottery becomes increasingly stronger during the next part of the Samoan sequence. In this respect, as I have commented elsewhere, the Samoan evidence "is fairly satisfactory, the Marquesan evidence is slightly more equivocal, and the Tongan data are least satisfactory" (Green 1972b: 81).

The Samoan Ceramic Sequence

The relationships between the various pottery collections which make up the Samoan ceramic sequence are fairly easily stated, but their interpretation is partially bound up with how one defines Lapita as a ceramic complex. Discussion here, therefore, anticipates the position taken on this question below. The collection from the Mulifanua lagoon serves to document an initial period of Samoan prehistory when people accustomed to making a fairly sophisticated variety of Lapita style pottery elsewhere, settled in Samoa and began there the manufacture of an almost identical pottery from local materials. The result was a wide range of vessel forms using decorative devices characteristic of similar Lapita pottery from Fiji and Tonga. In short, the environment of Samoa at that time did not preclude initial reproduction of the ceramic tradition the potters brought with them.

The precise developments of the next 400 to 600 years are not yet properly documented by archaeological excavation. However, from the ceramic assemblages of the first century A.D., it is readily apparent that major changes had occurred which in many ways parallel those in Tonga. They probably took place before the third century B.C. and relate to two trends, one a diminution of decoration to an incised motif on the rims of bowls which is confined to less than 2 percent of the total sherdage, and the second, a restriction of vessel shapes to some rather similarly shaped simple bowls in various sizes. Thus, a wide range of decorative motifs, both dentate and incised, which occur on both the bodies and rims of narrow-necked jars, shouldered jars, bowls, and flat-bottomed dishes characteristic of Lapita ceramics, disappears. In their place are bowls of several sizes which are largely undecorated, except for the occasional rim. The result is that what was formerly no more than a minor and rather ill-defined component of the Lapita ceramic complex, has now become the whole pottery assemblage. In this context it is necessary to recognise that the last statement may require reformulation when the plain ware component of the Lapita ceramic complex receives analytical treatment equal to that given to the decorated component. At present this neglect is unfortunate, for it is my conviction that the plain ware component of the Lapita assemblages is the one on which the claims for continuity with the subsequent Plain Ware assemblages in Tonga and Samoa will ultimately rest.

In Samoa, the case for continuity between Lapita and the Plain Ware assemblages is at present based on general technological resemblances (Golson 1971: 71; Green 1972b: 81) and a few specific items. Among the best of these is the use of the same temper in the Samoan Lapita and the early thin, fine ware variety of plain pottery. There is also the use of the same kind of notched decoration on Lapita jar rims as appears on Plain Ware bowl rims. In addition, some body sherds from jars in both periods possess a common pattern formed by prominent irregular striations on the vessel body. Continuity may also be argued between the few plain and decorated bowl rims of the Lapita collection and bowls which are their counterparts in the Plain Ware assemblages. In particular, one might cite the coconut-shaped cup known from early Lapita contexts in Tonga (Poulsen 1966: Fig. 24) as well as the following plain ware period (Groube 1971: 300), as one of the more convincing examples, because two almost identical vessels occur in the thin fine ware variety of pottery from Samoa (Report 29, p. 128).

The above claims for continuity are not very impressive, except in the wider context of other Pacific ceramic traditions, and it was this lack of alternatives which led Specht (1969: 248-250) and Golson (1971: 70) to see the Samoan Plain Ware assemblages as simply a variety of Lapita. While the claims for some sort of relationship with Lapita have been considerably strengthened by Groube's (1971) revision of the Tongan sequence and by the recovery of a typical decorated Lapita collection from Samoa, what still seems not to be appreciated is the degree of ceramic change that has occurred by this point in the Samoan sequence and probably elsewhere in Polynesia (see below).

Continuity in the Samoan ceramic tradition is, in fact, restricted to a small part of the Lapita ceramic complex. This becomes particularly evident if a functional rather than a technological and formal viewpoint is maintained. As I have tried to show (Report 29, p. 129), the Plain Ware vessels of Samoa have their functional equivalents in the wooden vessels that must have replaced them in the aceramic part of the sequence and are known from the records of the historic period. In contrast, functional equivalents of many of the vessel shapes common in the Lapita style ceramics are unknown in any later contexts, and it would appear that many of them are vessels designed to fulfil functions not reflected by later assemblages, whether in pottery, stone or wood. For this reason, I continue to view Samoan Plain Ware assemblages as distinctive of a style of Polynesian pottery developed by differentiation out of the Lapita ceramic complex, which in my view, must be designated by a term other than Lapita to indicate this fact (Green 1972b: 81). Moreover, it is a Plain Ware tradition which shows internal stylistic development in its own right from a predominantly thin, fine ware variety of pottery with minimal decoration to a thick, coarse ware pottery with almost no decoration.

At this time, a third trend in the Samoan ceramic tradition also becomes particularly evident. This is a diminishing quality of the vessels being produced. Starting with the thin, fine vessels of the Samoan Lapita, there is first a major restriction in range of form and decoration, which is followed by a notable decline in the quality of those vessels still being produced. The decline goes in concert with an increasing use of a coarser and far less satisfactory temper. The result is a rather uniform, uninteresting, ponderous and rather poorly fashioned set of pottery bowls whose relationship to the earlier Lapita ceramics is not at all evident without some knowledge of the intervening steps and trends involved.

The Samoan Ceramic Tradition and the Lapita Horizon

In contrast to Golson (1971: 75), I believe the ceramic style defined below as Lapita may be interpreted, along with the cultural complex which accompanies it, as a horizon. Without any apparent antecedents, its sudden appearance in a limited number of localities in island Melanesia, its rapid dispersal from New Britain and New Ireland to Fiji and Tonga in the period between 1300 and 1100 B.C., and the close similarity of its earliest assemblages throughout this area (Green 1973a) are all elements indicative of a ceramic and cultural horizon. The accompanying evidence of long-distance trade in obsidian (Ambrose and Green 1972), in pottery (Dickinson 1971), and other materials (Green 1973a: 335), when taken in conjunction with the rapid dispersal of the ceramic complex from New Britain to Samoa, implies that its bearers possessed a highly developed form of maritime technology and a fair degree of navigational skill. Without it they would have been incapable of sustaining such trade or establishing their settlements on such a widely distributed set of islands. In short, they pioneered a specialised form of cultural adaptation in island Melanesia which made possible their spread not only throughout that area, but also into Polynesia, where they became the founding populations.

Lapita style pottery in each of the areas from which there is adequate evidence, has approximately the same time span, further reinforcing its interpretation as a ceramic horizon. Thus, the well-dated sequences from the Santa Cruz and Main Reef Islands, New Caledonia, Fiji, and Tonga reveal a series of ceramic assemblages in the Lapita style which undergo change over the course of 600 or 700 years before they either disappear, or are replaced by the pottery of some unrelated tradition, or develop into a new and distinctive ceramic style. As a result, Lapita style assemblages from the late part of the Lapita horizon differ more markedly from one another than those at the beginning. For example, the assemblage from the Reef Islands, dating to around 600 B.C., is still highly decorated in a range of dentate-stamped motifs applied to a wide variety of typical vessel forms (Donovan 1973). In contrast, *circa* 5000 sherds from Erueti in the New Hebrides, dating to the fourth century B.C., are 96 percent undecorated, and of the decorated sherds, only 6 reflect the dentate stamp technique; the rest employ an incised technique (Garanger 1971: 61) which in the Santa Cruz and Reef Islands plays a consistent but minor role throughout the sequence. However, the Erueti assemblage still includes various shouldered and carinated-shaped vessels in the distinctive Lapita style (Garanger 1972: Fig. 19). Specht (1969: 245) observed a larger number of differences than similarities between the Sigatoka Phase ceramics and those of Watom and Buka.

In Fiji, in a pottery assemblage from Sigatoka, dating to *circa* 500 B.C., typical dentate-stamped decoration is restricted to the rims of only four shouldered bowls and three of the numerous sub-globular pots. For the most part, the remaining decoration on sub-globular pots is very limited and consists largely of notching or excising along the outer ridge of expanded rims (Birks 1973). A similar type of decoration occurs on some shouldered jars, although many of the shouldered vessel forms and various of the flat-bottomed dishes and plates have in fact disappeared (fig. 90), just as they have from the Erueti assemblage.

By the fifth century B.C. in Tonga, decoration at To-6 has been reduced to 1 percent of the sherds by weight or to 3 percent (23 of 713) of the rims. Again, most decoration is confined to rims, especially rim lips (Poulsen 1967: 139 and Tables 30 and 31). Vessel forms, too, have been much reduced, so that only a few undecorated shouldered jars (Poulsen 1967: Fig. 74/3 and 6) and flat dishes occur. Dentate-stamped motifs still appear on dishes with rounded bases and on convex-bottomed bowls with shoulders and narrow, slightly or sharply inturned rims. A whole example of one of these was recovered from To-1 some time after Poulsen's excavation (Poulsen, Rogers, pers. comm.).

The dominant vessel of this period in Tonga is a pot of muted to ovoid body shape with either a collar or a vertical to near vertical rim (Golson n.d.). The latter rim, associated with Tongan vessel type 3 (Poulsen 1967: Fig. 65), has now become dominant over the former rim associated with Tongan vessel type 2, a type more characteristic of the earlier Lapita levels in Tonga. In this context it is worth noting that these two vessel types appear to distinguish Tonga from other Lapita assemblages of the same age in Fiji or further west. The closest parallels are with the Samoan Lapita collection (Report 33, p. 171). The point here is that in vessel shape as well as in decoration (Mead *et al.* 1973), the Lapita style of each island group diverges over time in independent directions, even though a general trend towards simplification and reduction in vessel form and in decoration is common to all.

In island Melanesia there is some evidence to suggest that Lapita style ceramics did not always disappear abruptly or give way to some unrelated ceramic tradition, but developed instead into new and distinctive ceramic assemblages of Buka and Oposisi dating to a period after the Lapita horizon (Specht 1969: 193-95; Vanderwal 1973: 233). In Polynesia similar situations occur. One example is Tonga, where pottery manufacture may have lasted into the second century A.D. (Groube 1971: 304), and the other is Samoa, where it almost certainly did. It is at this point that one confronts squarely the issue of what is Lapita and what is not, when Lapita is defined solely on the basis of ceramics. It would be possible, for example, to assign the Plain Ware ceramics of both Tonga and Samoa to a "Lapitoid" tradition, as Golson and Specht have done. In this way Specht (1969: 254-255) has linked his Buka style ceramics to the earlier Lapita style pottery from Watom Island.

This is the situation to which Golson (1971: 75) refers in advocating that where a ceramic ware partakes of the features of both the horizon and tradition of American archaeological writing, archaeologists should follow American practice and apply the term *series*. Theoretically, a pottery *series* is made up of a set of ceramic *styles* which are not only similar but contiguous in either space or time or both. For the Lapita series he notes "the individual styles that it includes have yet to be isolated, described, and named" (Golson 1971: 75), although regional variations in decorative treatment which could lead to their identification were pointed out (Specht 1968: 130-132). Recently, some of these variations have been examined in detail, using a technique of controlled description and comparison (Mead *et al.* 1973; Donovan 1973). The result is to draw attention to a number of differences between the decorative styles of the Western Lapita sites of Watom, Ambitle and Santa Cruz-Reef Islands, and the Eastern sites of Fiji, Tonga and Samoa, with the former group displaying a far more complex and richer inventory of motifs and elements. Specht (1968: 131), too, found Fijian materials nearer to those of New Caledonia than to those of Watom. As noted above, similar differences occur between the later Lapita sites of Santa Cruz-Reef Islands, the New Hebrides, and those of Fiji-Tonga. The last two again form a distinctive Late Eastern Lapita style.

The Late Eastern Lapita style, however, as is evident in figure 90, undergoes fairly major development into a distinctive style of Polynesian Plain Ware, a change accomplished largely by focusing on the plain ware component of the Lapita ceramic series. One could legitimately include the Polynesian Plain Ware under Golson's proposed term, Lapitoid, as evidence of continuity within a ceramic tradition. Yet to do so is, to my mind, to miss the significance of the change involved, and to stretch the term Lapita to undesirable limits, so that its definition rests primarily on technology. As Willey (1945) long ago observed, ceramic traditions are characterised by continuities in the realm of technology; ceramic styles, however, form horizons defined in terms of design and decoration. Just as notable divergences among languages are designated by new terms, one of which is Polynesian, so also should distinctive assemblages of plain ware pottery from that area be separately designated.

Figure 90 has been compiled from a careful review of the available publications (Birks 1973; Mead *et al.* 1973; Groube 1971; Poulsen 1967), in which the frequency of reconstructed vessel forms is noted numerically wherever possible. Unfortunately, the limited data published, particularly for Tonga, and for plain wares in general, require that frequency sometimes be indicated by "common", "present", "uncommon" and "not included". The results, however, do suggest the following definition for a Lapita series: ceramic assemblages, in which various shouldered pots, jars, and bowls, as well as flat-bottomed dishes and plates, occur in association with widely varying percentages of dentate-stamped, notched and incised decoration. The decoration consists of a catalogue of elements and motifs whose combinations can be listed and compared. In addition, there is a range of infrequently decorated bowls of simple shapes and varying sizes, plus several forms of rather more frequently decorated sub-globular pots. Site assemblages of Early Western and Early and Late Eastern Lapita styles can be recognised within the series by differences in vessel shape and by the style and frequency of decoration.

Whereas the Lapita ceramic series has its known spatial distribution from New Britain and

	VESSEL TYPES	Early Eastern Lapita: Fijian VL16/81 Yanuca Dentate	Early Eastern Lapita: Fijian VL 1/1 Natunuku Dentate Decor.	Early Eastern Lapita: Fijian VL 1/1 Natunuku Dentate Plain	Early Eastern Lapita: Tongan To 1–5 Mostly Dentate	Late Eastern Lapita: Fijian VL 16/1 Sigatoka Dentate Dec.	Late Eastern Lapita: Fijian VL 16/1 Sigatoka Other Dec.	Late Eastern Lapita: Fijian VL 16/1 Sigatoka Plain	Late Eastern Lapita: Tongan To-6 Dentate Dec.	Late Eastern Lapita: Tongan To-6 Plain	Plain Ware: Tongan Vuki's mound Undecor.	Plain Ware: Samoan Su-Sa-3 Decor.	Plain Ware: Samoan Su-Sa-3 Plain
I	Shallow simple bowls with direct rims (VL16/1 type 2A)	not incl.	2	pres.	present	–	–	21	–	present	common	6	23
II	Deep bowls with incurved rims (VL 16/1 type2D)	not incl.	–	?	not incl.	–	–	3	–	?	present	3	6
III	Shallow bowls												
	1. with vertical walls (VL 16/1 type 2C)	not incl.	–	?	not incl.	–	–	1	–	?	present	1	5
	2. with incurved walls	not incl.	–	–	not incl.	–	–	–	–	–	?	–	1
IV	Convex-bottom bowls with shoulders												
	1. large to medium size, carinated shoulder, narrow inturned rim (VL 16/1 type 2E; VL 16/81 type C)	–	1	–	present	4	–	–	present	?	–	–	–
	2. small size, shoulder and little inversion of rim (VL 16/1 type 2B; Tongan type 5)	–	1	–	present	–	–	2	1	?	–	–	1
V	Small coconut-shaped cup	–		–	1	–	–	–	–	–	1	–	2
VI	Water jars with narrow necks with and without handles (VL 16/1 type 3)	–	–	–	–	–	–	11	–	–	–	–	–
VII	Sub-globular pots (VL 16/1 types 1A & 1B; VL 16/81 type F; Tongan type 3)	2	3	pres.	common	3	22	3	?	uncom.	common	–	1*
VIII	Shouldered jars with little or no distension of shoulder beyond the neck (VL 16/1 type 1C)	–	1	–	present	–	10	2	–	–	–	–	–
IX	Shouldered jars with plane or convex area above shoulder. (VL 16/1 type 1D; VL 16/81 type E)	2	com.	–	present	–	3	2	–	present	–	–	–
X	Shouldered jars with narrow flat or convex-inward-slanting area above the shoulder. (VL 16/81 type D)	3	–	–	present	–	–	–	–	–	–	–	–
XI	Flat-bottomed open shouldered vessels (VL 16/81 type B)	7	com.	–	?	–	–	–	–	–	–	–	–
XII	Wide-mouthed shouldered bowls (VL 16/81 type G)	1	–	–	present	–	–	–	–	–	–	–	–
XIII	Open dishes and plates with flaring sides												
	1. with flat bases (VL 16/81 type A)	30	50	–	common	–	–	–	–	2	–	–	–
	2. with rounded bases (Tongan type 4)	–	–	–	very common	–	–	–	com.	?	–	–	–

* from SU-Va-4

Fig. 90. Comparisons of ceramic vessel forms of the Eastern Lapita and Polynesian Plain Ware assemblages.

New Ireland to Tonga and Samoa (Green 1973a: Fig. 1) and its temporal distribution from the thirteenth century B.C. to the fifth century B.C., Polynesian Plain Ware has its spatial distribution in Tonga, Samoa, the Marquesas and probably Futuna, and its temporal distribution from *circa* fourth to fifth century B.C. to the third or fourth century A.D. Polynesian Plain Ware also exhibits an early style known from Tonga and Samoa, and a late style known largely from Samoa. It may be distinguished from the ceramics of the Lapita series by a total lack of the use of the dentate stamp in decoration, and the confining of such minimal decoration as occurs (less than 3 percent) largely to the rims and lips of vessels. It may also be distinguished by its increasing concentration on several simple bowl forms of various sizes and shapes at the expense of open-mouthed sub-globular pots, and by an almost complete lack of shouldered and flat-bottomed vessels of any type.

The marked ceramic change noted above between the Samoan Lapita collection and the Plain Ware assemblages can also be assessed in the light of figure 90. In it, the case for continuity with the plain ware component of the Lapita ceramic style made above is reinforced, as is its roughly comparable typological status with the pottery from Vuki's mound, the main ceramics from which, in my view, should be dated between the fourth and the second centuries B.C., among Groube's (1971: 301, 305, Fig. 5) several estimates of 550-250 B.C. *circa* 500-200 B.C., or 550-350 B.C. Given such an age, the ceramics from the main layers of Vuki's mound fit well chronologically and typologically between the vessels at the base of To-6 and those of Va-4 and Sa-3 in Samoa. These pottery assemblages, together with that from the Sigatoka site in Fiji, serve to suggest the several steps by which the Samoan Lapita style was gradually transformed into the Polynesian Plain Ware style. They all depend on Groube's (1971) revision of the ceramic part of the Tongan sequence, but on that point I feel there can no longer be any question. Only with such a revision can the Samoan material be understood.

The transition from the end of the Lapita series to Polynesian Plain Ware would appear to be part of the trend evident in Fiji and carried to completion in Tonga and Samoa. The successive loss of various shouldered bowls and jars and flat-bottomed dishes apparently occurred in each of the three areas at approximately the same time. Why, it is difficult to explain. Certainly, no obvious environmental or ecological factor common to three such different island groups seems to be at work. Presumably, it was a change in function which led to the dropping of the most elaborately decorated vessel forms, hence reducing significantly the amount of decoration practised. One can only suggest that the original culinary, ceremonial, status, or other specialised roles played by these elaborate pots was, for some reason, discontinued. In the process by which the Lapita potters abandoned their former role in island Melanesia and became the founding Polynesian populations in a previously unoccupied island world, it would seem that the society associated with the Lapita style of pottery itself may have undergone a major change.

The Disappearance of Pottery in Samoa

Environmental and technological factors are no longer a sufficient explanation for the disappearance of pottery in Polynesia. Pottery can be, and was made in a number of its high islands, yet it disappeared even in the Tongan group, the most highly favoured with good natural deposits of clay. Moreover, it is now clear that the loss of pottery is as common in areas of island Melanesia as it was in Polynesia. No simple or single causal explanation is likely to suffice. Urban (1964: 439) reviews the major alternatives, but no one explanation which he suggests seems any more appropriate to the Samoan case than another. It would appear that a number of social roles in which pottery played an important functional part when the makers of Lapita pottery settled Fiji, Tonga and Samoa, were replaced or abandoned for other activities in which such pottery was no longer required (Kaeppler 1973). Next, it was found that in areas such as Samoa, where good clay resources were not abundant, wooden vessels of the same form would suffice which in due course replaced those in clay. This means that functional and sociological reasons for the disappearance of pottery hold more promise than the solely environmental explanations formerly cited in the literature. Still, until more is known of Samoan Lapita style pottery and its functions, the issue is not capable of resolution.

Adzes

One kind of portable artifact present with some regularity throughout the Samoan sequence is the adze; another is the stone flake, usually derived from the manufacture or use of adzes. Yet, while both items are frequently encountered in small numbers in secure stratigraphic contexts, it is evident from repeated examples that context is not always a reliable guide to age. For example, adzes, especially broken ones, were frequently incorporated in the gravels or dirt fills brought to a site. Thus, it is not always easy or possible to distinguish adzes discarded in the gravel spread *('ili'ili)* of a house floor or its surrounding pavement by the inhabitants from those of an earlier date brought to the site as part of the deposit (Report 24, p. 87). For this reason, all water-rolled or broken adzes whose surface is more weathered or edges more battered than others in the same deposit have been discounted as evidence in assessments made in this report. Although it is reasonably certain that these specimens are no younger than the deposit in which they occur, they can yield little more than an indication that the type in question was present in Samoa at some unknown point in time before that.

Except for a recent study of New Zealand adzes by Park (1972), few classifications of Polynesian adzes have used metrical data or analysed the results statistically. In the classification of Samoan adzes, a certain amount of metrical information has been employed in constructing the formal typology used for adze description. In particular, features of length, width and thickness, and ratios between them, plus the factor of weight in the Sa-3 adze assemblage, have played an integral part in the assessments and interpretations of various collections, both surface and excavated. Still, no multi-factorial analysis of a large number of metrical features has yet been carried out, nor have the cutting edges been scrutinised for different types of damage, although both would make profitable future studies. At this stage in Polynesian prehistory, however, the morphological attribute classification we have adopted does have the advantage of making possible comparisons with other adze assemblages from Polynesia which are grouped according to similar distinctions. The classification also serves adequately to describe the historical changes in form which appear to have occurred in the Samoan adze kit over the last 2000 years. In addition, from the few metrical features subjected to analysis, it is demonstrable that Samoan adzes and those of Eastern Polynesia have almost identical proportions and relationships with respect to length, thickness and width (Green and Dessaint MS). In fact, in every feature, morphological and metrical, which we have recorded, all Samoan adzes fall easily within the parameters observed on adzes thought of as typically Polynesian.

The system we used for classifying the adzes was wrongly summarised in table 1 of Report 2 in volume I, although by following the text discussion and illustrations one cannot go far wrong. As stated, the system is built on Buck's earlier classification of Samoan adzes based on cross-section, because this typology has proved more suitable than Duff's for adzes of West Polynesia. However, in positioning the degree of grinding along the top row of the table as if it was a major sorting criterion, we erred. It is the strict use of this by Leach (1972) that is the principal source of the problems he posed. Adze Types III and X should have been placed in columns of the left-hand side of the table with the others of quadrangular section, and the low level distinction between these two fully ground forms and all others shifted to the bottom row rather than appearing at the top of the table.

Another error which should also be corrected is the transposition of the drawings illustrating Variety A and Variety B of Type VIII in figure 10 (I, Report 2, p. 29).

Information on the manufacture and use of adzes in Samoa at the time of contact is limited. On this subject the ethnohistorical sources are very poor, and what little ethnographic information has been recorded was summarised by Buck (1930: 330-333, 356-364). It is evident from the missionary accounts of the 1830s that European goods had by then been incorporated in traditional exchanges among Samoans (Williams MS 1832). Four metal axes, for example, were sufficiently desirable to have formed, along with 120 pieces of tapa, 80 fine mats and 20 pigs, part of an otherwise entirely traditional payment for the making of a large canoe (Buzacott MS 1836-37). In fact, metal axes seem to have replaced those in stone, for they were also reported in use by "heathen" Samoans intent on plunder (Buzacott MS 1836-37: entry for 17 June 1836). This fact is again reflected in Wilson's (MS 1837) listing of axes among the items requested from England. A decline in the production of stone adzes is reinforced by the single reference to the source of the rock for them (see Report 29, p. 141) and the lack of any description of their manufacture.

The relatively rapid replacement of stone adzes by metal axes offers a contrast to the retention of the traditional forms of Samoan fishing gear and houses. The major changes in adze technology as a result of European contact took place earlier than the mid-1830s. This has left little other than the archaeological record and museum collections on which to draw. For this reason, it is difficult to know in what regard the occupation of adze manufacture was held, in a society where house and boat builders, fisherman, and tattooing experts were highly regarded specialists (Mead 1969: 36-39, 68-69). One would expect that because adzes were the tools of craftsmen held in the highest respect by Samoan society, and were kept and transported by them in a special basket made of sennit (Buck 1930: 207), that their manufacture was a specialised activity. This was certainly so in Mangaia in the Southern Cook Islands (Gill 1876: 117-118; Jones 1973: 18) where the specialist, after presentation with a suitable block of stone from a recognised quarry, proceeded to transform it into a finished product for which he was paid. It would appear likely that the same was probably true in Samoa, at least for those adzes used by the expert house and boat builder. Thus one must avoid drawing from Buck's (1930: 370) statements about the "crude appearance" of Samoan adzes, or his impression that "The aesthetic sense of the Samoan craftsman did not express itself in stone but sought some other medium", the inference that adze manufacture was a mundane task without much prestige carried out by the average male as a normal part of his domestic activity.

Given the above perspective, it becomes apparent that the fifth of Ember's (1966: 167) proposed archaeological tests, designed to resolve a conflict between himself and Freeman over Samoan kinship and political structure, involves several unwarranted assumptions. We could agree with Ember (1966: 167) that prehistoric (though not necessarily early) settlements were "relatively small in size (no more than 50-100 people), and variably located", and we could also agree that post-marital residence in these was probably patrilocal (see Report 39, p. 236). However, we fail to see any reason for Ember's further assumption that "physically separate, localized patrilines would have differed in those areas of tool-making that males were responsible for" (Ember 1966: 167), particularly in the light of what is known of the inter-settlement nature of activities performed by male specialists in Samoa. Also, what Ember calls "early settlements" in fact turn out to be the equivalent of our late prehistoric to protohistoric settlements. Thus his fifth suggested test predicting "significantly more local variation in artifact design in earlier settlements than in later ones" proves difficult to apply (a) because adzes are the only item recovered in sufficient quantity to test it prehistorically, and (b) because his time scale is generally inappropriate for these or any other items on which it might be used. Still, were it applied to adzes from the wholly prehistoric part of the sequence, there is little in the available evidence to suggest such a tendency (see below).

It would appear we know too little ethnographically about toolmaking at the time of contact to set up valid tests of the kind Ember proposes. Even our descriptions of Samoan adzes follow a convention based on a practice commonly, although not invariably, used in hafting Polynesian adzes. The convention assumes that the stone heads were hafted with the bevel at the back. Yet it is probably the case, as Buck (1930: 362-364) has shown, that some adzes in Samoa were hafted as axes or chisels and others hafted in reverse fashion to that used in their description. The problem is that so little is known about the way various types of stone adzes were hafted or used in Samoa that to depart from conventional practice at present would only lead to confusion.

Because the excavated samples of Samoan adzes are small, and the ethnographic information on adzes unsatisfactory, the assessments which follow have been based on the general surface collection of adzes made by ourselves and those we have recorded in museums. These collections provide 724 adzes capable of unambiguous classification according to the typology which has been adopted (I, Report 17, table 27). These 724 adzes comprise seven major sub-samples, two being surface collections from widely scattered localities on Upolu and Savai'i, one being an intensive surface collection from a single locality, and four being museum collections. The biases which went into their formation are quite different, some having been collected from varied localities on an island during several years, some recovered from a small area during a short interval, and some assembled from a range of sources at quite different times. Yet despite this variation in origin, the results in table 27 of Volume I (Report 17, p. 263) exhibit a sufficiently high degree of rank-order consistency between the seven sub-samples to suggest that the total collection is probably fairly representative of the universe of Samoan adzes. This conclusion gains further support from metrical comparisons between the Buck-Bishop Museum sub-sample and our surface one, which exhibited virtually identical results in those features analysed. In short, there are fairly good grounds for believing that the general collection furnishes one of the few sound base-lines against which our much smaller excavated and localised samples may be evaluated.

The use of a general collection from an island or island group as a means of evaluating assemblages of much smaller size gathered under more controlled conditions is a kind of primitive postulate held by most writers on the subject of Polynesian adze classification. The use of the concept is apparent in the work of Duff (1959: 141-144), where he provides a very general picture of numerical importance of adze types by island groups arranged in order of their distance from the Society Islands. This he uses to assess both the age and time of dispersal of specific types and to portray general tendencies and changes in particular directions for the adze kits of certain islands. Even more explicit use of the practice is evident in Emory's (1968) survey of the adzes of East Polynesia, where actual numbers and percentages of adze types in museum collections are compared with excavated assemblages. For example, he claims for the Society Islands that "Statistics on adz collections enable us to judge the main changes in form which have taken place from the beginning of settlement" (1968: 158). Because his comparisons between collections take the form of percentages, and there is a wide variation in the sizes of the samples involved, the resulting interpretations are not always subjected to as critical an evaluation as the data warrant. The principal interpretative postulates Emory employs are that (1) surface collections "will include mostly adzes of later times, but will have a lower percentage of archaic forms" (1968: 157); (2) low percentages in the surface collection of adzes prominent in early excavated assemblages indicate an early abandonment of the form (1968: 155, 159); (3) comparisons of the surface collections with early assemblages permit the isolation of the later types, allowing one to judge the changes which have occurred (1968: 160); and (4) a higher percentage of a given form in the surface collection argues for a longer span of use before abandonment than is the case for early forms possessing lower percentages of occurrence (1968: 159).

Two principal viewpoints seem to be involved. One is that the population of adzes, like those of sites and people, formed an ever expanding universe, so that surface collections include a larger number of late adzes because that is when the greatest number of them were manufactured, used and discarded. The second is that early assemblages are less likely than late ones to be exposed and available for inclusion in the surface collection. Hence certain of the adze types which exhibit low frequencies in museum and surface collections will prove to be early. However, other reasons may also be advanced for a type's low frequency, including those of a new type not yet well established, a functionally very minor type in use over a longer time span, or a type employed in contexts other than the habitation sites from which the bulk of the adzes are generally recovered. In a similar fashion, an adze could have been present in about the same proportion throughout the sequence, so that its frequency in the surface collections was very great. In this case, what appears to be the dominant adze type of the later period could, in fact, have been the common type over a much longer span of time. For this reason, it is not possible to judge from surface collections alone which of several alternatives is a more likely explanation. It is possible, however, to use surface collections of the order of 600 or 700 items in order to judge which variations in small controlled samples present possibilities for other explanations because they deviate from the expected number predicted by the general collection. Such explanations, however, need not be restricted to differences in chronological age; they may also reflect differences of use or function related to the special activity context in which the adzes are found or to the geographic context from which they were recovered.

The important point is that comparisons between large general collections and the much smaller assemblages from more rigorously defined contexts furnish one of the few possible ways of distinguishing variations from the expected that are probably due to sampling error from those which offer a reasonable possibility for another sort of explanation. The means for deciding is essentially one of assessing the significance of the difference between the small sample and the large on the Null hypothesis that by chance they both could have come from the same population. In this case, the expected proportions in the population are defined by a large number of adzes gathered from the surface representing specimens from all periods and contexts in Samoan prehistory, and biased, if at all, in the direction of a greater number of adzes from the later periods when the size of the total population was largest. The probability that an outcome in the small sample results from sampling error can be evaluated by calculating the appropriate chi-square values (Snedecor and Cochran 1967: 215-218, 228-236). In the assessments carried out here, various forms of the chi-square test have been applied to a large number of the potential groupings of data, including all those in the evaluations which follow. In general, the results are reported only as probably significant, significant, and very significant, indicating the conventional 5 percent, 1 percent and .01 percent levels of probability respectively. Where useful, a more exact indication of the probability is given in brackets.

This procedure is viewed as an improvement on previous methods used in assessing adze assemblages from Polynesia, especially where sample sizes, as in many excavated assemblages, are invariably small, making evaluations difficult and the use of percentages unreliable. The nature of the problem in Samoa, which is typical in Polynesian archaeology, is seen in table 28, where the raw numerical data on Samoan adzes on which all statements in this section are based are tabulated. Only by some form of statistical testing would it be possible to decide whether the absence of an adze type from a particular sample from some context is adequately explained as a result of sampling error, or whether it is reasonable to infer from its non-occurrence the probability that the type is absent. Such tests also make it possible to evaluate when marked deviations of observed frequencies from expected numbers are of sufficient magnitude not to have arisen easily from chance variation, thereby making other explanations worthy of exploration. In an ever expanding kit of statistical tools, there are perhaps more sophisticated techniques which could be applied. However, given the restricted nature of the basic data available and the type of classification employed, I am not convinced that more sophisticated procedures are warranted. Rather, I would argue that the strategy of testing

TABLE 28

FREQUENCIES OF ADZE TYPES FROM SURFACE COLLECTIONS AND EXCAVATION CONTEXTS IN WESTERN SAMOA

<table>
<tr><th>COLLECTION CONTEXT</th><th></th><th>I</th><th>II</th><th>IX</th><th>X</th><th>VI</th><th>III</th><th>V</th><th>IV</th><th>VIII</th><th>VII</th><th>Unique</th><th>Total</th></tr>
<tr><td>General: Surface and Museum</td><td></td><td>257</td><td>120</td><td>95</td><td>30</td><td>68</td><td>60</td><td>29</td><td>20</td><td>18</td><td>13</td><td>14</td><td>724</td></tr>
<tr><td>Inland Luatuanu'u:</td><td>Observed</td><td>13</td><td>7</td><td>5</td><td>7</td><td>14</td><td>9</td><td>6</td><td>3</td><td>(3)</td><td>(3)</td><td>—</td><td>70</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td colspan="3">6</td><td></td></tr>
<tr><td></td><td>Expected</td><td>23.8</td><td>11.2</td><td>8.8</td><td>3.3</td><td>7.2</td><td>6.1</td><td>3.1</td><td>2</td><td colspan="3">4.5</td><td></td></tr>
<tr><td>Coastal Luatuanu'u:</td><td>Observed</td><td>20</td><td>10</td><td>8</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>(3)</td><td>(1)</td><td>—</td><td>42</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td colspan="3">4</td><td></td></tr>
<tr><td></td><td>Expected</td><td>15.2</td><td>7.1</td><td>5.6</td><td>1.6</td><td>3.7</td><td>3.3</td><td>1.6</td><td>1.1</td><td colspan="3">2.7</td><td></td></tr>
<tr><td>Coarse Ware Context:</td><td>Observed</td><td>5</td><td>3</td><td>—</td><td>(1)</td><td>4</td><td>1</td><td>10</td><td>—</td><td>—</td><td>(1)</td><td>(2)</td><td>27</td></tr>
<tr><td></td><td></td><td></td><td></td><td colspan="2">1</td><td></td><td></td><td></td><td colspan="4">3</td><td></td></tr>
<tr><td></td><td>Expected</td><td>9.4</td><td>4.4</td><td colspan="2">4.5</td><td>2.6</td><td>2.2</td><td>1.5</td><td colspan="4">2.4</td><td></td></tr>
<tr><td>Fine Ware Context:</td><td>Observed</td><td>8</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>9</td><td>(3)</td><td>—</td><td>—</td><td>(1)</td><td>21</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td colspan="4">4</td><td></td></tr>
<tr><td></td><td>Expected</td><td>7.5</td><td>3.4</td><td colspan="2">3.5</td><td>1.9</td><td>1.7</td><td>1.1</td><td colspan="4">1.9</td><td></td></tr>
<tr><td>General: Lotofaga Beachfront</td><td></td><td>3</td><td>2</td><td>2</td><td>—</td><td>1</td><td>1</td><td>1</td><td>—</td><td>—</td><td>—</td><td>—</td><td>10</td></tr>
<tr><td>Lotofaga Excavations</td><td></td><td>—</td><td>—</td><td>1</td><td>—</td><td>—</td><td>1</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>2</td></tr>
<tr><td>SU-Lu-53: layers 11, 12</td><td></td><td>3</td><td>—</td><td>—</td><td>—</td><td>3</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>6</td></tr>
<tr><td>layer 1</td><td></td><td>1</td><td>—</td><td>—</td><td>1</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>2</td></tr>
<tr><td>Historic Period Sasoa'a</td><td></td><td>1</td><td>2</td><td>—</td><td>—</td><td>1</td><td>1</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>5</td></tr>
<tr><td>SU-Fo-1</td><td></td><td>3</td><td>6</td><td>—</td><td>—</td><td>2</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>11</td></tr>
<tr><td>SU-Lam-1: layer I</td><td></td><td>1</td><td>—</td><td>1</td><td>1</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>3</td></tr>
<tr><td>layer II</td><td></td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>1</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>1</td></tr>
<tr><td>SU-Le-12: layer 1</td><td></td><td>—</td><td>—</td><td>1</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>1</td></tr>
<tr><td>layer 2</td><td></td><td>2</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>2</td></tr>
<tr><td>layer 3</td><td></td><td>1</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>1</td></tr>
<tr><td>layer 7</td><td></td><td>1</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>1</td></tr>
<tr><td>layer 5 (fill)</td><td></td><td>—</td><td>—</td><td>1</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>1</td></tr>
<tr><td>SU-Le-3: surface layer 1</td><td></td><td>1</td><td>1</td><td>—</td><td>—</td><td>1</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>3</td></tr>
<tr><td>layer 2</td><td></td><td>1</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>1</td></tr>
<tr><td>SU-Va-2: period 3</td><td></td><td>—</td><td>—</td><td>1</td><td>—</td><td>—</td><td>1</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>2</td></tr>
<tr><td>SU-Va-3: layer 1</td><td></td><td>2</td><td>1</td><td>—</td><td>—</td><td>1</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>4</td></tr>
<tr><td>layer 2</td><td></td><td>1</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>1</td></tr>
<tr><td>layer 3</td><td></td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>1</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>1</td></tr>
<tr><td>SU-Va-4: layer A</td><td></td><td>—</td><td>—</td><td>—</td><td>—</td><td>1</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>1</td></tr>
<tr><td>layer C</td><td></td><td>1</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>1</td></tr>
<tr><td>Hearth horizon</td><td></td><td>1</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>1</td></tr>
<tr><td>layer F1b</td><td></td><td>1</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>1</td></tr>
</table>

observed frequencies in small samples against frequencies which are assumed as the population norm on the basis of a large standard sample of diverse origins, constitutes an appropriate method at this stage of Polynesian prehistory and an advance on previous practices. Where relevant and possible statistically, the smaller samples can also be compared directly, increasing confidence in some of the conclusions reached.

THE EARLY ASSEMBLAGES

Nowhere in Samoa have excavated samples of adzes with a fairly well defined site or temporal context exceeded 6 to 11 items, except for the two early assemblages associated with pottery. These consist of one numbering 21 specimens from a single site and layer dating to the first century A.D., in which a predominantly fine variety of Plain Ware pottery occurs, and a and layers dating to the second century A.D., in second numbering 27 specimens from two sites which a predominantly coarse variety of Plain Ware pottery occurs. These two samples, which will be referred to in the discussions that follow as occurring in a fine ware or a coarse ware context, will be evaluated first.

The unexpected frequency of Type V adzes in early Polynesian assemblages, and their rarity in later ones or the general collection, has been thoroughly discussed (Emory and Sinoto 1964: 156; Emory 1968: 159; Green 1971: 27). The occurrence of 9 examples in a sample of 21 and 10 in a sample of 27, when compared to their frequency in the general sample, yields a very highly significant chi-square value. In fact, this type accounts for most of the very high chi-square values which result when the overall differences in proportions of adze types in either of the two early assemblages are compared with those in the general collection. The frequency of Type V in the two early assemblages is even significantly different ($P = .005$) from that in the inland Luatuanu'u assemblage, the only other context in which these adzes appeared in greater than expected numbers. Conversely, there is no significant difference in the proportions of Type V adzes when the two early assemblages are compared to each other.

It would appear that in the first and second centuries A.D., Type V adzes were one of two common forms. The other was Type I. At that time both occurred in about equal proportions. Thus Type I adzes are present in the two early samples in frequencies that are approximately what would be predicted from the general collection. This indicates that this type, which we characterised as very common, because it occurs in the general collection in numbers that are twice or more those of any other type, in fact owes its overwhelming prominence to its position as a common type throughout the last 2000 years of the sequence (see below).

The differences in Type I adzes from the early assemblages, noted in Report 29 (pp. 131-133), are that they exhibit more variation in form at this time than in later contexts, a fact indicated by the recognition of varieties b, c, d in describing them, and that all lie at the small end of the general size range established for Type I adzes on the basis of the general collection. As Ember proposed in his fifth test, adzes of Type I, as an example of early tools made by Samoan males, do exhibit more variation in their features than later ones, although whether they exhibit greater variation *locally* than is found in later assemblages, or whether one can relate this to assumptions about their production being in the hands of localised patrilines, seems highly debatable. Moreover, a wider degree of variation in features applies only to Type I and not to other adze types in these two early assemblages.

Adze Types II, IX/X, VI and III may be discussed next. All are present in the coarse ware pottery contexts, the numbers of Types II, VI and III conforming closely to their expected frequency. Only the type grouping IX/X shows a tendency, which is not quite significant, to occur in less than expected numbers. The sole IX/X specimen recovered is almost certainly assignable to Type IX, but because it may have been fully ground on *all* surfaces (I, Report 7, p. 133) it could also be classed as Type X. For this reason, the two types have here been grouped and evaluated as one type. The reason for the absence of the Type IX/X group from the fine ware pottery assemblage is difficult to decide, although the fact of its absence reaches probably significant chi-square levels. This might be taken as an indication it was not present at that time. However, if as is indicated by the coarse ware context data on adzes, Type IX/X tends at this early date to occur in lower frequencies than expected from the general collection, then its absence in the fine ware context may simply be one of sampling error. I am inclined to this latter view because a probable Type IX adze was recovered from a presumed earlier pit fill containing fine ware pottery at Le-12, and one probable Type X, or if not X, then certainly Type IX adze, was recovered from the base of Lu-53 in a second century B.C. context. The type, in small numbers, therefore, very probably has an antiquity dating to at least the last half of the first millenium B.C.

The absence of Type II adzes in the fine ware sample also reaches a probably significant level. Because it is an innovation largely confined to Samoa and has yet to be found in earlier than the coarse ware pottery contexts, its absence from the fine ware adze assemblage may be indicative either of its non-occurrence or of a lower frequency of occurrence at that time than in the general assemblage.

The significance of the absence of adze Types III and VI from the fine ware sample is more difficult to evaluate. Because Type III is a fully ground form of Type I, known from even earlier contexts in Tonga, its absence may be simply a result of sampling error. Its association with coarse ware pottery contexts is secure, for it was also found in association with such pottery at the base of Lam-1. Type VI adzes of triangular cross-section have always been regarded as a Polynesian innovation (Duff 1959: 137; Green 1971: 31). They are not well represented in Tonga even in later contexts. Their early development in Samoa is therefore likely, given the evidence that they were present in the coarse ware adze assemblage of the second century A.D. In as much as they occur in that context in the frequency expected, their absence from the fine ware context may be indicative of their previous unimportance, even if this has only a low probability ($P = 0.15$).

Because expected frequencies for Types II, IX/X, VI and III in the fine ware sample are somewhere between 1.7 and 3.5, it has not proved possible to demonstrate with great confidence that the absence of any one of those types from that context is highly significant. What is significant is that all are missing, whereas one would have expected at least one specimen among the four types to be present. The absence of all these adze types from the fine ware pottery context can also be evaluated by directly comparing their expected proportion in that assemblage as a group and their expected proportion in the coarse ware context as a group. Here, after applying the correction for continuity, the difference between the two early assemblages is significant. In conjunction with the very significant result obtained by using the same grouping and comparing the fine ware sample with the general collection, I would argue that these two small samples in fact attest to the end point in a period of change in the Samoan adze kit. Types II, IX/X and VI, missing from the fine ware assemblage, are also not present in the Tongan Lapita sites (see discussion below and fig. 92), and by inference the Samoan ones. Yet they appear in expected or close to expected frequencies in the coarse ware pottery contexts immediately following this and dating to the second century A.D. It would seem that by that time almost the complete Samoan adze kit had been established, the one difference being that Type V adzes were then as common as specimens of Type I. In short, the changes from the Lapita adze kit to a typically Polynesian one took place before the second century A.D., and on the evidence of the adze assemblage associated with the fine ware context, at least some of the changes occurred about that time or not long before. Unfortunately, change in Samoan adzes in the period prior to the first century A.D., which would involve Types II, III, IX/X, VI and VII, is not directly documented by our present Samoan materials. Discussion is deferred, therefore, until later when the two early assemblages are placed in a broader comparative context including Tongan and other early Polynesian adze kits.

About the remaining adze types known from the coarse and fine ware contexts, there is less that can be said with certainty. The only excavated layer from which Type VII, a generally rare Samoan form, has been recovered is at Va-1 in association with coarse ware pottery. Even this is dependent on the recognition of a fragment as the cutting edge and bevel distinctive of that type alone. This and Type VII's presence in the inland Luatuanu'u assemblage in expected numbers, and its occurrence in the coastal Luatuanu'u sample would suggest a time span of over 1000 years. When coupled with its low frequency in the general collection, and its distinctive shape, they indicate it was a rather unusual and specialised tool. I incline to the view that it was for making deep, narrow grooves, especially where it was necessary to demarcate lineally defined areas from which the remaining material could be removed with much broader-bladed adzes without endangering the portions to be left intact. It could well have had a role in the initial hollowing out of canoes or drum cylinders in the bush, which would mean that it would seldom be found in later coastal sites, and would not often appear in domestic contexts.

The non-occurrence of Type IV in the coarse ware pottery contexts is best explained by sampling error, as three examples occur in the earlier fine ware sample, and it appears in the later inland Luatuanu'u assemblage in expected numbers. The chi-square test indicates a greater than expected frequency of occurrence in the fine ware sample, which is significant, but the expected frequency for that cell is less than one, and I hesitate to attach any importance to the result. To meet statistical requirements I have had to group it in table 28 with other adzes (VII, VIII, Unique) whose expected values were all less than the one recommended in using various chi-square tests (Snedecor and Cochran 1967: 235-236). Because both Types IVa and IVb appear in the inland Luatuanu'u assemblage (I, table 15, p. 197), and Type IVa occurs in a Tongan context earlier than the first century B.C. (fig. 92), both would appear to have had a long history even though the type was never a common Samoan form. Of the three Type IV adzes in the fine ware context, only one is of variety a, the "proto-type simple rectangular adze" form (2A) of Duff (1970: 13). The importance Duff assigns to this adze form in the early Polynesian adze kit does not appear to be warranted on the basis of the Samoan evidence. At present there is little more to be said about its history or its function in Samoa. Although present early in the Samoan sequence, it becomes an important adze type in East Polynesia only at a somewhat later stage.

The Luatuanu'u Samples

The other controlled samples on which statistical comparisons with the general collection can be made are those from the locality of Luatuanu'u, divided by Davidson (I, Report 12, table 15 and pp. 197-198) into coastal and inland samples of 42 and 70 specimens respectively. It was observed that in these two geographically defined surface collections, many from known sites or findspots, the principal types, II, VI and X, by which the samples differ, were all recovered in actual house floors inland, so their absence from the coastal village settlement area is perhaps to be explained by age rather than function or the activity context in which they occur. On this basis Davidson postulated a period of sustained inland occupation prior to the later occupation of the coast, when Type III, VI and X, together with I and II, formed the majority of adzes. She also noted that a few adzes, such as the rare Types IV, V, VII, might represent an earlier stage of occupation. Finally, she suggested a decrease in the popularity of Types III, VI and X in the later part of the sequence, leaving Types I, II and IX as the prominent forms compatible with the actual situation observed in the coastal Luatuanu'u assemblage. It is worth noting that when groupings of Types I, II and IX *versus* all others, and II, V, VI and X *versus* the others, are made among the coastal and inland samples, and the two are compared directly, the resulting chi-square values in both cases are very significant, giving statistical support to the conclusions

Davidson reached from an inspection of the raw data. Her conclusions are also supported by comparisons of each sample with the general collection. In addition, inspection of the contribution of the individual categories to the overall chi-square values is possible, so that subsequent analysis can be performed to see which variations by type are the most significant.

The proportions of types observed in the inland Luatuanu'u sample possess deviations from the expected numbers too large to be reasonably attributed to sampling fluctuations (P. = .0025). Contributions to this general result are largely from a very nearly significant lesser number of Type I adzes, a definitely significant greater number of Type VI adzes, and a probably significant greater number of Type X adzes. There is, as well, a tendency for Type V to occur in more than expected numbers, but neither it nor Types II, IX, III and IV occur in frequencies that would be totally unexpected by chance. The coastal Luatuanu'u sample exhibits only a probably significant overall difference from the general collection. The two adze types contributing most to this are VI and III, which on individual assessments have probabilities of P = 0.05 and P = 0.06. Other types have values which could be solely due to sampling variation. Dismissing a tendency towards a lesser number of Type I adzes in the inland sample as belonging to one of the rare larger than usual variations from expected, it is the higher than usual occurrence of Types VI and X in the inland assemblage which is to be contrasted with the less than usual frequency of Types VI and III in the coastal assemblage. The different proportions of these types are responsible for much of the general difference in the two samples, just as Davidson suggested. Here it is worth remarking that each of the Luatuanu'u samples differs significantly from the overall pattern noted in the scattered, island-wide surface collections, the individual museum collections, and the total collection. Yet, when the coastal and inland samples from Luatuanu'u are added together, they fit the overall pattern well (I, Report 17, table 27). This suggests our general sample contains no major geographic bias, or at least is not solely representative of coastal forms.

Later Changes in the Samoan Adze Kit

Using the Luatuanu'u assemblages and the rather meagre record available on adzes of various types recovered from excavated sites of known age (table 28), it is possible to sketch some aspects of continuity and change in the Samoan adze kit once it was established in its Polynesian form around the second century A.D. In this respect there is little to add for Types I and II. They were present as common forms in predictable frequencies at that time and they have persisted as such since, a fact evident in both Luatuanu'u samples, and in the data from all of the excavated sites (table 28). Not only do they occur in the Luatuanu'u sample in proportions generally consistent with the total sample, but among the rather restricted numbers of adzes in the excavated occupation contexts lacking in pottery, contexts which represent most of the time span following A.D. 200, they are the two adze types that almost invariably occur. Only in Folasa is the recovery of 6 Type II specimens among a sample of 11 significantly different from expected proportions. Here the sample is so small that the outcome may be the result of incorrectly classifying some adzes as this type when, in fact, they were too incomplete or broken and should not be included. Alternatively, it may reflect a local preference for this type, related to some function in which it was used on this site. The one other noticeable change is an increase in the number of medium to large-sized Type I adzes from the later time contexts whose size is more consistent with those Type I adzes in the general collection.

Type IX, which probably appeared somewhere in the first few centuries B.C., and in those early contexts probably occurred in somewhat less than expected numbers, continued, like Types I and II, to the end of the sequence. This is attested by the inland and coastal Luatuanu'u samples, and by its presence at Lotofaga, Vailele, Puna (Lam-1) and Leuluasi (Le-12) in progressively later excavation contexts. From the general Lotofaga collection and the two samples from Luatuanu'u it is reasonable to infer that over the last 600 years it has probably increased in frequency to about the proportions indicated by its numbers in the general collection. Thus, along with Types I and II, it was one of three common types at the end of the sequence.

The history of Type X, in effect a fully ground version of Type IX, can only be sketched in outline on the available evidence. If some of the early Type IX/X examples discussed above are of Type X, then it has as early an origin as Type IX, a fact which is hardly surprising. If this is correct, the number of fully ground forms may have increased over time on the evidence from the inland Luatuanu'u sample, making them somewhat more numerous before the end of the sequence than the general collection would predict. Kikuchi (1963: 141) regarded the type as confined to Manu'a in the Samoan group. Although this has proved incorrect, its concentration there may reflect his acquisition of a localised sample derived from sites dating prior to the last stage in Samoan prehistory, as at Luatuanu'u.

The full grinding of all surfaces on small and fairly rectangular Type I adzes leads to the production of adzes classified under Type III. Their existence is attested by examples dating from the second century A.D. to the end of the sequence. The earliest examples from the coarse ware pottery contexts were discussed above; their continued presence to the time of contact may be demonstrated by single examples from excavated contexts at Lotofaga, Vailele, and Sasoa'a (table 28). The two Luatuanu'u samples indicate that by the end of the sequence, what was a relatively common form was perhaps declining in prominence.

Triangular-sectioned adzes of Type VI have a history very similar to adzes of Type III, and occur in about the same proportion in most collections. Like many others writing on the subject, I believe the triangular adze is a Polynesian innovation (Green 1971: 31-32) and a form so far unknown from earlier Lapita contexts. In Samoa, such adzes are present in expected numbers in the coarse ware pottery context of the second century A.D. They were probably developed earlier than that but occurred only in small numbers initially. On the evidence from excavated sites in which they occur at Luatuanu'u, Folasa, Lotofaga, Vailele and Sasoa'a, they continued to be used until the end of the sequence in the 1830s (table 28).

The two Luatuanu'u collections indicate that Type VI may have reached a peak of prominence in Samoa before the end of the sequence and declined thereafter. An unexpectedly higher frequency of Type VI adzes in our general surface collections may be the result of our collecting and classifying as Type VI all broken as well as complete specimens, in contrast to largely complete specimens in Museum collections (I, Report 17, p. 262). Yet this does not explain the unexpected absence of Type VI from the coastal Luatuanu'u sample, nor its rather more common occurrence inland, indicated by a significantly greater than anticipated number in the inland Luatuanu'u sample. Further support for their reaching a peak of prominence before the end of the sequence is provided by the recovery of 3 adzes of this type from among 6 found in layers 11 and 12 of Lu-53, and 2 among 11 at Folasa (table 28).

The Lotofaga variety of Type VI, with its slightly concave front profile and a slight upturn of the blade towards the cutting edge, has proved to be an extremely rare form, a total of three specimens only being collected by us, two from Lotofaga and one from Savai'i. One was also found by Golson, pressed into the natural subsoil at the eastern end of the bulldozer cutting at site Va-1, Vailele (I, Report 7, p. 108 and fig. 50a; Golson 1959: 16). Golson commented both on the rarity of the type in West Polynesia and the possibility of its typological importance (Golson 1959: 18). From our additional excavations at Va-1, I would suggest his specimen does not derive from the early pottery-bearing deposit of layer V, but from a layer IV or later context. This assessment is based on its findspot and on its lack of the surface weathering so characteristic of adzes from layer V. It would mean that the adze dates to the thirteenth century A.D. or some time thereafter. The large size and the extreme rarity of the Lotofaga variety of Type VI suggest either that it was functionally a very specialised adze, or that its rare appearance in Samoa is in fact dependent on outside contact. While a very few rather similar adzes of Type VI are known from Fiji (Palmer 1969b: 199), they lack the distinct features of the upturned blade end. However, in a cache of six adzes from Rarotonga in the Cook Islands, Duff (1968: 125) records five of our Type VI (his Type 4E) with precisely this feature. On the basis of an incipient grip on the sixth adze, he tentatively assigns the cache to an early part of his Proto-Early Polynesian Phase (A.D. 0-500). Bellwood (1971: 147) reports another specimen of the same type from a site with deep deposits dated between the tenth and thirteenth centuries A.D. in Aitutaki. Because all the other Type VI adzes in early Samoan contexts belong to relatively small specimens quite unlike the Lotofaga variety, it appears that a later dating than was suggested by Duff, more in line with that indicated by the Samoan and the Aitutaki evidence, is to be preferred. I believe this opens the prospect that what are virtually identical and certainly very distinctive adzes in Samoa may reflect the influence (and perhaps even import) of a unique and early form of Cook Island adze. Given other unique Samoan adzes of probable Cook Island origin (I, Report 17, p. 260), and the periodic arrival of Cook Islanders in the Samoan group recorded in early mission records (Davidson (1969a: 48, fn. 37), this proposal is just as feasible as the prevailing assumption that the variety represents an early form diffused from Samoa to the southern Cook Islands.

Type V, a common adze form in the second century A.D., probably declined in importance thereafter, its functional role as a heavier general purpose shaping tool being filled by larger sizes of Type I adzes which are known from the later part of the Samoan sequence but not from the early end. The strong representation of Type V in its expected frequency in the inland Luatuanu'u sample and its presence in the general Lotofaga beach-front collection is an indication that the type may well have persisted until after A.D. 1100-1200, before it dropped from the Samoan adze kit. This, however, is not confirmed by any examples from excavated contexts. Still, if true, it would mean that Type V went from a position where it constituted some 40 percent of the Samoan adze kit in the first two centuries

A.D. to somewhat less than 5 percent of the adze kit 1000 years later. A relatively rapid decline would explain its absence from all but the earliest excavation contexts we have sampled, as well as its position as one of the more uncommon forms in the general collection.

The temporal position, chronological change or function of the remaining adze types, all of them fairly uncommon or unique in the general collection, are not easily summarised. Type IV, as was noted above, may have persisted like Type V to some point after A.D. 1000, since it appears in expected numbers in the inland Luatuanu'u assemblage. Its somewhat higher than expected incidence in museum collections still remains a problem (I, Report 17, p. 264) for which sampling fluctuation is only one of the possible explanatians. Type VII, as has already been indicated, extends throughout the sequence and is a likely candidate for a functionally specialised form only rarely occurring in the domestic contexts from which the majority of the specimens come. On the other hand, Type VIII, a triangular form with the apex to the back, was in East Polynesia a later development. In Samoa it has an unknown history and never became a popular form.

This exposition of continuity and change in the Samoan adze kit is necessarily incomplete, primarily because the data will not support a more detailed analysis, even though adzes are one of the few portable artifacts regularly recovered by excavation. Yet the results are sufficient to infer a period of substantial change in the Lapita adze kit initially introduced with the first settlement of Samoa, even if these changes are not directly documented by the Samoan materials recovered to date. The hypothesis examined below is that the initial changes were in the direction of an early and typically Polynesian adze kit manufactured in olivine basalt such as is documented by the 48 specimens recovered from second century A.D. or earlier contexts in Samoa. Once established, this adze kit continued until the end of the prehistoric sequence in the 1830s. All available data lend support to a model of continuity during that 1800 year interval in which there is some change of frequency, though not of type, in the basic tradition. To reconstruct the probable changes in Samoan adzes earlier than the second century A.D., and to investigate the probable origin of the Polynesian adze kit in the Lapita complex require placing the early Samoan adzes in a wider comparative context where they are viewed in relation to even earlier assemblages of adzes from Tonga and Fiji.

Early Tongan Adzes

The Tongan data used here are drawn from Poulsen (1967) and classified according to his typological categories. However the dating of his sites is revised in line with the proposals of Groube (1971: Fig. 5) so that sites To-1, 2 and 3 are assigned to an Early Lapita period dating to before 700 B.C., horizon I of To-6 is assigned to the end of a Late Lapita period dating from 700 to 400 B.C. (see above, p. 253), and horizons II and III of To-6 to the Plain Ware period which follows. In this respect the adzes in horizons II and III, which are closest to the Samoan forms (fig. 91), are found with a type of pottery directly comparable to that associated with the Samoan adzes. Not surprisingly, these Tongan materials are also closest in age to those from Samoa. For this reason, I believe Poulsen's Tongan assemblages serve quite adequately as an indication of change in the Polynesian direction that took place in Samoa, perhaps before it occurred in Tonga.

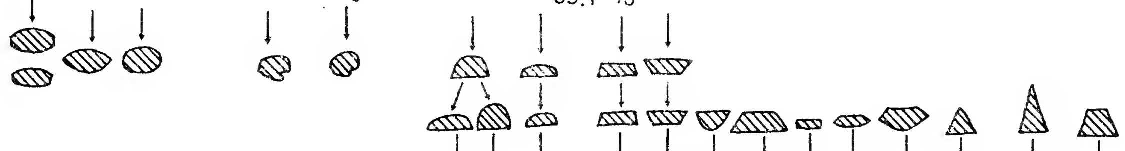
In another paper using this same material (Green 1971: Fig. 1) an illustration similar to figure 91 was used to support the following conclusion: that although there appeared to be no marked discontinuity between the early adze kits of Tonga and Samoa, the earlier Tongan adze assemblages, associated with Lapita style pottery, did differ significantly in content from the later Samoan ones associated with Plain Ware pottery, by emphasising adze forms unrepresented in any Samoan collections and by having only a restricted range of the more usual Polynesian adze types (Green 1971: 19). On this basis, I nominated the first to second century A.D. adze kit of Samoa as sufficiently differentiated in the Polynesian direction, although derived from the earlier Tongan-Eastern Melanesian Lapita adze forms, to qualify as a representative sample of the ancestral Polynesian adze kit. At that time, lacking certain evidence of earlier materials in Samoa, it was necessary to keep open the possibility that at least some change in the adze kit could have taken place in Tonga before the settlement of Samoa. I no longer find this necessary.

On present evidence it is still not possible to know what alteration, if any, has in fact occurred in the Tongan adze kit over the last 2500 years. What is documented, although only to a limited extent, is the sequence from 1100 B.C. to about 250 B.C. (Groube 1971: 300-304) During that part of the Tongan sequence, sampling error constitutes the probable explanation for the non-appearance of Type III and IV adzes and at least some varieties of Type I in the earlier sites. This conclusion is supported by their presence in the early Lapita levels of Fiji (Birks and Birks 1968: 108-110), and in the later Lapita and Plain Ware levels of Tonga. If true, it means that no marked change in the Tongan adze kit is evident during the first 1000 years of the sequence. A similar conclusion may be drawn from the limited adze

Summary of early Tongan adzes

TONGAN GROUP		Stone			Shell		Stone					
Site No	Horizon	1a	2a	2d	Rect.	Curv.	2b	1a/1b	1b	1c	Misc.	Total
To 6	II & III	1	3	1	2	–	3	1	2	2	–	15
To 6	I	3	–	1	–	–	2	–	–	–	2	8
To 5	0,I & II	2	–	–	–	–	–	–	–	–	–	2
To 2	II & III	1	–	–	1	–	2	–	–	–	1	5
To 1	I	–	1	–	3	2	1	–	–	–	–	7
	Total	7	4	2	6	2	8	1	2	2	3	37
	Percent	35.1 %			21.6 %		35.1 %					

Outline of cross-section shape:



Summary of early Samoan adzes

SAMOAN TYPE		NR	NR	NR	NR	NR	Va,b		Id	III	IVa,b		I	Ib	Ic	II	VI	VII	IX	Misc.	Total
Site No.	Layer																				
Sa-3	4	–	–	–	–	–	2	2	2	–	–	–	1	–	–	2	3	–	–	1	13
Va-1	V	–	–	–	–	–	5	1	–	1	–	–	–	1	1	1	1	1	1	1	14
Sa-3	5	–	–	–	–	–	5	4	2	–	1	2	4	1	1	–	–	–	–	1	21
	Total	–	–	–	–	–	12	7	4	4	1	2	5	2	2	3	4	1	1	3	48
	Percent	56.7 %					52.1 %					41.7 %									
		LAPITA ADZES					TONGAN-SAMOAN CONTINUITY					SAMOAN ELABORATION									

NR – not represented

Fig. 91. Frequency details of adze types recovered from early Tongan and Samoan contexts placed in a comparative framework.

data available for the Lapita part of the Fijian sequence (Birks and Birks 1968). After 250 B.C., the Tongan archaeological evidence is minimal and a large enough general collection to be useful as a statistical standard is not available. A small collection of 39 surface adzes classified by Poulsen (1967: 194) does include most of the Samoan adze types except for Type II, and one may infer from this that later changes were probably in the Polynesian direction. However, various of the triangular-sectioned adzes of Samoa, Types VI, VII and VIII, seem never to have played a prominent role in the Tongan adze kit (Poulsen 1967: 209), and among them only Type VI is even minimally represented in Fiji (Palmer 1969b).

What one can propose on the basis of these materials, which I have not done previously, is that in Samoa, on the other side of the andesite line from all other Lapita assemblages, a restriction in the durable rock types and very large clam shells available for adze manufacture was imposed by the change in location. This, I believe, would have had an effect on the adze types produced. As a result, a whole group of supposedly "Melanesian" adze forms found in the Tongan Lapita, plus those made from the hinge portion of the giant clam shell, dropped from the adze kit. This loss, representing some 57 percent of the Tongan assemblage, was replaced by the elaboration in Samoa of new varieties of Type I adzes, and new adzes of Types II, VI, VII and perhaps IX/X, not present in the Tongan Lapita assemblages, nor in early Lapita sites farther to the west in Melanesia. This Samoan elaboration in the Polynesian direction, amounting to some 42 percent of its early adze kit, was largely completed by the second century A.D. For this reason, environmental grounds are at present rather better than the direct supporting evidence, for thinking this elaboration may have occurred earlier in Samoa than in Tonga. The situation will remain inconclusive until there are better documented assemblages from contexts after 250 B.C. in Tonga and from contexts before this date in Samoa.

In this postulated period of marked change in the adze kit of Samoa, continuity is provided by the plano-convex adzes of Types V, and the quadrangular adzes of Types I/III and IVa, corresponding to Duff's (1959) Types 4C, 2C and 2A respectively. The continuity, moreover, amounts to over half of the Samoan adze kit, although it does not feature the predicted dominance of the 2A adze (our Type IVa) postulated by Duff on the basis of his distribution studies. Still, the types present are all those which Duff would accept as Polynesian. Therefore, I can see no case for postulating that the change which occurred reflects the replacement of an earlier "Melanesian" culture with its typical adze kit by a later Polynesian culture bringing new adze types from elsewhere. There is, however, now a basis for postulating that the Polynesian adze kit had its immediate origins in an earlier adze complex widely distributed on an early time horizon in island Melanesia, and that like many other aspects of Polynesian culture, it took on its distinctive form after its arrival in the nuclear area of West Polynesia.

The Samoan Adze Kit in Polynesian Perspective

Theories on the development of the distinctive adze kits of each island group in Polynesia have until recently rested heavily on distributional evidence drawn largely from museum collections (Duff 1959). Only recently have new data become available from excavated contexts and intensive surface collections (Emory 1968; Green 1971) which would seem to modify well-established views on the origin of the Polynesian adze kit in Southeast Asia, followed by its transfer and subsequent development in Polynesia. In contrast to Duff (1970: 7), who is the most recent of a long line of scholars to bring a Neolithic adze kit into Polynesia in an already developed form, I have argued above that it took on its distinctive form there. After that, the West Polynesian adze kit remained fairly conservative; the East Polynesian adze kit, however, underwent further elaboration. Support for these statements is available, even though the evidence must be presented in the form of frequencies compared by means of percentage blocks, as in figure 92. When set in a broader context, the position of the early Samoan adze kit becomes readily apparent, although the Polynesian data are uneven and not able to be evaluated to the same extent as those for Samoa.

The basic data in figure 92 are the same as those previously published (Green 1971: Fig. 2), where the sources used and methods employed are fully documented. The Fijian and Tongan adze assemblages, even when grouped, are of very small size, the exception being the adzes from To-6 listed under the Late Tongan Lapita and Plain Ware contexts. Also, for neither island group are there carefully analysed general collections of adequate size against which to evaluate the excavated assemblages. The small size of the Maupiti burial site assemblage, even with a general sample of adequate size, analysed by Emory (1968: 157-159), makes the frequencies in some of its categories difficult to evaluate. Still, one can say that in the Maupiti assemblage, adzes with triangular cross-sections, apex to the back, occur significantly less frequently than would be expected; trapezoidal, quadrangular, and

EARLY DEVELOPMENT OF THE POLYNESIAN ADZE KIT

DATES	SITE ASSEMBAGES	1	2	3 Heavy Tridacna Shell	4	5	6	7	8	9	10	11	12	13	Misc:	TOTAL No:
1,000 to 500 B.C.	FIJIAN LAPITA	1	2		3	3	1	1								11
1,000 to 500 B.C.	EARLY TONGAN LAPITA	3	1	6	3										1	14
500 B.C. to 100 A.D.	LATE TONGAN PLAIN & LAPITA WARE	4	5	2	5		3	2							2	23
100 B.C. to 200 A.D.	SAMOAN FINE PLAIN				9	4	3	1	1	1+1?					1	21
100 to 300 A.D.	SAMOAN COARSE PLAIN				(1I) 10	2	4		1		5	3			2	27
300 to 1,000 A.D.	HANE, MARQUESAS		1		18	2	33 (1 S)	36 (7 I)		4	10			29 (2 T, 1 I)		133
800 to 1,100 A.D.	MAUPITI BURIALS SOCIETY IS.				5	1		2	1	1 (1 I)	1 (1 I)		2 (1 I)	2 (1 I)		15

0 50 PERCENT

T - MARKED TANG I - INCIPIENT TANG S - SHOULDER GRIP

Fig. 92. Early adze assemblages from Fiji, West and East Polynesia in a chronological and comparative framework illustrating the development of the Polynesian adze kit.

triangular apex to the front specimens occur in expected numbers; and plano-convex adzes in significantly greater number than would be expected. This is based on figures Emory (1968: Table 3) gives for a total of 859 adzes composed of 224 specimens from Raiatea and two general samples from the Windward Society Islands. Thus the high percentage of Samoan Type V adzes (fig. 92, column 4) and the low percentage of Samoan Type VIII adzes (fig. 92, column 12) in the Maupiti assemblage is indicative of different proportions of these two forms at an earlier date, despite the small size of the sample. Fortunately, the large size (N = 133) of the adze collection from the early levels of the Hane site in some measure makes up for the lack of a similarly analysed large surface collection against which to evaluate the different frequencies among its adze types. This appraisal, I hope, indicates that while the data in figure 92 have certain limitations, they provide a reasonable basis for assessing the Samoan adze kit by placing it in the wider context of early Polynesian adze samples from excavated and dated site assemblages.

In general, as figure 92 reveals, the Samoan adze kit fits easily into an intermediate position between the earlier Fijian-Tongan adze kits and the slightly later ones of the Marquesas and Society Islands. This reinforces the points made previously about the nature of continuity and elaboration in the Samoan adze kit based on the comparisons between the Tongan and Samoan samples, by adding the supporting data from Fiji. Inspection of the figure also indicates that the first to second century A.D. adze kit of Samoa furnishes not only an adequate basis for all later developments within Samoa, but also a reasonable source from which to derive the early adze assemblages of the Marquesas and the Society Islands. To do so, in my opinion, required only three major innovations in East Polynesia: (1) the development of a reversed triangular-sectioned adze of Type VIII which has Samoan Type II or IVb as a probable prototype; (2) the development of a much thicker bodied quadrangular adze form; and (3) the application to a number of these adze forms of a variety of grip modifications to assist in lashing the adze to a medium to heel type haft (Green 1971: 36).

On this basis I think it fair to take the early Samoan adze assemblage as representative of the ancestral Polynesian kit from which the adze types of East and West Polynesia derive.

If the above is reasonably correct, it has important implications for the theory of marginal survival often applied to the study of adzes and other items of Polynesian culture. It is the Samoan (and probably the Tongan) adze kits which in fact prove to have changed relatively little over the last 2000 years. The East Polynesian adze kit, on the other hand, has not only undergone the three early innovations noted above, but in Central East Polynesia many later changes have occurred which have been traced in general by Emory (1968), and by Duff (1956: 139-197; 1959). In short, after an early period of change undocumented by existing distribution studies, the adze tradition of West Polynesia has remained basically conservative. In the isolation of East Polynesia, however, this tradition has undergone a number of further modifications, resulting in quite distinctive assemblages in each island group by the time of European contact. Adzes parallel to a remarkable degree the linguistic situation, where it is the Tongan and Samoan languages that have remained the most conservative, and those of East Polynesia which have been most innovative.

Basalt Flakes

The purposeful reduction of fine-grained basalt stones to yield flakes destined for primary use as tools seems never to have been a feature of Samoan technology. As discussion in the next section indicates, the ethnographic record reveals that scrapers, cutters, graters and peelers were formerly made from materials such as hard wood, bamboo, or shell, and only occasionally of stone. It is true that early in the Samoan sequence obsidian was worked, producing flake tools of relatively small sizes, whose function is unclear. However, the majority of flakes from excavated contexts are of basalt and appear to derive from the manufacture of adzes or other core tools. Only a small proportion of the waste flakes from this process exhibit signs of further use; an even smaller number have been altered by additional flaking into more formal tools. Although the archaeological picture is, in this respect, entirely consistent with the ethnographic literature, the latter could result from the fact that the use of stone flakes as tools, like the use of stone adzes, ceased too early to be observed or recorded by Europeans. The observation is supported by the virtual absence of flakes from the three excavated house floors of Sasoa'a in the early historic period (Report 21, p. 32).

Following his discussion of Samoan adzes, Buck (1930: 368-369) devotes a short paragraph to those basalt flakes found in the gravel of house floors. He reasoned they were selected specimens brought to dwellings from the quarry for use as knives and scrapers, as many pieces had concave edges suitable for scraping rounded wooden objects. In his opinion, any piece that would serve was used and discarded, because he found no evidence of edge retouching. Observing that something was required for cutting or filing narrow grooves in shells from which pieces could be snapped off in forms suitable for fashioning trolling lures, he noted that larger flakes with straight or slightly convex edges were often found among the house platform stones. The restricted number of known or probable quarry sources in Samoa, the small number of flakes found in most excavated house floors, the lack of many cores and larger flakes reflecting the initial stages of adze production, and the low percentage of flakes in fact used, all suggest that contrary to Buck, selected flakes were not carried to dwellings for possible use, but rather that the process of finishing or reworking already completed adzes took place in most domestic contexts, resulting in the scatter of flakes found in the house floors.

At no site were either the numbers of incomplete adzes discarded as rejects, or the quantities of cores and flakes in all sizes, sufficient to suggest adze manufacture as a primary activity. Layers 4 and 5 at Sa-3 stand out from other sites in having a fair number of unclassified adze fragments and cores, as well as the usual range of flakes. In particular, the bulk of the layer 5 material derives from a locus adjacent to a house platform, and appears to reflect an area where the later stages of adze manufacture or the reworking of damaged specimens were carried out (Report 29, p. 141). The site at that time could well have been the home of a wood-working specialist. The limited number of flakes in a restricted size range, and the several types of flakes present in the Lotofaga beach-front middens, suggest that most are from the use and reworking of adzes (I, Report 15, p. 249). At other excavated sites the same interpretation would seem to suffice. In this respect, it is worth noting the small size of most of the flakes in every assemblage, and that in each collection some invariably possess ground or polished surfaces, or fragments off the bevel and cutting edge, indicating probable derivation from adzes in use in the vicinity.

Where flakes have been used extensively as tools and are recovered in large numbers, a great deal may be determined from a statistical analysis of carefully selected attributes (cf. Jones 1972). Where alteration of the edges is infrequent, as in Samoa, less can be said. Also, some of the more elaborate measuring procedures advocated by those working primarily with flakes do not appear warranted, given the small sample sizes involved. It would seem that the majority of waste flakes in Samoa, when used, were employed in scraping, because the edge alteration on them is primarily unifacial (Jones 1972: 146). Bifacially altered edges, such as result from the tasks of cutting, sawing or slicing, are rare. One flake knife, however, was recovered from layer 3 of Le-12 at Leuluasi (Report 24, p. 88). Perhaps, if a site were discovered where fishhooks had been manufactured by cutting or sawing shells with stone tools, more bifacially altered flakes might be anticipated. It would also appear that among the stone flakes which infrequently served as tools in Samoa, the majority were used in "maintenance" activities, i.e. suitable shapes selected from the available debris to make a range of more formal "extractive" tools fashioned in another material, usually wood.

Flakes in our excavations sufficiently altered to be described in more formal terms or assigned to a specific functional role have been few. It was suggested that some, which have small worked projections on one of their more pointed ends, functioned as hand-held boring tools. For example, two specimens from Sa-3 and one from Va-1 (Report 29, pp. 144-146) assigned to the early pottery ware contexts, are of this type. A similarly modified piece from the butt of a broken adze, found at Va-3, should probably also be included here (I, Report 9, p. 156). However, as is characteristic of flake assemblages in Oceania, such formally defined technological and morphological categories for flake tools are seldom of great utility.

Jones, in his study of flake technology in New Zealand, was able to differentiate within a single site on the basis of a series of criteria between flake assemblages which derived from adze manufacture and those which were struck to form flake tools. Most of the measurements which he found useful have not been made when examining collections of Samoan flakes. The exception is the Luatuanu'u assemblages from layers 2, 4, 10 and 11 at Lu-53 for which useful comparative observations are available (I, Report 14, pp. 218-220).

Jones also went on to examine the possibility that distinctions within any one site between the two types of flake debris could be applied more generally in New Zealand and the Pacific. This proved difficult to demonstrate, and he found, for example, that the Samoan flakes from Lu-53 did not clearly suggest the pattern of adze debris characteristics developed on the basis of the New Zealand assemblages. Yet it was evident to Peters, who did the Samoan analysis, that the debris represented the manufacture of adzes, rather than the production of flakes for use as tools, as there was very little evidence of worked flakes or flake tools (I, Report 14, p. 218). For this reason, Jones suggests the debris from Lu-53 may result from the manufacture of a type of adze different from most of those found in early New Zealand sites, whose flake debris he has studied closely.

In assessing site assemblages involving adze production, Jones concluded that the large thick flakes produced in the initial stages of adze reduction are likely to be present only in quarries and specialised sites representing intermediate stages in reduction. The major proportion of adze debris in habitation sites, in contrast, will be that produced by later reduction and final finishing. This is obviously the case in Samoa, as it was for New Zealand. In the New Zealand situation most of the flakes tended to have platform angles clustered around 90°, a feature which Jones related to the formation of quadrangular or near quadrangular core tools. Low angle percussion, on the other hand, Jones (1972: 185 and Fig. 18A) related to the production of adzes of subrectangular section, which, when finely ground, would be of plano-convex cross-section. From this he speculated that changes of adze type in Samoa, in which the plano-convex adzes gave way to those of more nearly quadrangular form, may well be reflected in a changing emphasis in the flaking technology from low angle to high angle percussion as one crosses the andesite line. Here, his discussion of the distinction between the hand-held percussion flaking technique used in shaping and reducing sizes *versus* other methods more appropriate to shaping the more intractable and durable stone and shell materials of Melanesian adzes may also be significant (Jones 1972: 188).

One result of a changing emphasis in the flake technology applied to the intermediate and final stages of fashioning adzes of plano-convex cross-section, in contrast to those with either quadrangular or triangular sections, would seem to be the removal of a higher proportion of smaller flakes at the end of a reduction process resulting in Type V adzes than in one resulting in adzes of Types I and VI. It is also well to recall that in the replacement of Type V adzes by those of Type I, more larger examples of Type I were produced. An expected outcome might be more small flakes in early sites than in the later ones. Here, Leach's (1972: 116-117) demonstration from the Lu-53 data on length-breadth ratios of a significant difference between the flakes from the first century B.C. to the fourth century A.D. contexts of layers 2 and 4, and those from the post-fourth century A.D. contexts of layers 10 and 11, may be indicative of a technological shift. If so, the change was from broader, shorter flakes to larger, narrower ones. At Sa-3, the layer 5 flakes were also found to derive predominantly from the less than 4 cm length-width category, and the slightly later Va-1 flakes of layer V from the greater than 4 cm category (Report 29, p. 146). Other support for the predominance of small flakes at the early end of the sequence is provided by the figures from the F-1 layer at Va-4, where two-thirds of the flakes were under 4.5 cm in their longest dimension (I, Report 10, p. 168). The possibility of correlating a change in the size of adze flake debris with a shift in adze typology is thus worth further investigation with additional data. On the other hand, the data on struck flakes from Lotofaga (I, Report 15, pp. 249-250) indicate the size differences observed above may instead reflect varying functions or activities carried out with adzes on a particular site, for the beach-front midden flakes are nearly all in the under 4 cm length-width category. One faces, then, the difficulty of determining from meagre evidence whether technological or functional explanations of the differences (Leach 1972: 117), or both, provide a better interpretation.

Scrapers, Cutters, Graters, Peelers and Drills

Many of the activities in which flake tools of stone played an important functional role elsewhere in the Pacific were performed in Samoa by a variety of wooden, bamboo and shell tools, at least ethnographically. The extent to which this was true prehistorically is more difficult to determine. However, in the absence of a strong tradition of the use of stone flakes as tools, some antiquity might be expected for alternative practices attested ethnographically.

In food preparation, especially for cutting flesh and soft foods, as well as for cutting materials such as bark cloth or the wefts in plaiting, Buck (1930: 109, 369) and Krämer (1903: 203) record that the bamboo strip served as the common form of knife. Peelers, too, were often made of bamboo, sometimes of wood, and occasionally from *Tonna* shell. Two shell scrapers similar to the *Tonna* form, made in *Turbo* shell, were recovered from late prehistoric contexts at Lotofaga (I, Report 15, p. 246).

Heads for coconut graters were made of coconut shell, the shell sometimes being replaced by stone heads (Buck 1930: 110-111). A typical stone grater head was found in the excavations at Lotofaga (I, Report 15, p. 246) and another on the surface of an inland site at Luatuanu'u (I, Report 12, p. 199). An example made on a discarded stone adze was excavated at Folasa (Report 22, p. 54).

The majority of the cutting, scraping and grating tools, however, seem to have been of shell. Krämer (1903: 203) lists six types of shell for cutting and scraping, including the use of *Perna* sp. for forming the teeth on a bone tattooing chisel. Mollusc shells often replaced the discarded half shells of the coconut as food scrapers, and a modified shell of *Periglypta reticulata,* said to be used in scraping fibre in mats and the red earth used in bark cloth manufacture, was found in the excavations at Lotofaga (I, Report 15, p. 246). Lumps of red earth showing striations from grating were found in layers 4 and 5 of Sa-3 (Report 29, p. 152). An *Arca* shell scraper was recovered from a small cave at A'opo inland on Savai'i (I, Report 5, p. 94).

Drill points were also said to be fashioned of shell, especially *Terebra* sp. However, the one drill point recovered, found near the base of the beach deposits at Lotofaga (I, Report 15, p. 247), was neatly worked in stone.

In general, despite an ethnographic emphasis on scraping, cutting, grating and drilling tools in shell, our excavations failed to reflect this because shell was seldom preserved in the sites in which we excavated. As a consequence, we recovered a few of the alternative forms in stone, and just sufficient of the shell items to suggest that the ethnographic record has the anticipated late prehistoric antecedents.

Other Early Artifacts

Krämer (1903: 203) remarks that for smoothing or filing wood, Samoans in the late nineteenth century used a glass splinter as well as shell scrapers. A worked specimen of glass from the surface of Sa'asa'ai village on Savai'i (I, Report 5, p. 94) supports his claim. The previous use of glass splinters in Samoa, perhaps in the same fashion, dates to nearly 1800 years earlier, when basaltic glass was being worked. Although the possibility exists that the continued use of basaltic glass or 'obsidian' extended to a later time in the Samoan sequence than the use of pottery, this has not been satisfactorily demonstrated by excavation (Report 29, p. 148; Report 30, p. 159). I incline to the view that if it did, the time involved was no more than several centuries, for like the pottery evidence reviewed above, the evidence against its continued use after the eighth century A.D. becomes progressively stronger. This means that the piece from the more recent Lotofaga deposits (I, Report 15, p. 250) and the pieces from the more recent levels of Sa-3 (Report 29, p. 152) and Le-12 (Report 24, p. 89) in the upper Falefa Valley, probably derive from earlier contexts. The pieces from layer 5 at Le-12 could, however, reflect Samoan use of basaltic glass in the first to second centuries B.C., while those from layer 7 could reflect its continued use up to the fifth to seventh centuries A.D. Regular use is, of course, best attested during the first to second century A.D., based on the materials from Sa-3 and those from Va-4, but not Va-1, at Vailele.

The use of natural glass during the early part of the Samoan sequence is another instance where the early materials from Samoa lie in an intermediate position between the earlier Lapita assemblages on the one hand, and the later East Polynesian assemblages on the other. Obsidian is occasionally found with Lapita materials in Tonga, especially in Niuatoputapu where there is a nearby source (Poulsen 1967: 284-286; Rogers MS; Report 32), and in New Caledonia (Gifford and Shutler 1956: 67; Golson 1962: 170), and it is a widely used and traded component of Lapita assemblages farther to the west (Ambrose and Green 1972). Its continued use in Samoa until the third century A.D. or after, thus provides (in contrast to Tongatapu) a temporally and geographically suitable context for its use to have been transferred to East Polynesia as part of the ancestral complex brought from West Polynesia. Suggs (1961a: 174) records a piece, perhaps an import, from an early context in the Marquesas. Once established in East Polynesia, even if only a minor industry, it was elaborated in islands such as Easter, New Zealand and Hawaii, where sources of basaltic glass or obsidian were ample. In other island groups it died out, as it did in Samoa and Tonga, despite, in the latter case, reasonable supplies on Tafahi.

The use of chert as a source of stone for flake tools is characteristic of Lapita assemblages from Melanesia (Green 1973a; Birks 1973: 49 and Table 10). Pieces of siliceous rock, although found in Lapita sites in Tonga, were not quantified (Poulsen 1967: 286). In Samoa only two pieces of chert, one from layer 5 of Sa-3 and the other from the very early layer 5 fill deposit at Le-12 (Report 24, p. 89; Report 29, p. 149) were found. No natural occurrences of chert are known from Samoa (Kear and Wood 1959; Brothers, pers. comm.) and the expectation of deposits is geologically marginal. Chert could occur as an infrequent siliceous precipitate in coral limestone deposits forming along the lines described by Suggs (1961a: 125-126) for the Marquesas, or it could equally well be an import. I am inclined to the latter view, especially for Samoa, as chert occurred in no later sites, as it does in the Marquesas.

Abrading tools form another category which has its beginning in the early part of the Samoan sequence and continued to the end of it. However, the use of a distinctive off-white quartz-trachyte rock seems to be confined to the early part of the sequence. Fine-grained friction saws or files of stone are recorded from layer V of Va-1 (Report 7, pp. 135-136), from layers 6 and 5 of Le-12 (Report 24, pp. 88-89), from layer 10e of excavation A at Lotofaga (I, Report 15, p. 245), and from the surface collection on Savai'i (I, Report 5, p. 93). This is sufficient to establish their presence throughout the last 2000 years of the sequence. A recent coral example of the same type of file formed part of the surface collections from Upolu (I, Report 17, p. 264). Slab type grinding stones appear in nearly all sites from the earliest to the latest levels. Doubtless they are to be correlated with the evidence of adzes and adze flakes with which they are usually associated because they form part of the technology in the final finishing, reworking or sharpening of adzes, tasks carried out in most of the domestic contexts investigated. A quartz-trachyte grindstone of this type from layer 5 of Sa-3 establishes the use of that rather distinctive material during the early part of the Samoan sequence (Report 29, p. 149). Additional evidence of its use for this purpose is a piece found with the pottery in the fill of Lam-1 (Report 23, p. 69). Further support for the use of this distinctive material is provided by some small thin slabs of uncertain shape and function which were found in layer 5 of Sa-3 (Report 29, p. 150), layer F-1b of Va-4 (I, Report 10, p. 170), and layer V of Va-1 (I, Report 7, p. 136), all of a similarly early date).

Hammer stones, like slab grindstones and flakes, also seem to occur throughout the sequence and probably for the same reason, all being part of an interrelated adze manufacturing complex.

Other items from these early pottery-bearing contexts which are worthy of note in this summary include pebble chopping tools and discoidal stones, both found at Sa-3 and Va-1 (Report 29, p. 150). The latter objects have close parallels with objects associated with the Tongan and Fijian Lapita (Birks and Birks 1973). Poulsen (1967: 275) interprets rather similar items from Tongan Lapita sites as bowling stones. In Samoa it is hard to choose between this interpretation and that of an anvil for crushing nuts or some similar items.

The lumps of red ochre from layers 4 and 5 of Sa-3 establish the use of this material as beginning early in the Samoan sequence (Report 29, p. 152). The finding of more lumps at Folasa (Report 22, p. 55) and probable pieces from Le-12 (Report 24, p. 89) establish it for the later prehistoric part of the sequence, while its use in the early historic graves at Sasoa'a (Report 21, p. 30) and the ethnographic records of its use establish its continuation well into the historic period. Its presence throughout the Lapita sequence of Tonga has been documented by Poulsen (1967: 286), pushing the record for its use in Polynesia back another 1000 years. Colouring for brightening the dyes used in bark cloth or in the slip on pottery, or at a later time to cover inhumations, are all possible interpretations of its functional role in Samoa.

Finally, one should note the cowrie-shaped octopus lure sinkers from layer V of Va-1 (I, Report 7, p. 135). The identity in form with the early octopus lure of the Marquesas but not the later octopus lure sinkers of Samoa, Tonga, Hawaii, or the Marquesas, and the complete lack of sinkers of this type from any Tongan or other Lapita contexts, appears to me to have some importance. It may well be that the attachment of the large stone sinker to this lure is a Polynesian innovation which had its beginnings in Samoa.

Other Items

Other items to which attention should be drawn in this summary are not numerous, although some are important. They include a broken, elongated stone object from layer 5 of Sa-3, which might be, but is probably not part of a stone lure shank (Report 29, p. 150). A more probable stone lure shank is the white siliceous specimen from layer II of excavation B at Lotofaga (I, Report 15, p. 244). Sea urchin, but not coral files, were also recovered from excavations A, B, and C on this beach front. Because these are often associated with fishhook manufacture elsewhere in Polynesia, they lend support to the interpretation of a piece of worked *Turbo* shell

TABLE 29

THE VANDERFORD COLLECTION OF SAMOAN LURES, A.D. 1823

Cat. No.	Shank	Type	Holes	Shank section	Length in mm	Hackle
7123A12/10	*Conus leopardus*	*pa ala*	bilateral	thick, rounded	56	white feather remnants on line from base to head
7123A12/11	*Conus leopardus*	*pa ala*	bilateral	thick, rounded	47	white feathers on line from point base to head, tufts of red wool? at distal end
7123A12/7	*Conus leopardus*	*pa ala*	bilateral	thick, rounded	37	tufts of plant fibre at distal end
7121A10	*Conus leopardus*	*pa ala*	bilateral	thick, rounded	61	white feather remnant on line at head
7123A12/1	*Conus leopardus*	*pa ala*	bilateral	thick, rounded	52	white feather remnants on line from base to head
7123A12/3	white shell with purple streaks	*pa ala*	bilateral	thick, rounded	40	remnants of fibre? at distal end
7123A12/9	*Conus leopardus*?	*pa ala*	dorso-ventral	thick, flat	69	white feathers on line from point base to head
7123A12/8	*Cypraea mauritiana*?	*pa ala*	dorso-ventral	thick, flat	60	remnants of feathers on line from point base to head
7123A13	pearl shell	*pa 'atu*	bilateral	triangular	72	remnants of red wool and fibres at distal end
7123A12/13	pearl shell	*pa 'atu*	bilateral	triangular	62	plant fibres at distal end
7123A12/12	pearl shell	*pa 'atu* and *pa ala*	bilateral	double shank, one short thick rounded shank and one larger one with triangular head	66	none in evidence
7123A12/6	pearl shell	*pa ala*	dorso-ventral	thick, flat	45	white feathers on line from point base to head
7123A12/4	pearl shell	*pa seuseu*	dorso-ventral	thin, flat	30	white feather remnant on line from point base to head
7123A12/5	pearl shell	*pa seuseu*	dorso-ventral	thin, flat, double shank	36	none in evidence
7123A12/2	pearl shell	*pa seuseu*	dorso-ventral	thin, flat, double shank	36	none in evidence

from layer 10e in excavation A as an incomplete one-piece fishhook. Recent work in Anuta (Kirch and Rosendahl 1973) has established the antiquity of *Turbo* shell fishhooks and sea urchin files more than 2500 years ago in Melanesia in association with predominantly plain pottery.

Further discussion of types of Samoan fishing lures in use at the time of European contact is undertaken in a following section. Here it is important to record that another of Ember's (1966: 167) proposed archaeological tests which, if he is correct about changes in Samoan social organisation, should show an increasing dependence upon sea resources and a concomitant increase in the number of different fishing implements from "early to late pre-contact" times, is simply not feasible. The amount and type of data in this area normally recovered by archaeologists in Samoa are too minimal to test such hypotheses, even if the assumptions which gave rise to them were accepted.

In addition to the above items concerned with exploitation of sea resources, one should also mention the anchor stone with a rope hole at the top from layer IVb at Va-1 (I, Report 7, p. 135), and another without a hole from layer 2 at the same site.

Other miscellaneous items include possible shell trumpets from Folasa (Report 22, p. 55) and from the stone mound of Pulemelei on Savai'i (I, Report 4, p. 86). The only worked bone items recovered were from beach middens at Lotofaga (I, Report 15, p. 250) and Apolima (Report 31, p. 166). They belong to broken specimens of uncertain shape and use.

Samoan Lures at the Time of Contact

The most certain means of establishing some control over the types of fishing lures in use at the time of European contact, as at earlier times, would be archaeological. Unfortunately, excavations have not yet provided the necessary evidence. Another means is to examine collections made at or very near the time of first European contact, especially if these collections contain a number of items and their dates of acquisition are well established. In this category are a collection of lures from Samoa given to the Peabody Museum, Salem, by Captain Benjamin Vanderford in 1823, and one made in Samoa in 1839 and 1841 by the United States Exploring Expedition (the Wilkes expedition). These may be compared with lures brought back from Tonga on the second and third Cook Voyages in 1773-74 and 1777.

Buck (1930: 494-517), in a careful appraisal of lures in Samoa, distinguished a number of types: the *pa 'atu,* or what is here called the West Polynesian type of bonito lure, used with rod; the *pa ala,* a smaller lure trolled from a hand line; and the *pa seuseu,* an even smaller lure to which an iron fishhook is attached, and which is used as a fly on the end of a casting rod. A fourth type, the *pa tangi,* may well have been the Samoan term applied to the large Tongan lure (described below), but this type is not known in ethnographic collections from Samoa (Buck 1930: 497) and its prehistoric presence is not attested archaeologically.

Buck noted that the *pa 'atu* were all made of pearl shell at the time of his study, but had formerly been made of other shells, or of *tio,* a siliceous rod-like material. He believed pearl shell did not occur in Samoa (Buck 1930: 498). Our enquiries among Samoans suggest that it does occur, particularly in the broad lagoons at Mulifanua and perhaps Aleipata, but was probably sufficiently rare, or difficult to obtain, for other materials to be preferred, or at least frequently used. Once pearl shell began to be stocked by traders, however, it became the preferred material for the bonito lure.

The *pa ala* lure shank was generally made in one of the following types of shell: *Spondylus ducalis, Cypraea mauritiana,* or *Isognomon (Perna) costellata,* according to the examples studied by Buck (1930: 510). The shanks were of two types, with a rounded head if the shell were thick enough, or flat throughout if it were not. In the less common rounded type, the hole for the line attachment was bilateral (from side to side), as in the triangular-headed *pa 'atu.* However, the majority of Buck's specimens were of the flat type with holes bored from front to back on either side of the mid-line.

The *pa seuseu* could be made not only of any of the materials used in the other types, but also of others such as *Trochus, Turbo* and *Tridacna,* with no particular preference for pearl shell. Except for an atypical example figured by Buck (1930: Fig. 291e), examples studied by him were attached to metal hooks. He suggested, but could not demonstrate, that the modern *pa seuseu* was a historic innovation based on a prehistoric form. The only example of a *pa seuseu* recovered by us was from the surface of a midden in the early historic village of Vailele (I, Report 17, p. 265).

The Vanderford Collection

The 15 lures on which I have data, from the collection of Captain Benjamin Vanderford, were deposited in 1823, along with 12 other items, in the Peabody Museum (Salem). Copies of the Museum catalogue records were made available by Ernest Dodge and annotated by Peter Fetchko, Assistant in Ethnology, who also made the tentative shell identifications.

Seven of the lures have shanks in pearl shell, six have shanks in what is probably *Conus leopardus,* one is probably of *Cypraea mauritiana,* and one is an unidentified shell (table 29).

Among the 15 lures only one, 7123A13, clearly qualifies for inclusion in the *pa 'atu* category. This is a 72-mm-long pearl shell specimen of typical shape with a red wool hackle at its distal end. The length is well within the 65 to 105 mm range for this type given by Buck (1930: 499) and outside his range of 47 to 62 mm for five examples of the *pa ala* type (1930: 511). Moreover, this lure has the longest shank encountered in either this or the Wilkes collection (described below). The remaining Vanderford lures are all between 30 and 69 mm (table 29). The next longest, 7123A12/12, is a curious lure in which two shanks of different size and shape are lashed together. The larger shank is of the shape and size typical of the *pa 'atu* type, and the shorter shank with a point has a thick, rounder head like the *pa ala* form. The shorter shank has been tied along the flat portion of the longer, producing a single heavy-bodied lure. One other reasonably large pearl shell lure, 7123A12/13, also belongs to the *pa 'atu* category on the basis of its shape, material and hackle at the distal end, though it is only 62 mm long. Given the small size of all early lures, and the definite size differences between this group of pearl shell lures and those of a different and smaller type (see below), its slightly shorter length is hardly significant.

Six lures in other shells, five of them probably made in *Conus leopardus,* have the thick, heavy and usually more rounded shank heads with a bilateral hole for line attachment that are typical of one form of the *pa ala* lure. Most have or had a white feather hackle on the line running from the point base to the head of the shank (table 29). They range in size from 37 to 61 mm, extending the lower end of the range given by Buck downward 10 mm. As noted above, the smaller complete pearl shell lure of the specimen with the double shank discussed above should probably be included here. The other type of *pa ala* lure described by Buck has a flat shank and two dorso-ventral holes for line attachment at the head end. It is represented here by three specimens, two in other shells and one in pearl shell. They range in size from 45 to 69 mm, extending the upper end of Buck's *pa ala* size range to the point where it overlaps slightly with the early *pa 'atu* type, as might be expected.

In addition, there are three very small, thin lures with flat shanks, whose heads are wider than normal and whose tails are very narrow. They are thus of identical shape to the *pa seuseu.* Two have identically shaped double shanks lashed together (the ventral shank being of a golden coloured pearl shell) which is a feature not illustrated by Buck (1930: Fig. 291) or Demandt (1913: Pl. III). All three have an appropriate size of the usual form of unbarbed turtle shell point, with its proximally projecting base and two holes for lashing, common to all these lures. The shanks of these three examples are all in pearl shell. They provide the necessary documentation, which Buck lacked, to demonstrate the occurrence of a traditional form of *pa seuseu* in Samoa at the time of first regular European contact, although not in the variety of other shell materials described by Demandt (1913: 29) for the late nineteenth century examples.

The Wilkes Collection

The lures from the Wilkes expedition were recorded by a colleague, S. M. Mead, while visiting the National Museum of Natural History of the Smithsonian Institution. The shell materials were identified by Dr J. P. E. Morrison, of the Division of Molluscs at that Museum. The lures which can definitely be assigned to the Wilkes collection number 11; 3 others are almost certainly of this origin, although without numbers; and 4 other specimens, also unnumbered, probably stem from the same source. Origins are referred to below as certain, probable, and possible, respectively.

There are no examples of *pa 'atu* in the collection. All belong to the *pa ala* type, and range in size between 65 and 37 mm, the majority being between 50 and 60 mm. This can be contrasted with the size range of 65 to 105 mm given by Buck for *pa 'atu.* Only three examples belong to the variety of *pa ala* with the thick, rounded shank head; these are all in a shell which could not be identified, although it is not pearl shell. The remaining 11 examples (3 probably and 8 certainly, Wilkes collection) are of the flat variety with two dorso-ventral holes for line attachment at the head end. Among these 11 examples, 4 (including the 3 probables) are in *Cypraea mauritiana,* 2 in *C. testudinaria,* 2 in *Conus leopardus,* and 3 in pearl shell. This means that only 3 out of 11 (certain), or 3 out of 14 (certain and probable), or 3 out of the total of 18 hooks in this collection are in pearl shell. (The four lures of possible Wilkes origin are in an unidentified shell other than pearl shell.) This would seem to support the evidence from the Vanderford collection, that although hooks in pearl shell were present at the close of Samoan prehistory, they were not common, nor were they often of the "West Polynesian" type so well known in later collections.

In this respect it is worth noting that the later collections in the National Museum recorded by Mead include four *pa ala* collected in the mid to late nineteenth century; two of the thick, round-headed type (one probably made in *Vasum ceramicum* and the other in an unidentified shell), and two of the flat type (both made in pearl shell). The collections do not contain a pearl shell lure of the *pa 'atu* type earlier than the 1930s, and even that specimen can be contrasted with a *pa ala* in some other shell collected in the same decade.

One other item of interest first noted by Mead is the tying of the white feather hackle all along the line of the *pa ala* lures in the Wilkes collection, from the base of the hook point to the attachment of the line to the head of the shank. This contrasts with its position on the *pa 'atu* type, where it forms a tail piece.

Tongan Lures

Records of the Tongan material collected by Cook's expeditions have been assembled by Dodge (MS), who records 28 lures among the items collected in 1773-4 and 1777. Of these, 22 are the typical large Tongan lures with bone shank, backed by a plate of pearl shell. Only 3 of the 22 were possibly not collected on Cook's voyages, although they were almost certainly collected at an early date. Five of the remaining 6 among the 28 lures have triangular-sectioned pearl shell shanks and turtle shell points identical to the Samoan *pa 'atu,* or what I am here calling the West Polynesian form. The sixth, however, has a flat pearl shell lure shank "with two holes bored through at right angles to the usual one hole in the normal heavy shank" and is described by Dodge as unusual. It is also noted by Anell (1955: 167), along with another of the same type collected by Labillardière. Anell remarked, with respect to their Tongan origin, they "should have probably been designated 'wrongly labelled', if these two voyages really had visited also Samoa".

The results of the analysis of the Cook collection are supported by other collections of lures from Tonga studied by Adrienne Kaeppler (pers. comm.), in which 25 are of the large Tongan type and 7 of the West Polynesian type. Thus although prehistoric forms of Tongan lure are not attested by the archaeological record (partly because no sites of the late prehistoric period which would produce them have been dug), the types present at contact are reasonably certain.

These results establish several kinds of Tongan lure in the early ethnohistoric period. The most common is the unique rather large Tongan form, which has a bone shank with a pearl shell plate as backing. Less common but present is the typical West Polynesian pearl shell lure shank with a triangular-shaped head and bilateral hole for the line attachment. Least common is the thin flat shank, which, as demonstrated above, was characteristic of Samoa.

Discussion

The *pa 'atu* form of lure here called the West Polynesian type was described by Anell (1955: 158) as the Samoan type, after "the island group on which this variant occurs in its probably purest form" (1955: 156). It is known from Tonga, Samoa, the Ellice Islands, Tokelau, Pukapuka, Uvea and Futuna, all culturally and linguistically West Polynesian, although Pukapuka is geographically in East Polynesia. It is also known from Manihiki in East Polynesia, where 6 of 25 specimens studied by Anell belong to this type (Anell 1955: 159). Doubtless the form was borrowed or the hooks imported from Pukapuka. As this type of lure only achieved predominance in Samoa well into the historic period, it would seem more reasonable, in view of its wide West Polynesian distribution, to refer to it henceforth as the West Polynesian lure type. During the early ethnohistoric period in Tonga and Samoa, this form of lure with a pearl shell shank was present, but in neither island group was it the dominant type.

In Tonga, the most common type was a unique large variety with a bone shank and pearl shell plate inset along the back as a lure. As Anell remarks (1955: 169), typologically it belongs to the West Polynesian group. It may therefore be referred to as the Tongan variety of the West Polynesian lure type. Only a few examples are known from other island groups than Tonga, and are probably Tongan imports.

In contrast, the most common lure in Samoa was the *pa ala* type, only occasionally made in pearl shell. It is a small lure, made in two forms, one with bilateral holes in a thick, rounded shank head and the other with dorso-ventral holes at one end of a narrow elongated flat shank. The thick-headed form, which was usually made in shell other than pearl shell, is unique to Samoa and was probably a response to the restricted availability of pearl shell in its waters; the second form, with the flat shank, is also known from the Tokelaus, Tonga, and Pukapuka in West Polynesia (Anell 1955: 166-167; Green 1967: 88) and occurs in pearl shell shanks with a single dorso-ventral hole from early contexts in the Marquesas and New Zealand (Green 1967: 89). The East Polynesian evidence suggests some antiquity for the form in West Polynesia, even though this is not yet attested archaeologically. Among the *pa ala* forms, those with the heavy shank head and bilateral holes typologically belong to the West Polynesian group, and have the best claim to be called the Samoan variety of that type. The other *pa ala* variety with the flat lure shank and dorso-ventral holes should probably be considered a separate form related to the even smaller *pa seuseu* variety which it most closely resembles. This type, present at contact in Samoa, is also known ethnographically from the Tokelau group (with holes) and from Pukapuka (without holes) (Anell 1955: 166-167). In New Zealand, the single-holed variety has been called the Tairua type.

Despite a lack of supporting archaeological evidence, the lures of Tonga and Samoa may be compared on the basis of early ethnographic collections. This shows that both groups possessed the widespread West Polynesian type as one of several lures in use at the beginning of regular contact with Europeans. This type quickly dropped from use in Tonga, but became the predominant form in Samoa in the modern period.

European Artifacts

Portable objects of European origin were encountered on the surface and in the upper levels of a number of excavated sites. Some were solitary finds, some were associated with burials, and some with occupation assemblages. They can be ordered in an approximate temporal sequence which reflects the adoption of a European-based technology by Samoans over the last 140 years.

The earliest occupation assemblage is that from Sasoa'a. It contains a few pieces of metal, including a piece from a gun and a flint for firing it. Trade beads and clay pipes appropriate to the period, 1830-1860, are among the most numerous items recovered. Pieces of slate and hand-blown glass were also encountered.

A later assemblage was recorded at Lotofaga. This was from layer 2 of excavation C, where part of a ceramic bowl, a broken clay pipe stem, a thin strip of copper, a battered and broken glass marble, and an old piece of glass, probably debris from a house site, made a distinct contrast with the more recent European rubbish tipped over the cliff from the village above and encountered in excavation A (I, Report 15, pp. 250-251). Two small beads, fragments of china, a few pieces of slate and a slate pencil in layers 1 to 4 of excavation A indicate a continuity from the earlier assemblage.

The graves of plantation workers, probably Solomon Islanders, from Va-1 at Vailele, belong to the late nineteenth to early twentieth century. There are wire nails and hinges on the coffin in one grave, and a board with flat-headed nails in the other. Ceramic jugs for schnapps, wine bottles, a metal locket and a pin constitute one set of grave goods. The other set includes two clay pipes and many small, fine coloured beads which were once part of an armband (I, Report 7, p. 127).

An occupation assemblage of approximately the same age was recovered from layer A at the nearby mound of Va-4. Disturbances from that occupation resulted in the intrusion of a number of items into earlier layers, including the following: pieces of green bottle glass, crockery pieces from schnapps jugs, both square and wire nails, a metal lock washer, and a piece of field tile (I, Report 10, p. 170). The assemblage from the surface and layer A was more extensive, and may well result from the debris of a "mixed" household belonging to a European plantation employee rather than a Samoan household. Thus there is a wide range of china-ware potsherds from plates and saucers, the usual crockery sherds from schnapps jugs, and green and clear glass from wine or similar bottles. In addition, there is clear window glass, which when correlated with concrete piles for a structure, suggests a European building. This is supported by an abundance of wire nails, an iron hinge, and metal washers. Finally, there are a few pieces of clay pipe (I, Report 10, pp. 166-167).

The latest assemblage from a Samoan household, dating to the last decade, was found on the surface of Lam-1. It included an iron bar, an iron bolt, and the blade of a bush knife. As well, there was a broken iron pot, a handle for it, and a dessert spoon. A percussion cap of a 12 bore bullet and an elongated stone pounder, of the type now used to pound cocoa, were also found (Report 23, p. 70).

Of approximately the same age is the ceramic penguin found in a recent pit at Folasa (Report 22, p. 55).

This brief review of the European materials from a number of sites serves to reinforce the early contact interpretation of the assemblage from Sasoa'a by emphasising its contrast with the more recent assemblages dating to the 1880s and thereafter. Although the dwelling at Lam-1 still reflected the use of traditional Samoan architecture, the portable artifact assemblage associated with it revealed its modern age. At Sasoa'a the artifacts clearly belonged to an earlier period.

Conclusions

The portable artifacts recovered from intensive surface surveys and from excavations of varied extent in 22 sites in Samoa, permit several general conclusions to be drawn. The first among these is correlated with the observation made at the conclusion of Report 38, that it is the Samoan sequence which provides the best evidence of continuity in West Polynesia between the earlier Lapita assemblages and the indisputably Polynesian materials from the last 1000 years.

In Report 39 Davidson brings together for the first time the archaeological evidence which reveals the extent to which Fiji, Tonga, and Samoa share a common core of structural features, from house types to fortifications and roadways, and the ways in which each has elaborated certain elements in different directions. The difficulty there was to provide archaeological evidence of the time depth for the various structural forms in each island group. In the area of portable artifacts this proves to be less of a problem, and reasonably good cases for origins in the Lapita complex can be made for the adze kit, the Plain Ware pottery, and a number of other items found in Samoan contexts dating to the first to second century A.D. As a result, one focus of this review has been to demonstrate the continuity between Samoan portable artifacts of that date and earlier Lapita materials, and to indicate ways in which the Samoan items have diverged in a uniquely Polynesian direction.

A second focus has been to demonstrate, where possible, the continuity of these early Samoan assemblages with items encountered throughout the remainder of the Samoan sequence ending in the mid-nineteenth century A.D. This second focus, for which a slightly less satisfactory overall case is made because of the low numbers of items usually found in later contexts, is well supported by the analysis of the structural forms (Report 39, p. 243). It is also well supported by the analysis of adze types, the one category of artifact encountered in fair numbers throughout the sequence.

Another aspect of the portable artifact complex from Samoa which is examined is the degree to which the assemblages of the first to second century A.D. furnish not only a basis for later Samoan developments, but also an example of the type of ancestral Polynesian cultural complex available for transfer to East Polynesia. Here the difficulties are compounded by the fact that no earlier excavated assemblages from Samoa are available, except for dredged pottery, and that only the Marquesas group in East Polynesia provides material of sufficient age to be compared closely to the Samoan assemblages. Also, as I have shown in discussion of the problems provided by the recovery of Samoan pottery in secondary context, the implications are that in the Marquesas there must be an earlier assemblage in direct association with numerous sherds of locally manufactured pottery, as well as even earlier varieties of adzes and types of fishing gear. Such an assemblage from the Marquesas, together with an earlier one from Samoa, would help to fill a gap in our present understanding of the settlement of East Polynesia. Nevertheless, the early Samoan assemblage of portable artifacts provides a more adequate intermediate stage between Lapita and early East Polynesian materials than any other assemblages now available. It is for this reason I have nominated it as *an* (not *the*) example of the change which took place in moving from the continental islands of Melanesia to the truly oceanic islands of the Pacific basin, where a distinctive Polynesian form of culture evolved as part of an adaptive process influenced by entry into the biogeographically most impoverished part of the Pacific island world.

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XI. CONCLUSIONS

CONCLUSION

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The preface to volume I ended with an expression of our hope that as editors we had permitted those associated with us in the production of these two volumes to present their materials in a way which enabled each report to stand on its own. In adopting this approach, we expressed our intention so to integrate the reports that when the second volume was complete, an outline for a prehistory of Samoa could be said to have been written. This aim, we believe, has now been fulfilled. We are the first to recognise, however, that gaps exist which still require investigation.

To give some perspective on what has been accomplished, we begin by examining a summary of Samoan prehistory written before any of the investigations described in these volumes, with the exception of those by Golson (I, Report 1; Report 7a), were undertaken. Using only Golson's then newly available results, Suggs (1960: 90) concluded that "the early cultures of Samoa and Tonga were undoubtedly much the same, as the effects of isolation had not yet produced any local cultural idiosyncrasies to distinguish the two". In the early stages of our Samoan investigations this outcome was not realised (Davidson 1965; Green 1968), largely because, as subsequent events have shown, the early Lapita materials from Tonga were wrongly dated by as much as 1000 years, making the early divergence seem very great. Suggs (1960: 94) went on to postulate that divergence between Samoa and Tonga had become rather marked by A.D. 1000. Now, with a redating of the Tongan materials by Groube (1971), it appears that Suggs, in taking the early material from layer V of Va-1 at Vailele to represent a later stage of the period before divergence, was to some degree wrong about the point when the divergence began. However, the discovery of earlier Lapita material in Samoa as well as Tonga provides firm support for his general position on the central issue of early similarity.

On the basis of excavated Marquesan adzes and previous distribution studies, Suggs inferred that the earliest adzes of West Polynesia were probably quadrangular and truncated triangular in cross-section, that some had shoulders and steps chipped into the butts, and that triangular and cylindrical cross-section adzes were probably also used. This deduction now requires considerable modification. The same applies to his prediction that "we can be sure that the earliest inhabitants of Western Polynesia brought with them both the one-piece bait hook (made of mother-of-pearl, tortoise shell or wood) and the composite trolling hook formed of a shell shank to which a bone, shell, or tortoise-shell point was lashed" (Suggs 1960: 91). His anticipation of a large variety of early shell scrapers and knives has proved generally correct for Tonga, and although it has not been verified for Samoa, it could well be correct, because it does hold for the late end of the Samoan sequence. His prediction of the recovery in early West Polynesian contexts of a distinctive form of shell food peeler, similar to those he found at the early end of the Marquesan sequence made from *Tonna* shell, has been substantiated. Two were found in Lapita contexts in Tonga (Poulsen 1967: 237) and one in New Caledonia (Golson 1962: 170). Two others in *Turbo* shell were recovered from later contexts in Samoa, supplementing a lone ethnological specimen. Thus, in general, the conclusion reached by Suggs (1960: 93) that the early artifacts from West Polynesia would demonstrate "the relationships of this culture to Melanesia as well as to Malayo-Polynesian cultures farther west" has been supported, although the specific relationship to the distinctive Lapita materials which was being defined at that time by Golson (1959; 1962) was not fully recognised.

Another conclusion, that the subsistence pattern was based on root and tree crop horticulture, fishing, and domesticated animals, although challenged by Groube (1971: 312) is supported by our Samoan evidence. We would, of course, take issue with the statement by Suggs (1960: 94) that the favoured root and tree crops were initially the breadfruit and sweet potato followed by a later shift to an emphasis on taro and other root crops. We would also reject the view that the sweet potato was introduced into Samoa in the first century A.D. (O'Brien 1972: 361) in favour of the construction advanced by Yen (1971a: 338-340; 1971b: 12) for its introduction in East Polynesia around the third century A.D. or shortly thereafter. In our opinion, taro, breadfruit, the banana, and perhaps the yam, along with the coconut, but not the sweet potato, were part of the root and tree crop horticultural complex from the beginning of the Samoan sequence.

It is worth noting in this respect that although all our Samoan evidence is indirect, Groube himself accepts from the coastal and inland location of sites in Samoa 2000 years ago and the lack of evidence for concentrated shell midden dumping at any point in the Samoan sequence, that such a subsistence pattern is likely. The discovery of Lapita material in Samoa, therefore, puts further strain on Groube's hypothesis that the bearers of this cultural complex were "Oceanic strandloopers" with a restricted maritime/lagoonal economy lacking some of the basic Oceanic root and tree crops and domestic animals like the pig. It has been argued elsewhere that the concentrated shell-midden dumping in Tonga did not cease at the end of the Lapita part of the sequence, but continued throughout (Green 1972b). In contrast, it would appear that for ecological reasons, concentrated shell-midden dumping was never a feature of the Samoan economy (see below).

The rather speculative reconstruction which Suggs (1960: 93) offered of settlement patterns at this early period is still subject to archaeological confirmation or correction. Certainly, there is no reason to alter his point that no large monuments of stone or earth were constructed at this time. On the other hand, his suggestion that habitation sites consisted of small scattered clusters of simple houses of poles and thatch, each cluster composed of several houses not arranged in a particular order and lacking any common orientation, is largely guesswork. On the evidence of layer 5 at Sa-3, early houses are rather more similar to those at the end of the sequence than Suggs believed, while the recovery of reliable settlement pattern data for this period has not proved as easy as he imagined. The picture he drew, however, would be one possible inference from the data we have, granted that it could also apply to a much later period in Samoan prehistory than his reconstruction would allow.

In short, with a limited amount of newly excavated early material from Samoa and the Marquesas, Suggs was able to piece together a fairly reasonable, although necessarily general, reconstruction of early West Polynesian prehistory. What our own archaeological endeavours have provided is a more precise picture backed by much more detailed archaeological data. Where Suggs went far wide of the mark was when he tried to infer later changes in the Samoan sequence in the absence of any supporting archaeological data, as witnessed in the following quotation (Suggs 1960: 94).

> The Samoan culture of A.D. 1000 and later was quite different from the culture of the earliest settlers in those islands. The house forms had changed and a rectangular form of domicile was developed, raised on a stone-faced earthen platform (*paepae*). These houses were no longer scattered in small clusters but were organised into neatly planned villages with intersecting sunken paths or roads, located near the sea. The villages were generally fortified with walls of stone or earth and ditches. The subsistence pattern of the Samoans may have also been slowly shifting to an emphasis on taro and other root crops, with a trend away from sweet potatoes and breadfruit. The one-piece shell hooks of the early culture had begun to disappear, and the composite hooks for bonito or tuna were developed in elaborate form and exaggerated in size. The absence of the one-piece "bait" hooks was undoubtedly compensated for partially by development of net techniques.

There is in this brief paragraph a great deal of misinformation and no statements which the data presented in these two volumes would support in full. It emphasises, if emphasis is still needed, how crucial archaeological data are to the attempt to write the prehistory of any island group in Polynesia. Thus these two volumes provide the first real outline of the last 2000 years of Samoan prehistory.

The objectives around which our Samoan research programme was structured were outlined in the introduction to these volumes. It is our view that we have been reasonably successful in realising most of our aims. Thus we found and excavated as fully as time permitted another pottery-bearing site, the earliest levels of which were earlier than any encountered, and we have reported on another site much earlier than any of these, although its location has so far precluded excavation. We have excavated extensively in sites of a locality — the upper Falefa Valley — where we have developed a chronological sequence that can be compared to that of Vailele. We have sufficiently recorded the distribution of stone and earthen mounds and excavated in enough of them to make possible some interpretation of their probable functions and general chronological position in the Samoan sequence. Finally, for the later part of the Samoan sequence, we have documented some of the continuities and changes in Samoan settlement pattern, including shifts in site distribution, changes in structural categories, and the development of new settlement types at the end of the sequence. We have also made a beginning in tracing the origin and history of fortification in Samoa.

Only the aim of sampling sufficient beach middens to define the nature of prehistoric fishing gear and acquiring at the same time sufficient data on the midden aspect of Samoan economy has been somewhat frustrated. Even here something positive was learned, for we have been able to show from early ethnographic collections that our preconceptions of the type of fishing lures and the materials they were made of were incorrect. We have also learned that in contrast to Tonga or New Zealand, the formation of concentrated shell midden was not a Samoan practice, at least in the last 1500 years represented by present day coastal deposits. It appears that in moving from the continental islands of Melanesia with their extensive inter-tidal zones across the andesite line into the high islands and atolls of Polynesia, one of the effects is a marked decrease in numerous taxa including molluscan species (Balgooy 1971: 148; Thorne 1963: 329) which could be taken in sufficient numbers to form such dumps. Realising this, makes our failure to find such deposits more comprehensible. In Samoa, the debris of shellfishing, which always formed a minor component of the diet, resulted in dispersed beach middens, if the shells were not returned to the sea itself.

Various new problems and prospects have, of course, been identified during the course of the programme. One of the most obvious, which is currently the subject of investigation by Jennings is that of seeking sites which will yield data on the part of the Samoan sequence dating to the first millenium B.C. The discovery and excavation of additional sites with pottery and other early artifact assemblages seems a desirable goal. It is required both to test some of the hypotheses advanced in the concluding papers of this volume, particularly where these now depend on Lapita material from Tonga rather than Samoa, and to throw further light on the extent to which Samoa itself was a homeland for the development of Polynesian culture.

Investigations of the first third of Samoan prehistory will have to be carried out as part of a more general strategy, now that we are aware of probable changes in the Samoan coastline and its coastal deposits as the result of uplift during the first millenium A.D. They may also have to be conducted in the light of the probability that between 3000 and 2200 years ago, sea levels may have changed from a high of approximately 1 m above present mean sea level to a low of about 2 m below, before returning to near present-day levels around 1800 years ago (Butzer 1972: 225).

To date, only four sites with pottery-bearing occupation layers belonging to the first 1000 years of the sequence have been found in Samoa. Two, one at Va-1 and the other in the Mulifanua lagoon, have been discovered by archaeologists investigating sites affected by large-scale mechanically-made disturbances. One at Va-4 was found by excavations designed to test whether conditions under one mound were repeated under others in the vicinity. The last, at Sa-3, was the result of a strategy which worked well in the Falefa Valley and would probably be equally successful if applied to suitable coastal areas. If, after an intensive survey of a locality, a number of different sites are selected from among those assigned to the residential category, on the assumption that each will yield a stratified sequence of earlier occupations, it follows that one site will probably reveal an occupation layer earlier than all others, on which to base the beginnings of a local cultural sequence. If attention is confined to those coastal areas where the potential for early sites is greatest on locational and geological grounds, the prospects of finding early sites by excavation are fairly high.

Relationships between Samoa and Tonga throughout their prehistory pose an often mentioned problem over which the available archaeological evidence still offers too little control. Unlike Suggs (1960: 99), who found himself with insufficient excavation evidence to assess archaeologically the traditional view that Tongans occupied Samoa in the thirteenth century A.D., we are now able to evaluate the effect of this "influence" and dismiss any suggestions of profound archaeological consequences reflecting such an event. Yet we are not able to assess much more fully than Davidson (1965: 59-63, 67-69) did after the first stage of our programme, the age and direction of the influences that have passed between these two island groups throughout their prehistory. In part, this is because the last 2000 years of Tongan prehistory are so poorly known. What we can see is that the influences have probably been continual from the time of the earliest Lapita settlements on both island groups to the periods of traditionally remembered Tongan raids on Samoa some 70 years before contact and the historically documented continuation of interchanges in the early 1800s, when both groups were under increasing European influence.

The relationship between Tonga and Samoa has always involved the question of which, if either was the original Polynesian homeland or Hawaiki. Linguistically, either, or some third island (Green 1966: 13) could have been, although recent linguistic arguments have favoured Tonga (Pawley and Green 1971: 26-28). Archaeological claims for the cultural primacy of Tonga in this role have been offered by Groube (1971: 313). Counter arguments raising the possibility of cultural divergence following the linguistic differentiation, rather than parallel change in language and culture, were presented by Green (1972b: 84), who nominated Samoa as a more suitable place than Tonga for those developments, likely to be revealed by the archaeological record, which led to the formation of a distinctive ancestral Polynesian cultural complex. Now that the possibility of Samoa as a homeland has been strengthened by the recent finds of Lapita pottery in Samoa itself, further consideration and perhaps reformulation of Tonga's position as an initial homeland in which major linguistic or cultural differentiation in the Polynesian direction took place may be required. Moreover, the possibility of a third island or island group must be given more serious consideration than it has in the past. It seems unlikely, if most islands of the Tongan and Samoan groups were reached and settled by people using Lapita pottery, that other islands of West Polynesia (Futuna, Uvea, Niue, Niuafo'ou) had not also been discovered and settled at the same time.

When we began the Samoan programme in 1964, methods for collecting archaeological evidence of former agricultural practices in Polynesia were just beginning to be developed. The issue was already a major one in New Zealand, while in the 'Opunohu Valley of Mo'orea (Green *et al.* 1967: 175) we had recorded all such features and used some of them in interpretations of the social organisation reflected by the settlement pattern data. For most of tropical Polynesia, however, it was confidently assumed, usually on the basis of very little evidence, that the subsistence system of a group in the past was very much like the traditional one recorded for the modern period. The statement of Suggs for West Polynesia, noted above, provides an excellent example of this viewpoint. Since 1967 attempts to map, excavate, and date evidence of former agricultural systems have proliferated, especially in Hawaii and New Zealand. Much success has attended some of these endeavours, especially where investigations have focused on intensified systems involving large-scale structural alterations of the landscape.

Far more difficulties in obtaining satisfactory evidence have been experienced, however, when only non-intensive systems of dry land swidden have been involved (Yen *et al.* 1972: 91 and pers. comm.). Among the various features which are used as indices of agricultural intensification, few or none of the more specialised practices listed by Brookfield and Hart (1971: 100-116) for 44 Melanesian societies have been recorded in Samoa. Rather, Samoan agriculture would rank with that of a large number of the Melanesian societies sampled, as a low-intensity system of class 1A, mainly of the swidden type (1971: 105-106). Our surveys and excavations have revealed only minimal evidence of more intensive former practices, in contrast to repeated evidence of buried soils resulting from agriculture of the swidden type. Thus archaeological evidence is consistent with the modern picture.

One feature with an age of at least 2000 years in Samoa, is the small underground storage pit, probably for fermented breadfruit paste or other food products. If correctly interpreted, this semi-anaerobic fermentation of breadfruit is a West Polynesian innovation of some antiquity (Report 39, p. 237; Yen 1971b: 8-10). It could be indicative of an intensification of the agricultural system by means of storage. Other possibilities, none of great extent in Samoa, are drainage ditches in a few localities of the upper Falefa Valley and inland Vailele, and protective walls in inland situations exposed to marauding pigs.

Our experience in Samoa has shown that probable evidence of former agricultural practices is often preserved at the base of terraces and earthen mounds and residential platforms. It could now be investigated more thoroughly than we did between 1964 and 1967.

The question of Samoan population size at the end of the eighteenth and beginning of the nineteenth century is a source of conflict. Some writers, such as McArthur (1968: 104, 115) and Freeman (1964: 565, fn. 3; pers. comm.) believe that the popupation of Western Samoa was never more than the 37,000 to 38,000 people indicated by the missionary censuses of the late 1840s and early 1850s. Others, such as Pirie (1964: 43-44, 63-64; 1968; 1972: 196-202), believe that population in the early nineteenth century was declining, and that before this period population was perhaps twice the generally accepted estimate of about 38,000 for the mid-1840s. The issue has been examined from an archaeological perspective by Davidson (1969a: 72-77). That study and the more detailed evidence presented in these two volumes certainly show that the distribution of population between A.D. 1820 and 1840 changed from one less nucleated and more widespread, both on the coast and inland, to one in more tightly nucleated villages almost entirely on the coast, as documented by Watters (1958). Davidson therefore examines the hypothesis of correlating this change with a reduction in population size and concludes that the prospect of a larger population requires serious consideration, given the extent of archaeological evidence implying much greater use of the inland parts of Samoa than obtained either in the 1840s or for a number of decades thereafter. Green, having made a study of probable population size on Tongatapu (1973b) on the basis of former agricultural land use requirements, has followed up the arguments on population size and land use in Samoa presented by Pirie (1972: 199), by applying the methods used for Tonga to the Samoan situation. It appears very unlikely either on the basis of modern village figures of 1.5 acres (.61 ha) of cropland per person in Upolu and 1.8 (.73 ha) in Savai'i (Farrell and Ward 1962: 186), or reconstructured figures of 1.5 ± .2 acres (.71 ± .08 ha) for Upolu and 1.7 ± .2 acres (.69 ± .08 ha) for the time of contact (Green MS), that 38,000 Samoans would ever have required the use of more than 80,000 acres (32,375 ha) of arable land to supply completely their requirements under a low-intensity subsistence system of swidden agriculture, and no more than 100,000 acres (40,469 ha) of occupied land in total. In an island group with 699,200 acres (282,956 ha) of land, of which more than 200,000 acres (80,937 ha) are able to be cultivated, only 155,960 acres (62,151 ha) were occupied by a population of 97,237 in the mid-1950s (Farrell and Ward 1962: 186; Cumberland 1962: 318-321). It is evident, therefore, that Western Samoans in the 1840s needed to use, and were occupying only the coastal part of their islands in much the way that the historical records attest. Thus Watters (1958: 7,) concluded from these records that only four percent of the population (and fourteen percent of the settlements) were located inland; the remaining 96 percent was on or within 1 mile (1.6 km) of the coast. Whether Samoans lived in dispersed settlements, as in the past, or were concentrated in coastal villages, as in the 1840s, the one obvious explanation for the extent to which the landscape in Western Samoa has in fact been occupied, much of it continuously, for agriculture and residence over a long period of time, is a much larger population. It seems that only a population twice the size of that in the 1840s, or one with a radically different subsistence-settlement pattern basis, would require the amount of arable land which archaeology indicates was once in use. The possibility of such a population size thus continues to deserve close examination and further investigation, however unacceptable it may seem to those concerned with traditional Samoan social organisation.

Besides the various prospects and problems raised above, one other concern has motivated us in the production of these two volumes. This is to report in full the results of field work. It is sometimes said that final reports of major research programmes in archaeology should appear not more than seven or eight years after the excavations were completed. The programme which included the Samoan work began in 1962, the Western Samoan part of it occupying the period from December 1963 to March 1967 (I, Introduction). All but the last of the excavations in Western Samoa were published in 1969. The remaining summaries of surveys in the 1965-66 period and the excavations of 1966-67 are presented in this volume. The Samoan part of the Polynesian Culture History project is now completed.

The overall programme of which the Samoan work was a part is, however, far from complete. It involved foundation support of more than one quarter of a million dollars, of which approximately one-ninth went toward the research included in these two volumes. In the interim, numerous preliminary reports, syntheses, and theoretical papers on all aspects of the overall programme have appeared. There are, as well, final reports on some parts of the archaeological work in Fiji (Palmer *et al.* 1968, 1971; Birks 1973), Tonga (Davidson 1969b; Pietrusewsky 1969), and the Marquesas (Kellum-Ottino 1971; Bellwood 1972). Yet for the Society Islands, the Cooks, American Samoa and Pitcairn, all originally part of this programme, there are no final reports, while for the Marquesas, Tonga and Fiji, a great deal of work in progress remains unpublished.

By the integration of the more obvious results of the work done under this programme since 1962 into the existing picture of Polynesian prehistory, some notable advances have been made in the last decade towards defining in general outline the culture history of tropical Polynesia. In the meanwhile, other endeavours have greatly enhanced our knowledge of Hawaii and New Zealand, where a large cadre of resident archaeologists are permanently based in various institutions. Research in tropical Polynesia in the next decade is unlikely to enjoy the same level of funding as it did in the last. If we wish those who follow to be able to build on work already completed, and to achieve maximum results for their time and money, then every effort should be made to make available the basic data, interpreted whenever possible in the context of a final report. The release of unpublished field notes and basic data is rightly a jealously guarded prerogative; the alternative of writing a final report is a time-consuming and often not particularly inspiring task. Still, as many have discovered, a wealth of previously unexploited information usually results which makes the whole process worthwhile. It is our opinion that advances in Polynesian culture history in the next decade can be as great as in the past, even if the new field research is on a much reduced scale, provided that the materials we already have continue to be analysed and published in full.

In the meanwhile, we believe that Western Samoa, which in 1957 had little in the way of an archaeological record from which to write its prehistory, now possesses a better foundation than many other island groups which have been the subject of more extensive investigation for a much longer period of time. If so, then these two volumes should serve those who follow as a base on which to build future programmes with other orientations and objectives.

Ua sili mea le seuga

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PLATES

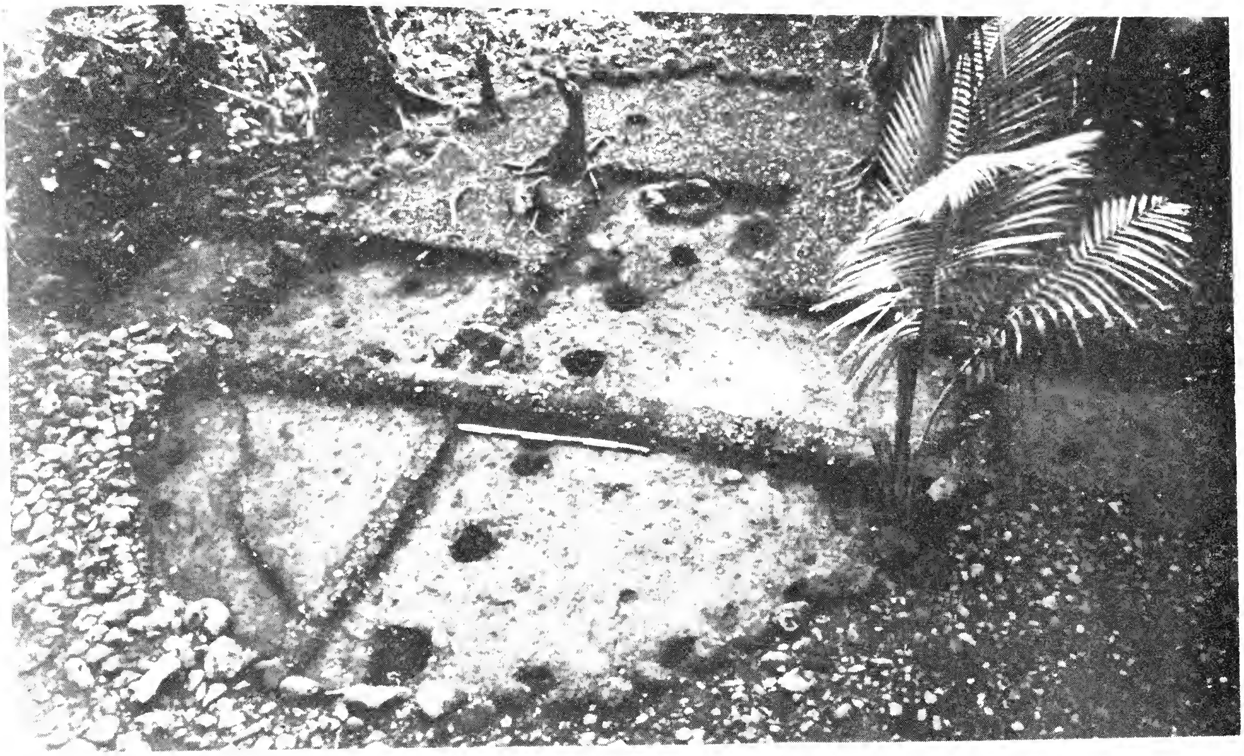

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PLATE 1. SU-Sa-1, showing outline of most recent house, and earlier postholes.

PLATE 2. SU-Sa-2, showing pavement, house outline, and earlier sets of postholes.

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PLATE 3. SU-Fo-1, house area 1, during excavation.

PLATE 4. SU-Fo-1, house area 2.

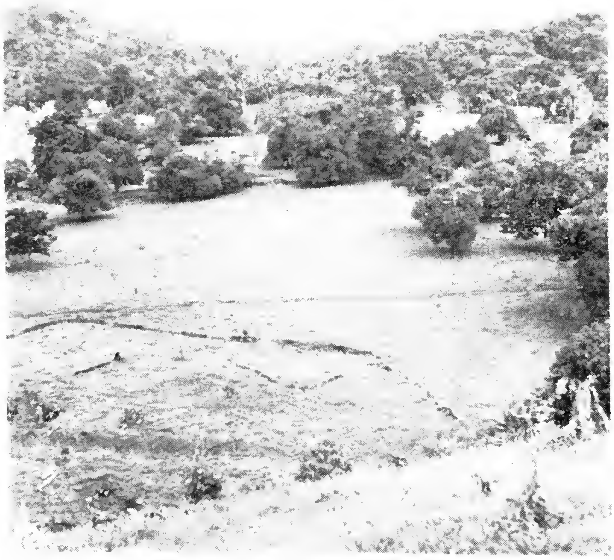

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PLATE 5. General view of part of Leuluasi. SU-Le-16 left foreground, SU-Le-11 centre right.

PLATE 6. General view of Leuluasi, looking towards Folasa-a-lalo.

PLATE 7. SU-Le-12 during excavation.

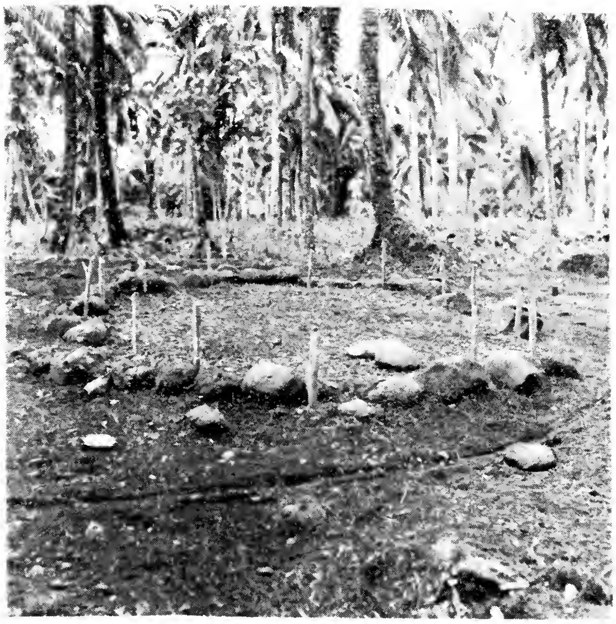

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PLATE 8. Outline of recent house on surface of mound SU-Lam-1. Postholes indicated by stakes.

PLATE 9. SU-Le-3. West wall of square A-6, showing deep posthole which may be associated with inner round house.

PLATE 10. View of SU-Te-1, looking north towards Falefa.

PLATE 11. Small house at SU-Te-5 on completion of excavation.

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PLATE 12. General view of SU-Sa-3 looking east, in relation to completed excavation of squares H-5 and H-I-4, 3 and 2.

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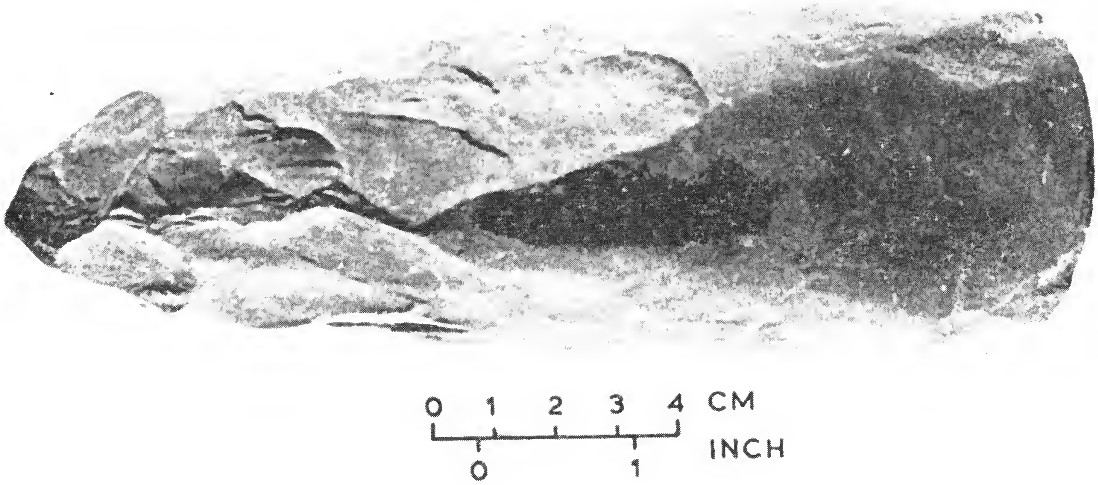

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PLATE 13. Postholes of round-ended house at base of excavations at SU-Sa-3, and stratigraphic section along west face of squares G-H-I-6.

PLATE 14. Irregular edge of rising bank of undisturbed natural clay found along south margin of site at base of layer 4, SU-Sa-3; and stratigraphic section of east face of square E-5.

PLATE 15. A 17/197, Type Vb adze with incipient tang, from layer 5, SU-Sa-3.

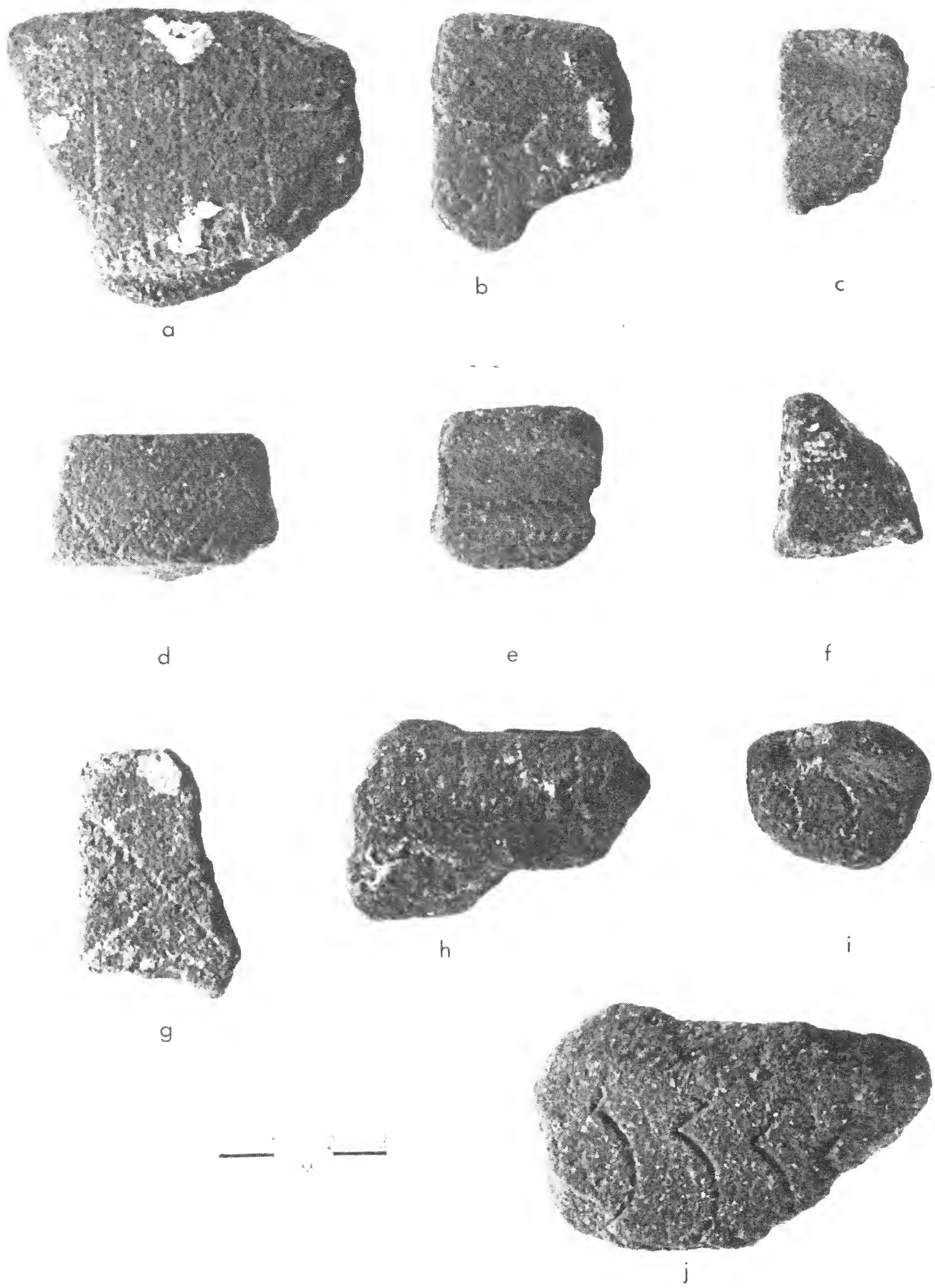

PLATE 16. Sherds from the Mulifanua lagoon, showing typical Lapita decorations. a,d, e, g, l rim sherds; f, m sherds with flange; b, c, n, p sherds with pronounced shoulder angle.

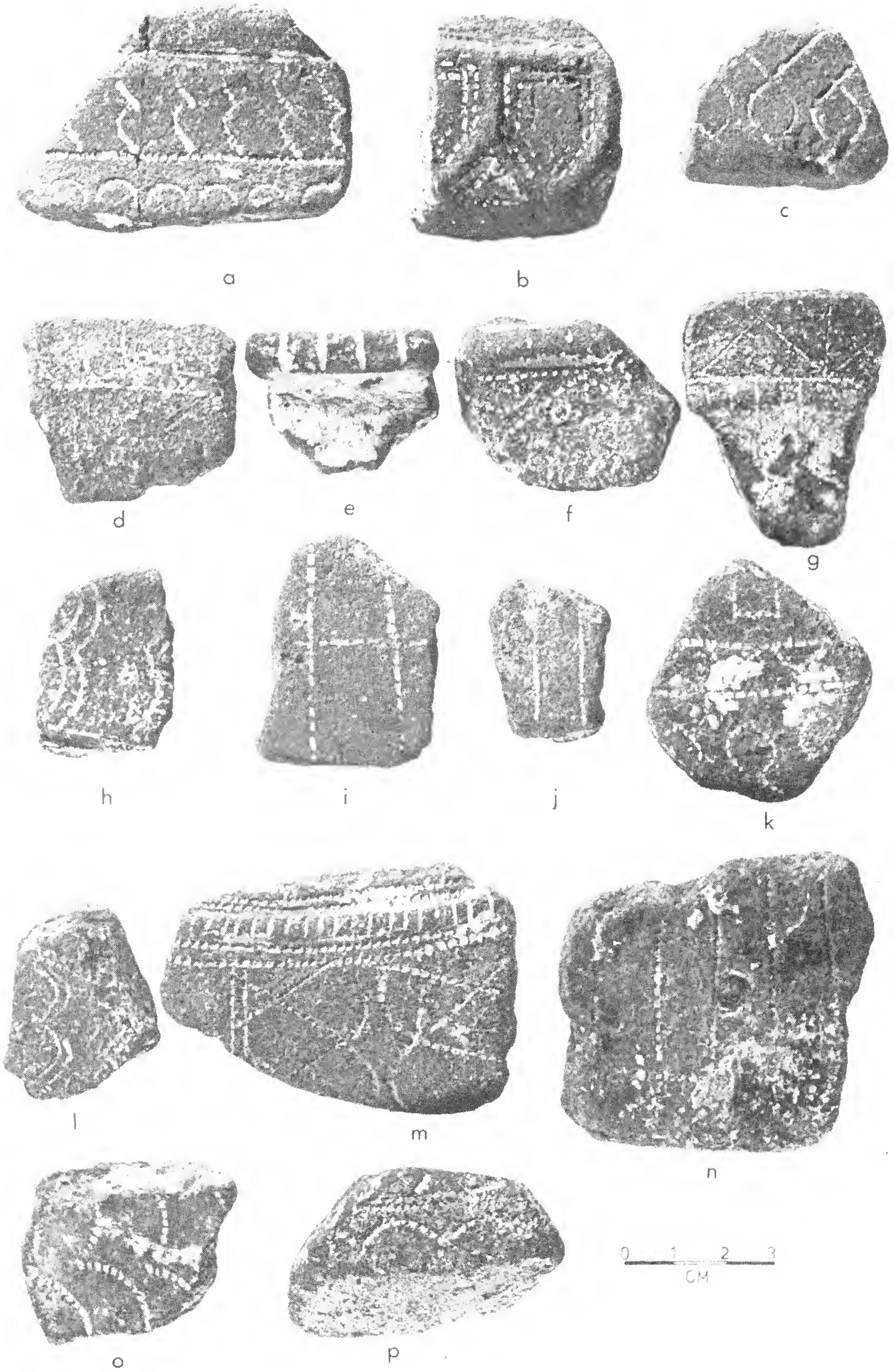

PLATE 17. Sherds from the Mulifanua lagoon, showing Lapita decorations. a-e rim sherds; h sherd with pronounced shoulder angle.

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